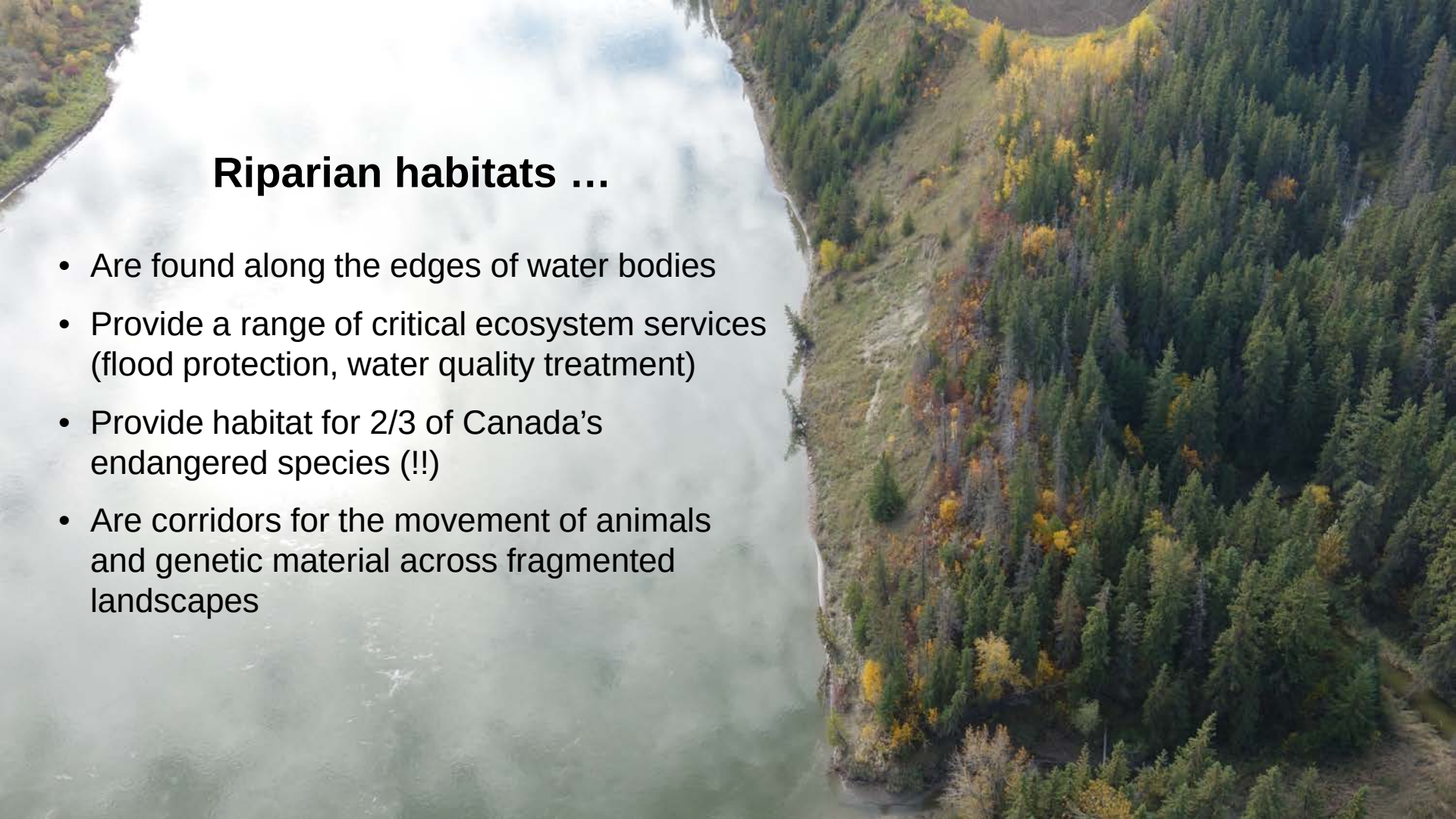
Assessing Riparian Intactness in the North Saskatchewan River Watershed using a GIS-based Approach

Watershed Wednesday Series

April 28, 2021

Shari Clare, PhD, PBiol

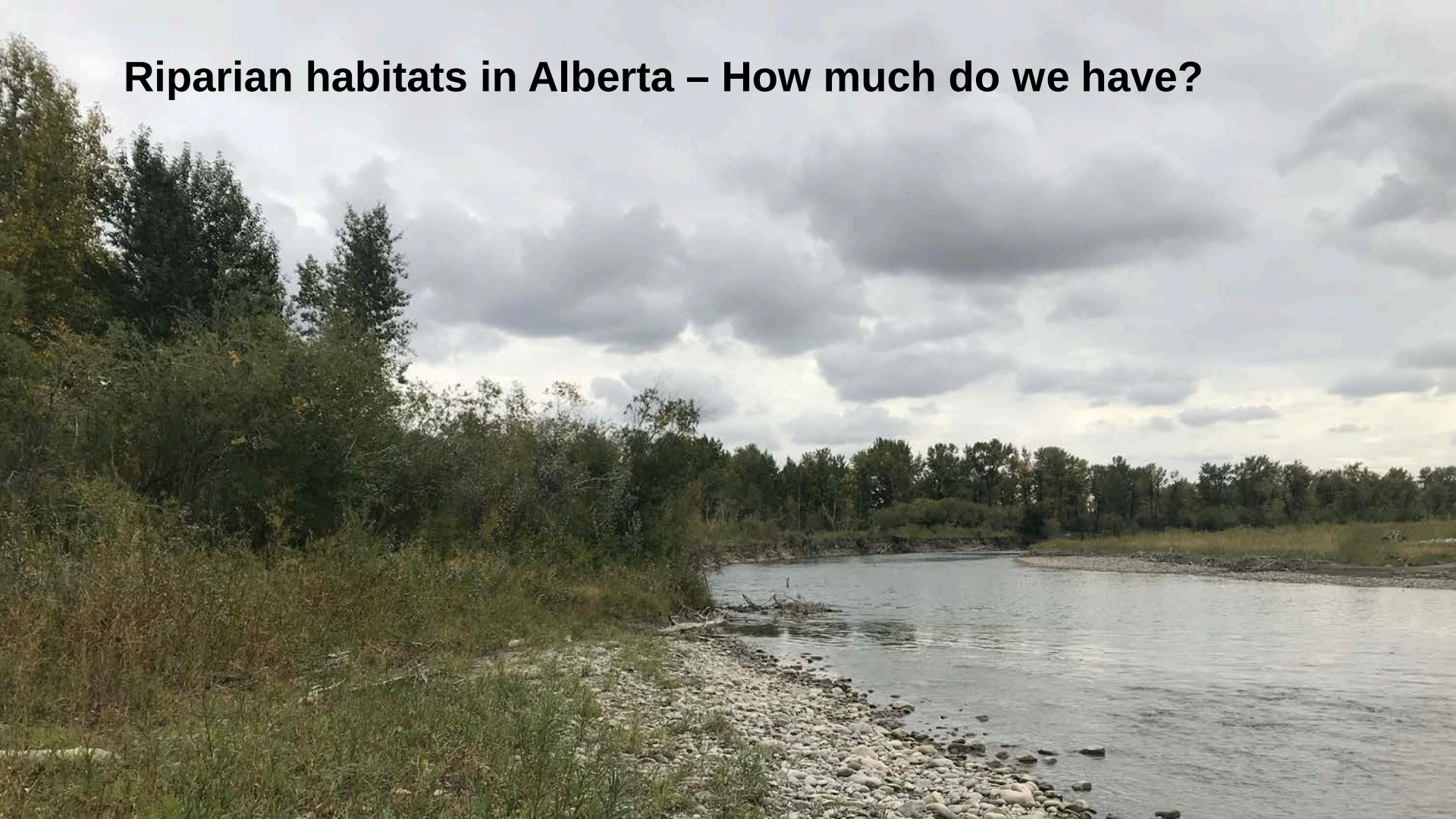
FIERA Biological Consulting



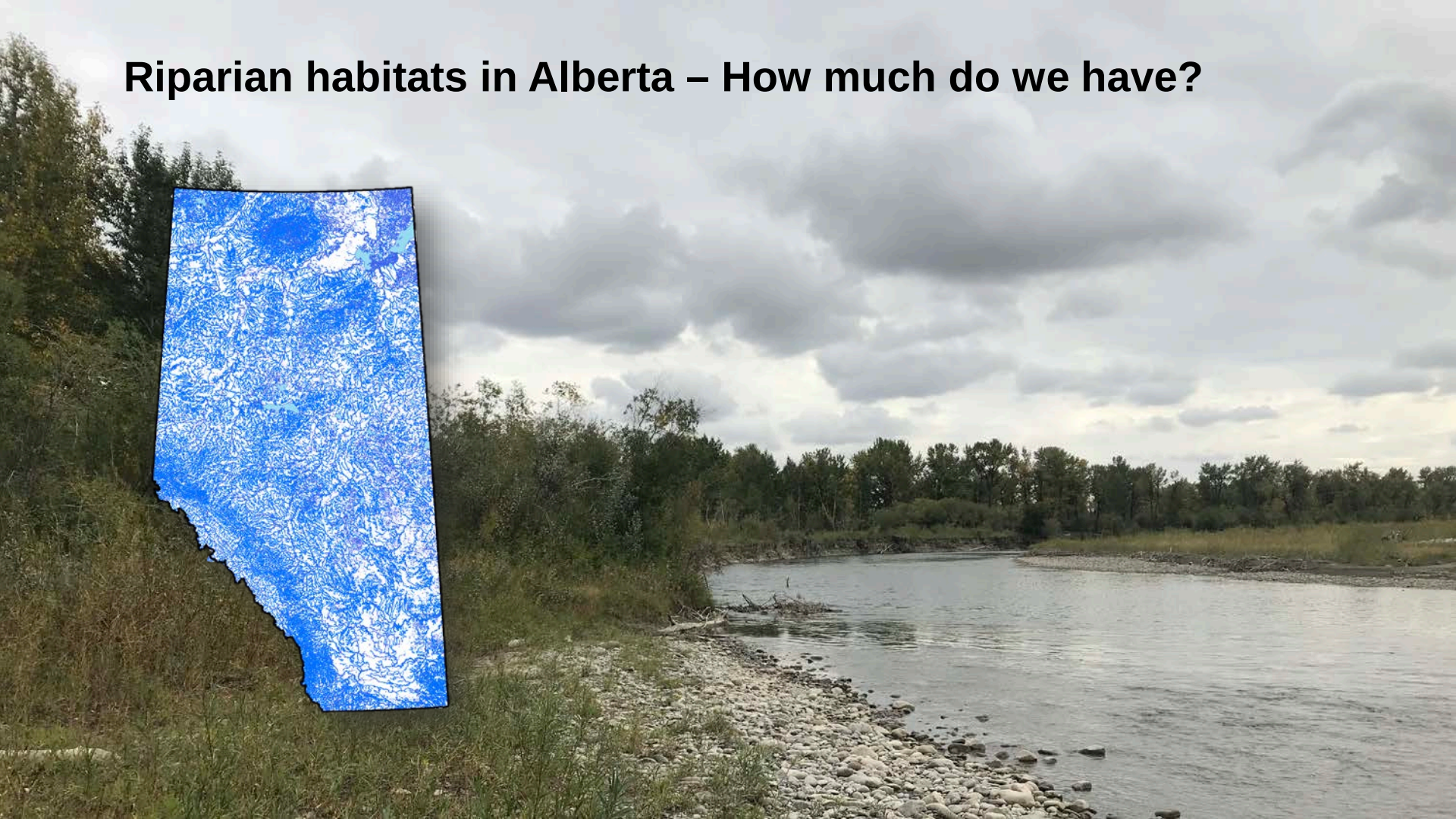
Riparian habitats …

- Are found along the edges of water bodies
- Provide a range of critical ecosystem services (flood protection, water quality treatment)
- Provide habitat for 2/3 of Canada’s endangered species (!!)
- Are corridors for the movement of animals and genetic material across fragmented landscapes

Riparian habitats in Alberta – How much do we have?



Riparian habitats in Alberta – How much do we have?



Riparian habitats in Alberta – How much do we have?

Our best guess (based on provincial hydrography data):

- Lake shoreline: ~236,500 km
- Stream shoreline (L+R banks): ~1.2 million km

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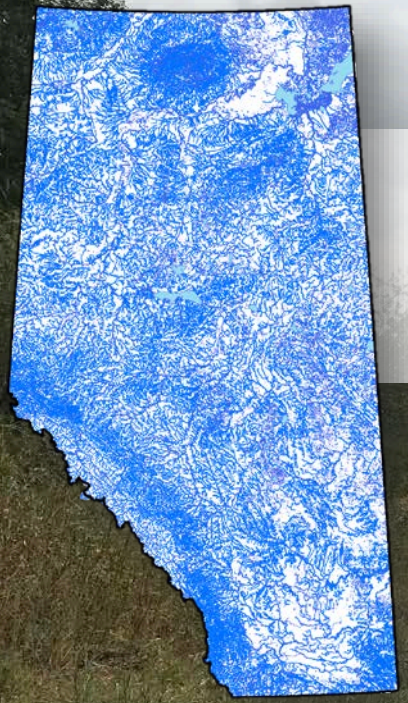

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Riparian habitats in Alberta – How much do we have?

Methods for assessing riparian condition in Alberta have included:

- Field based assessments
- Aerial videography assessment

@CowsandFish Twitter

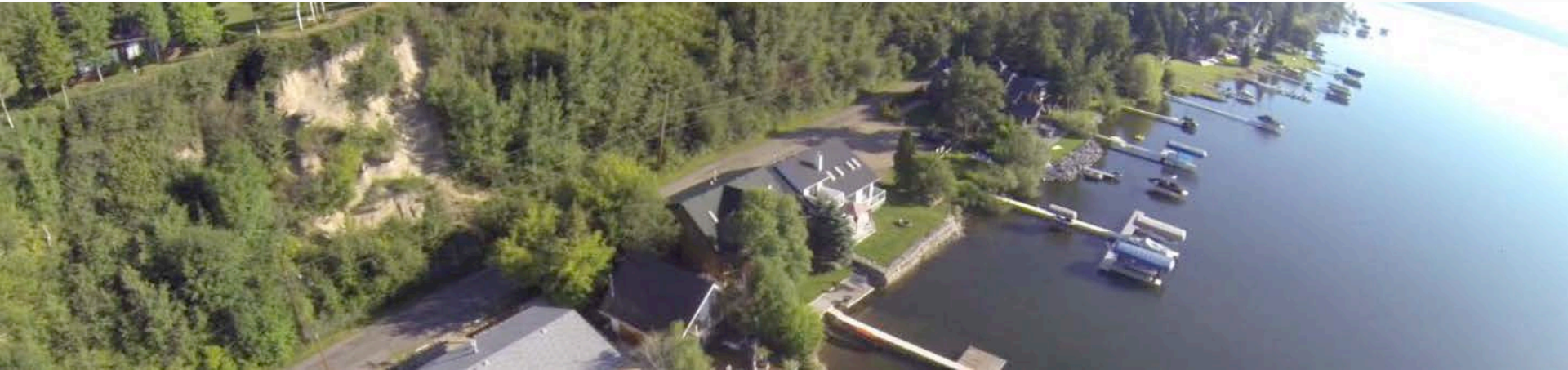
North Saskatchewan Watershed Council

Creating a GIS Method for Assessing Riparian Areas

- In the fall of 2016, the NSWA approached Fiera to complete a videography assessment on ~1,700 km of shoreline in the Modeste watershed
    - We used this opportunity to develop and test a GIS assessment method
    - Existing videography methods were used as the basis for the development of the GIS method

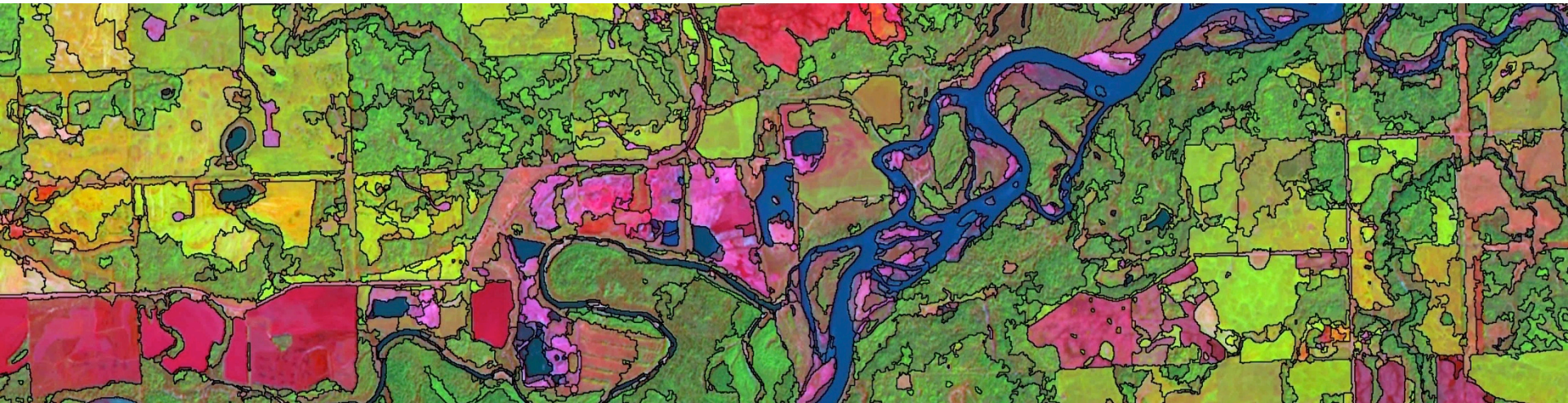
Quantifying Riparian Intactness Using GIS

- “Intactness’” is the measure of riparian condition for the GIS approach
- Completely intact habitats are free from human disturbance
- Loss of intactness occurs from a combination of habitat loss, fragmentation, and degradation arising from human activities



Quantifying Riparian Intactness Using GIS

- Intactness is calculated using land cover data
- A land cover is typically created using satellite imagery in combination with other data (e.g., terrain information)
- Vegetation and other surfaces (e.g., bare ground, buildings) are classified using machine learning techniques



Unit of Analysis: Riparian Management Area (RMA)

- RMA length = determined by major changes in the proportion of natural vegetation cover (variable length)
- RMA width = 50 m extending from the left & right banks (fixed)

Intactness Metrics

- Intactness within each RMA is assessed using land cover data by quantifying and combining three metrics:
    1. Percent cover of all natural vegetation cover classes
    2. Percent cover of land cover classes that are composed of woody vegetation (e.g., trees and shrubs)
    3. Percent cover of all land cover classes associated with human activity (e.g., agriculture, urban, roads, etc.)

Intactness Categories & Scores

High
(75-100)

Moderate
(50-75)

Low
(25-50)

Very Low
(0-25)

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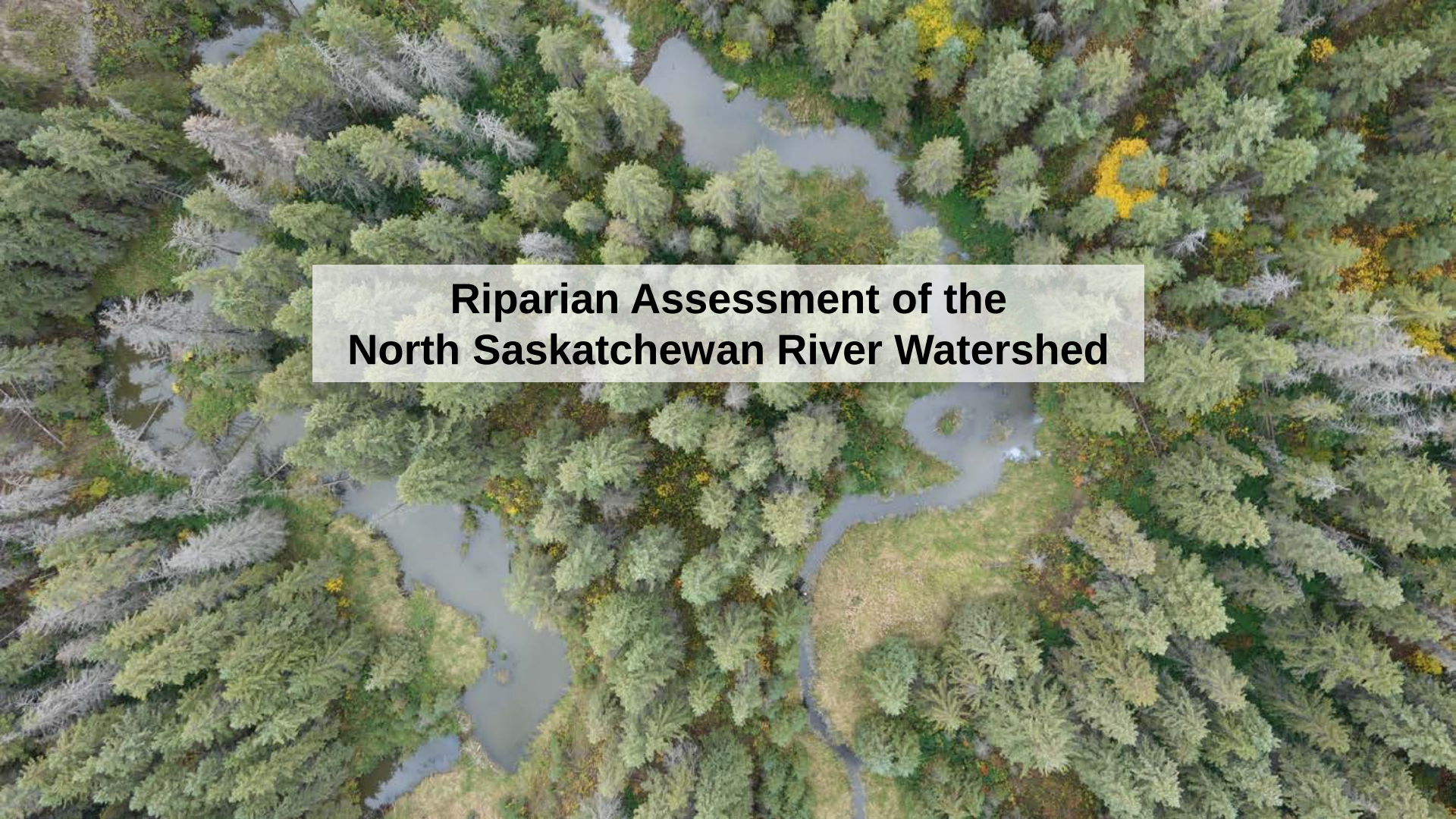
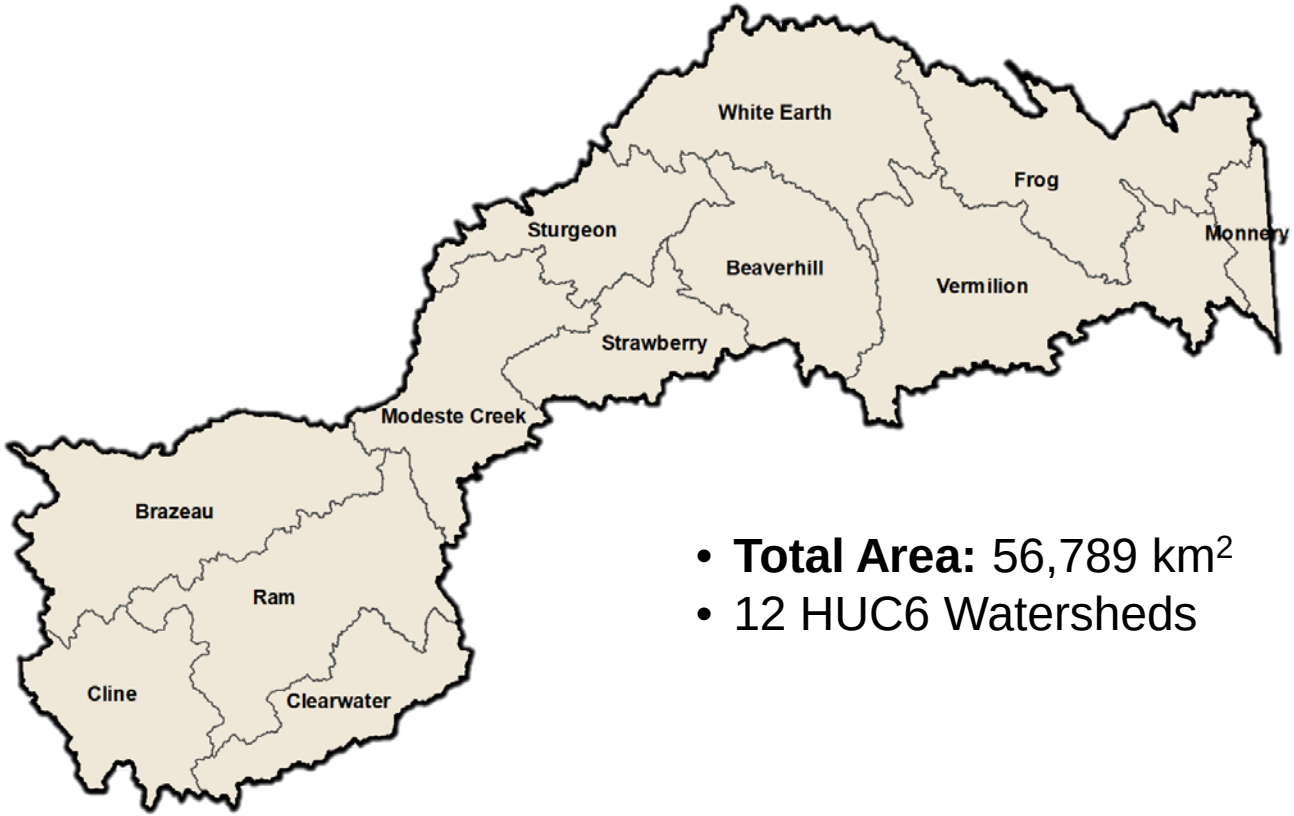
Validation:

- Field: 77% (161 sites samples)
- Videography: 76% (repeatability b/t observers = 72%)



Riparian Assessment of the North Saskatchewan River Watershed

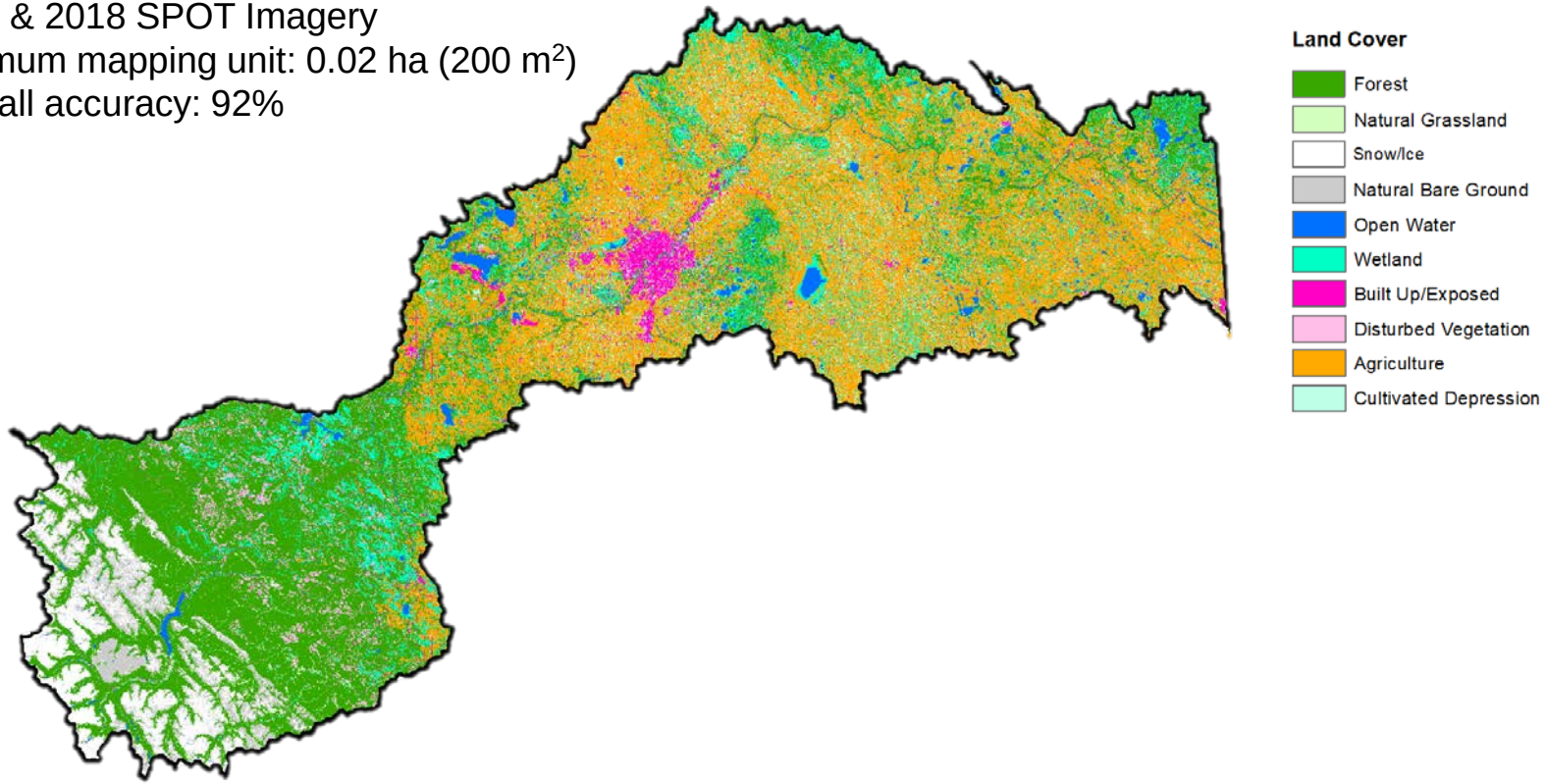
Study Area: NSR Watershed



- **Total Area:** 56,789 km^2
- 12 HUC6 Watersheds

Land Cover: NSR

- 2017 & 2018 SPOT Imagery
- Minimum mapping unit: 0.02 ha (200 m^2)
- Overall accuracy: 92%



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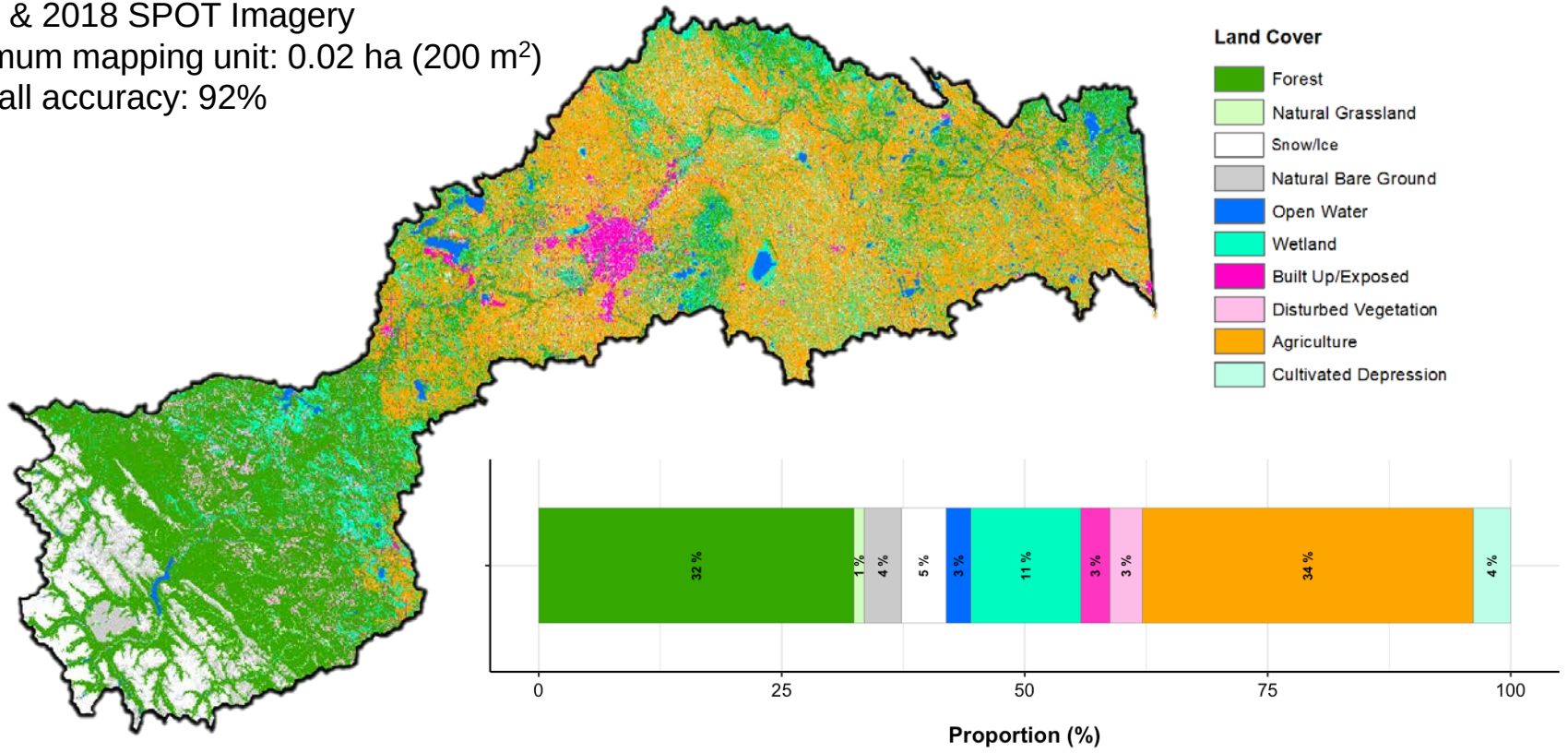

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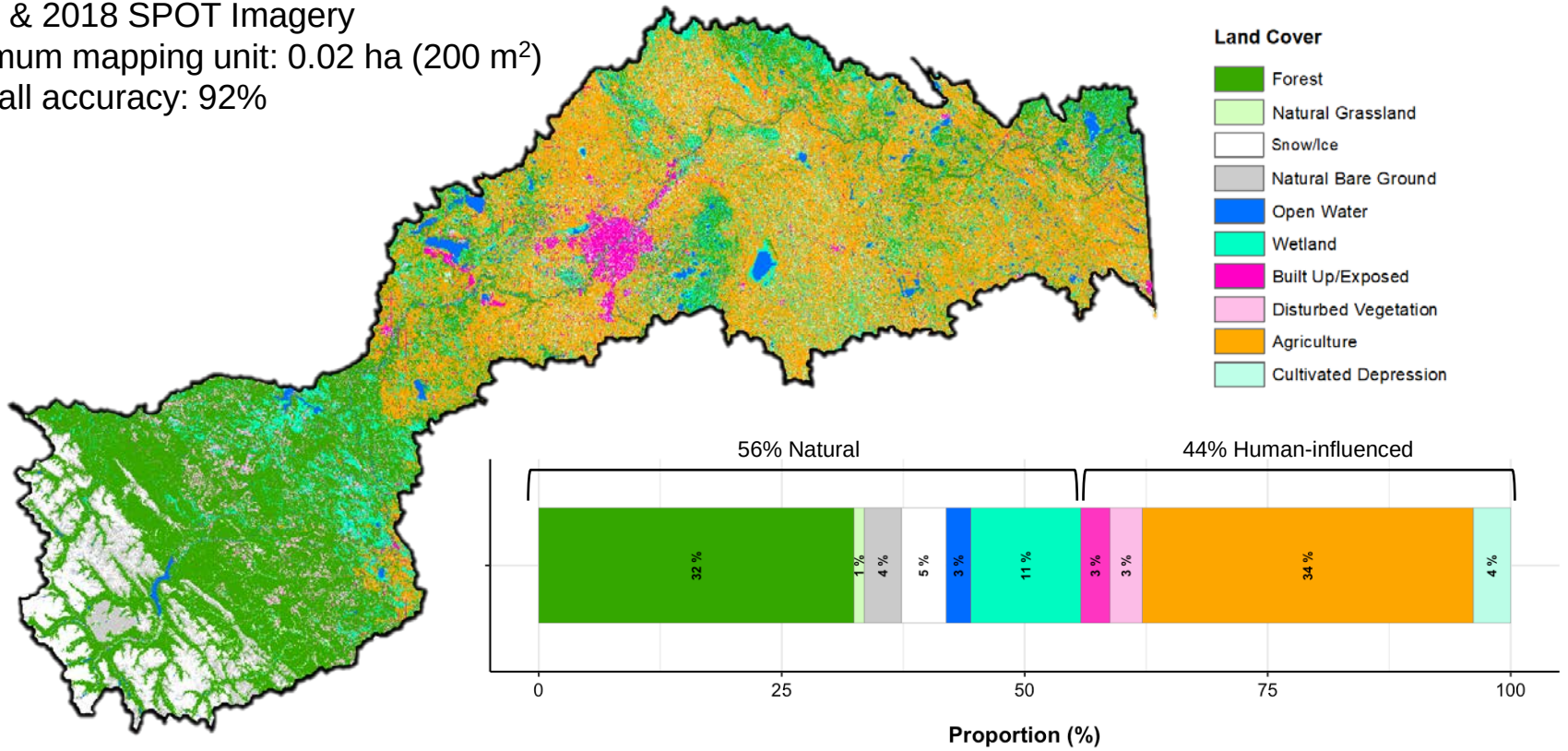
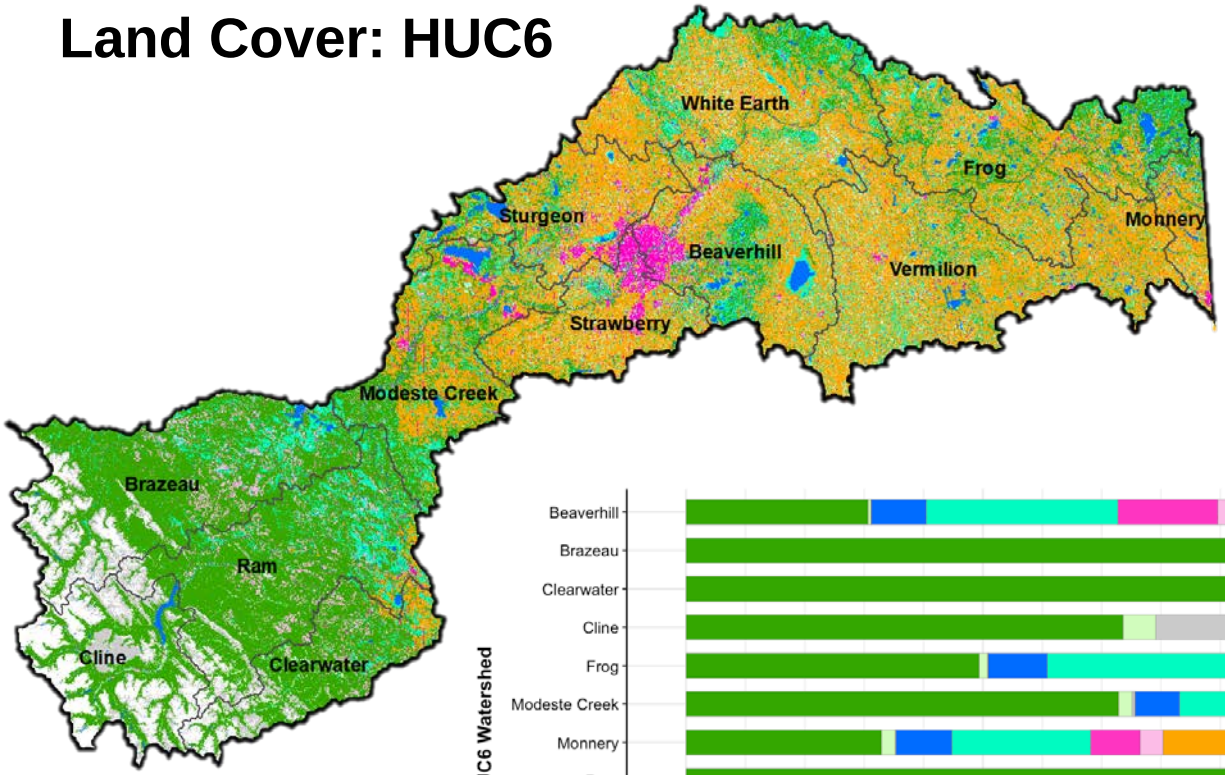
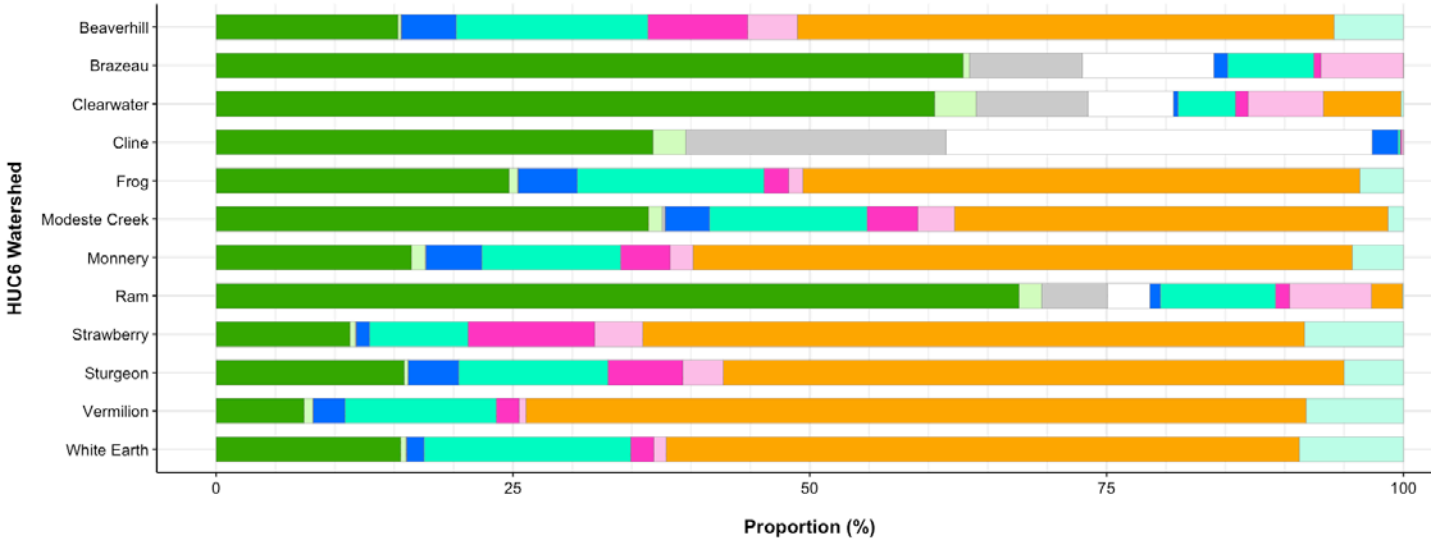


Land Cover: HUC6

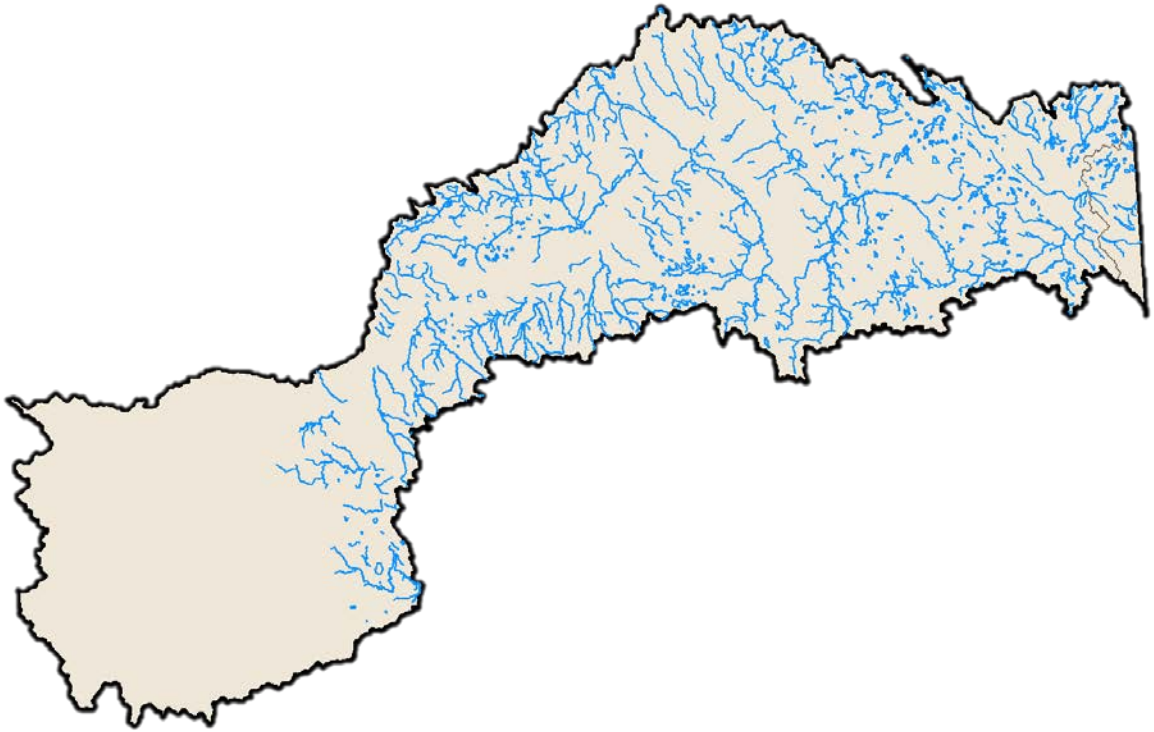


Land Cover

- Forest
- Natural Grassland
- Snow/Ice
- Natural Bare Ground
- Open Water
- Wetland
- Built Up/Exposed
- Disturbed Vegetation
- Agriculture
- Cultivated Depression



Riparian Intactness: NSR



- Intactness was assessed using a second land cover product with a 0.0036 ha minimum mapping unit
- **Total Length of Shoreline Assessed = 17,303 km**

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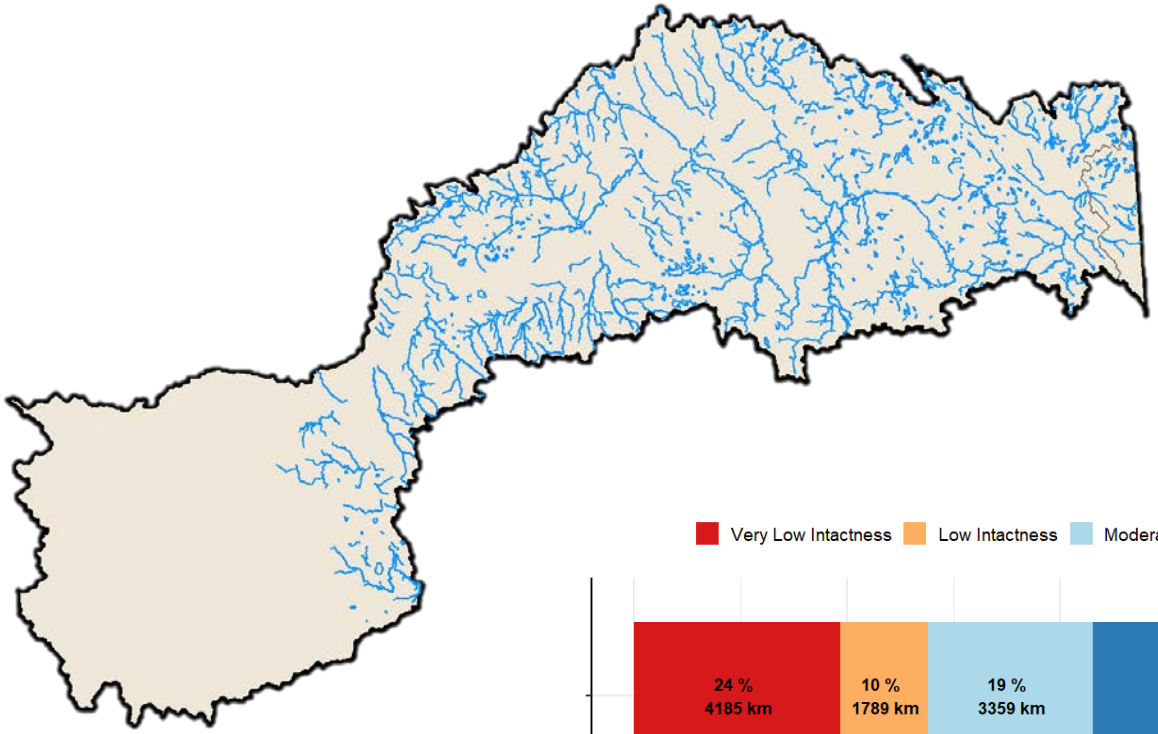

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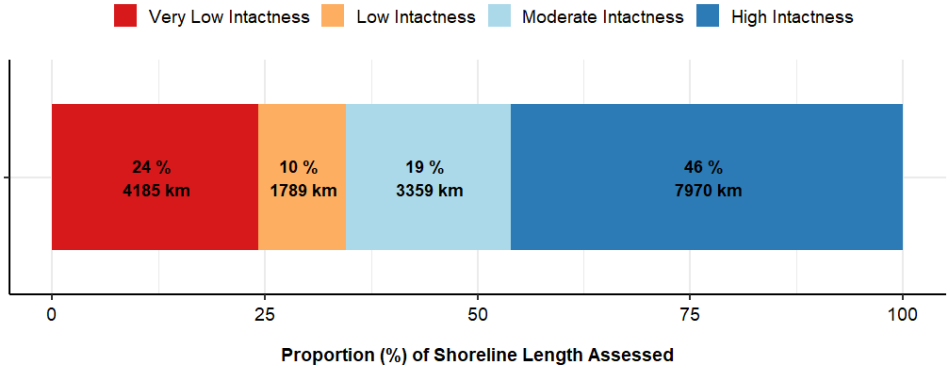

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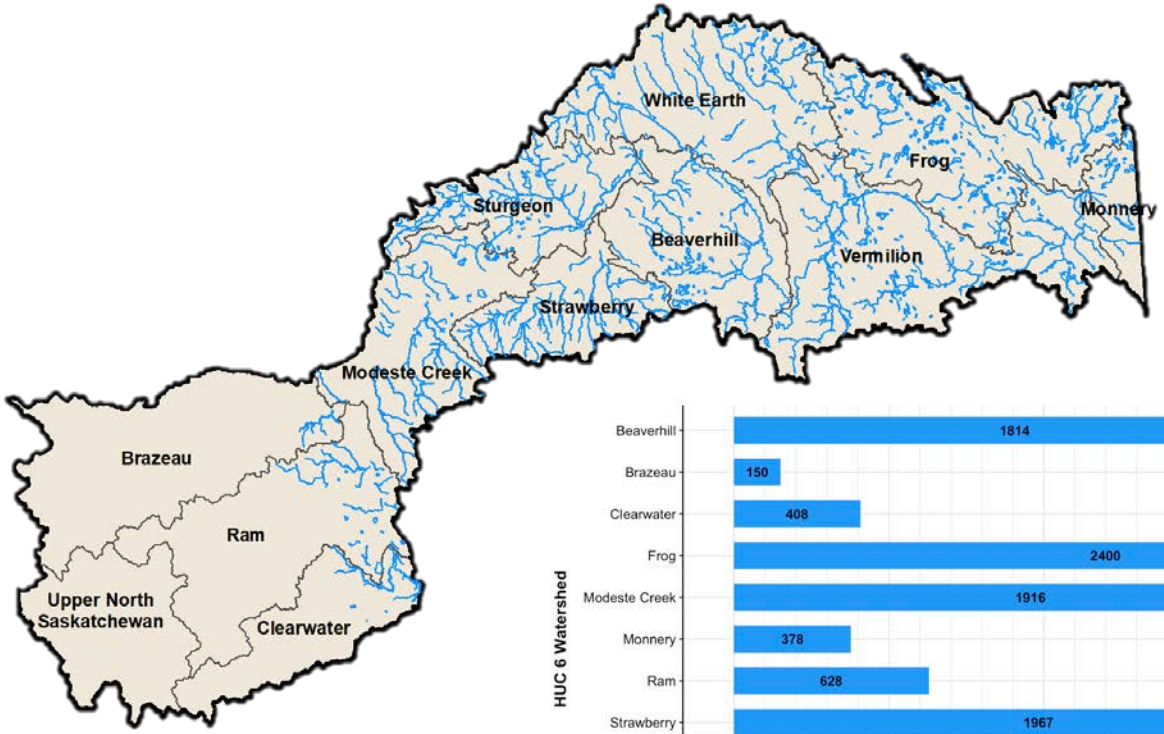

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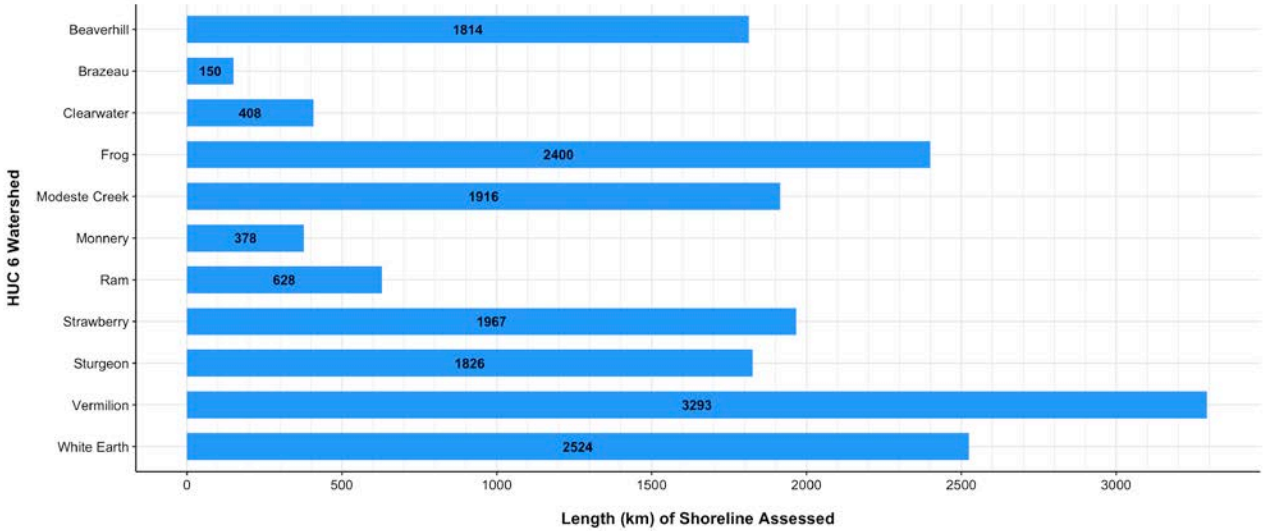

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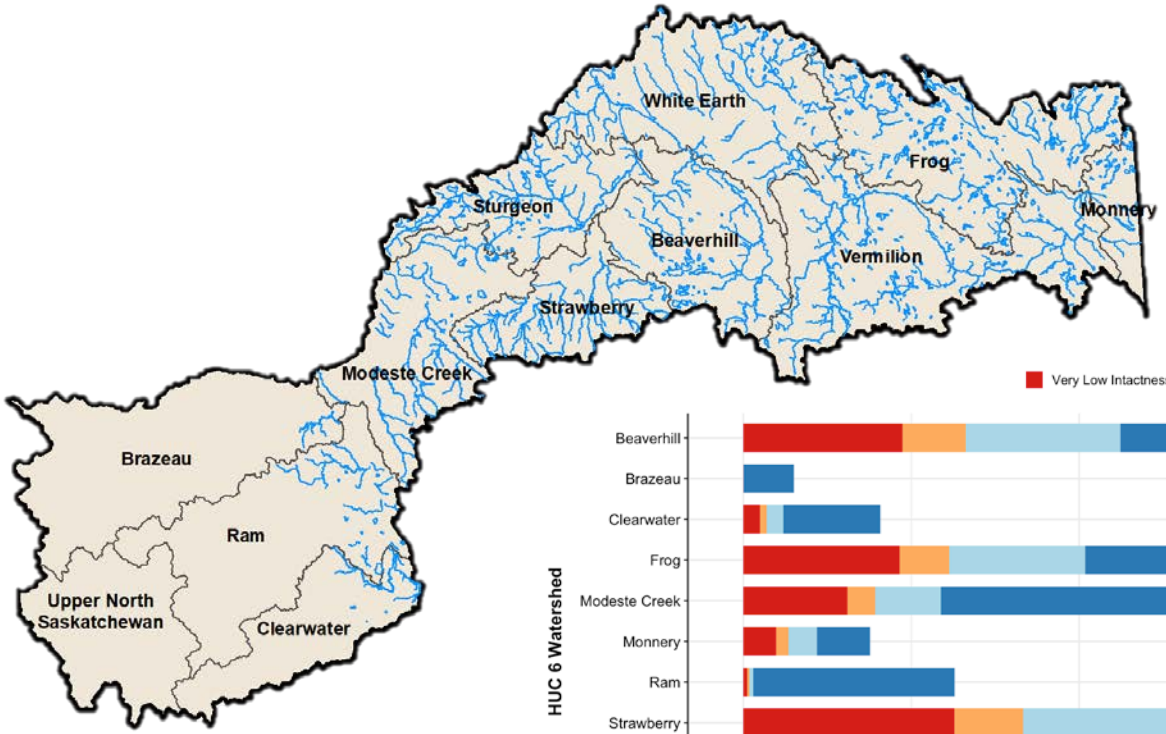

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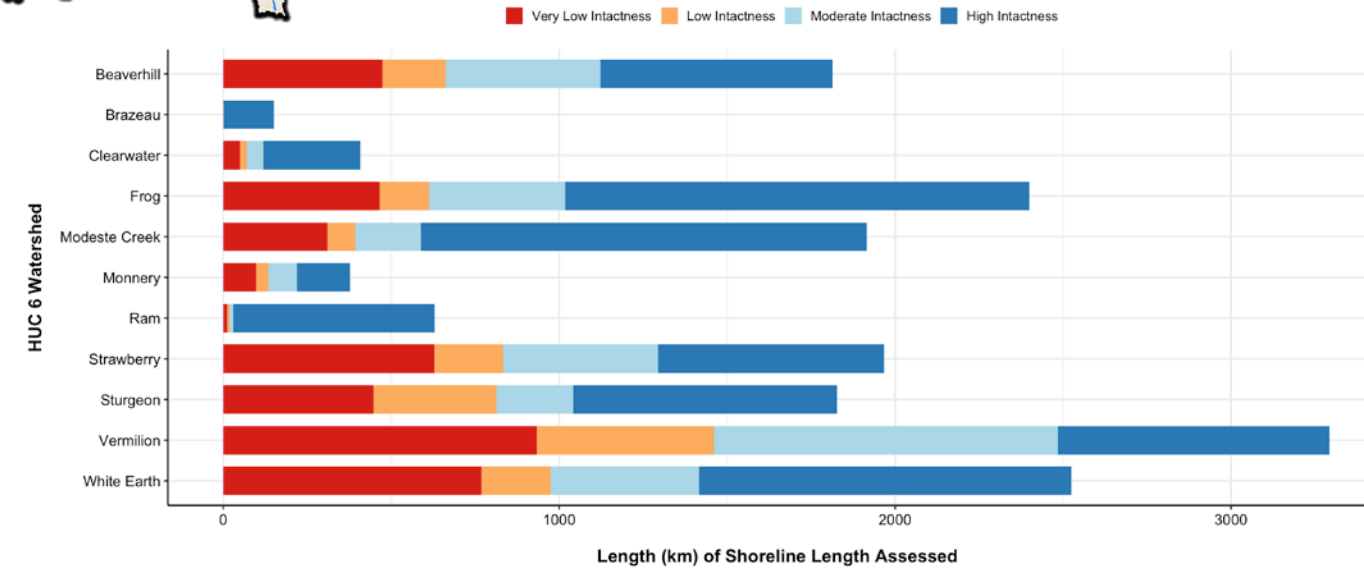

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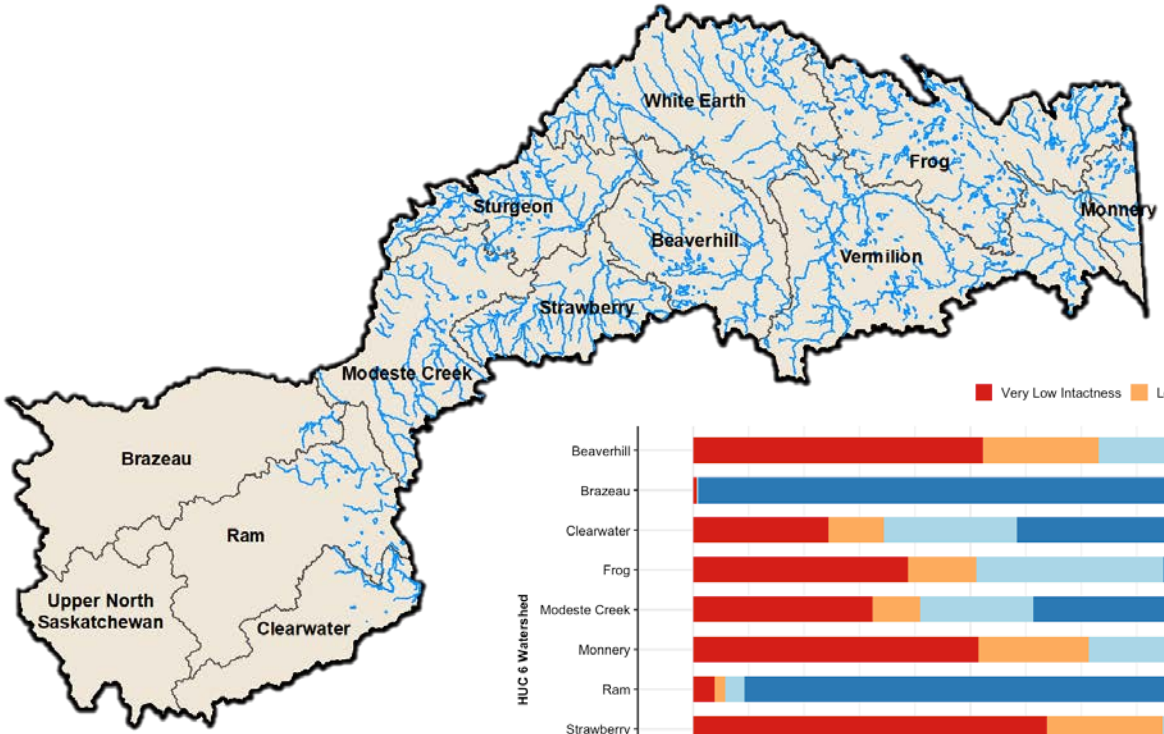

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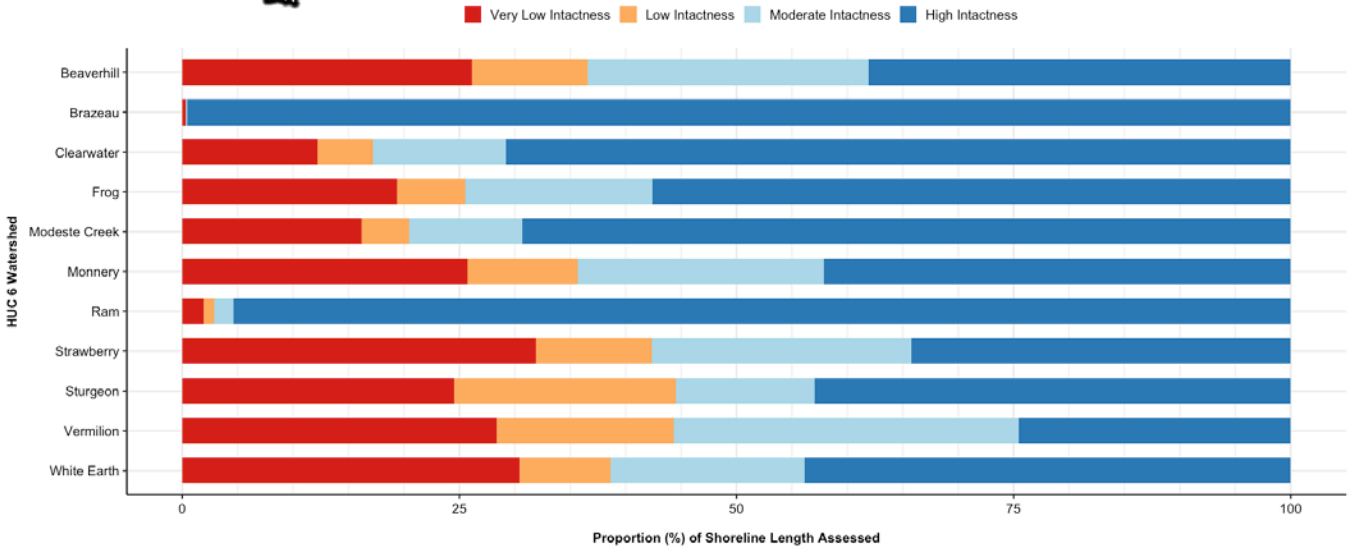

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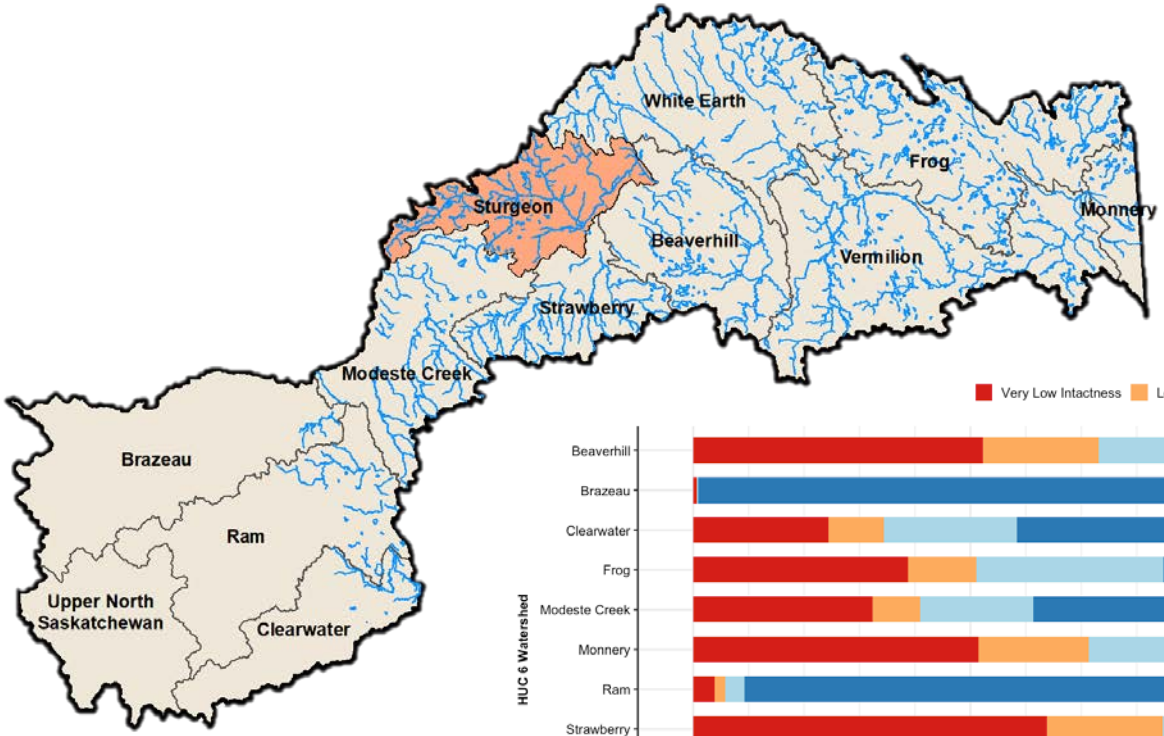

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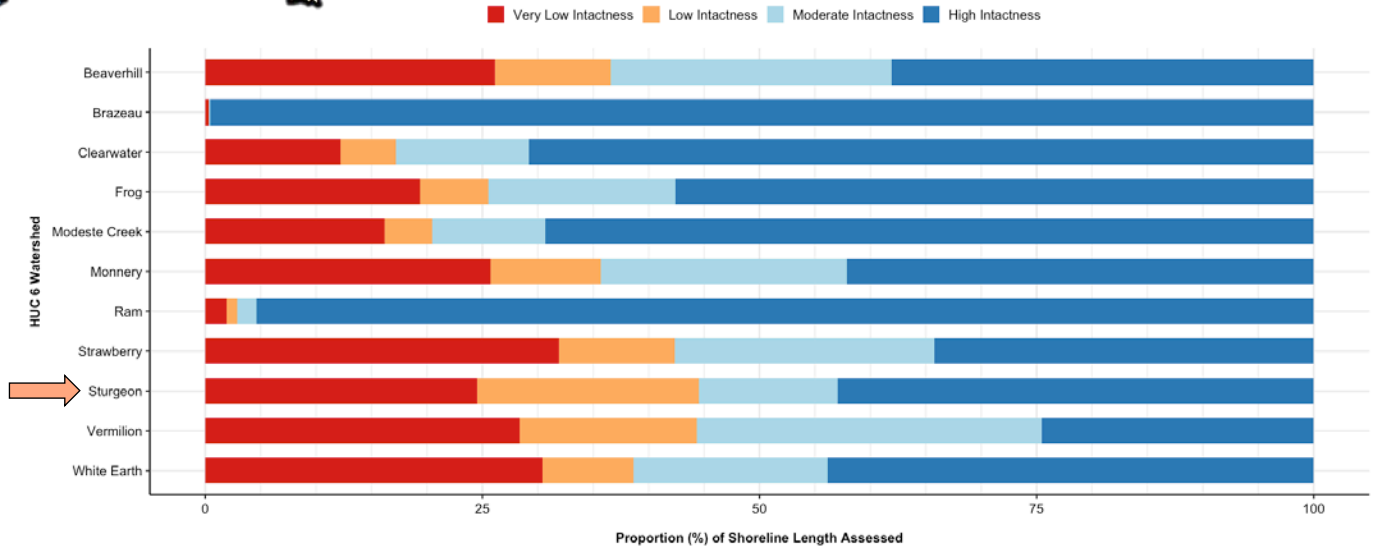
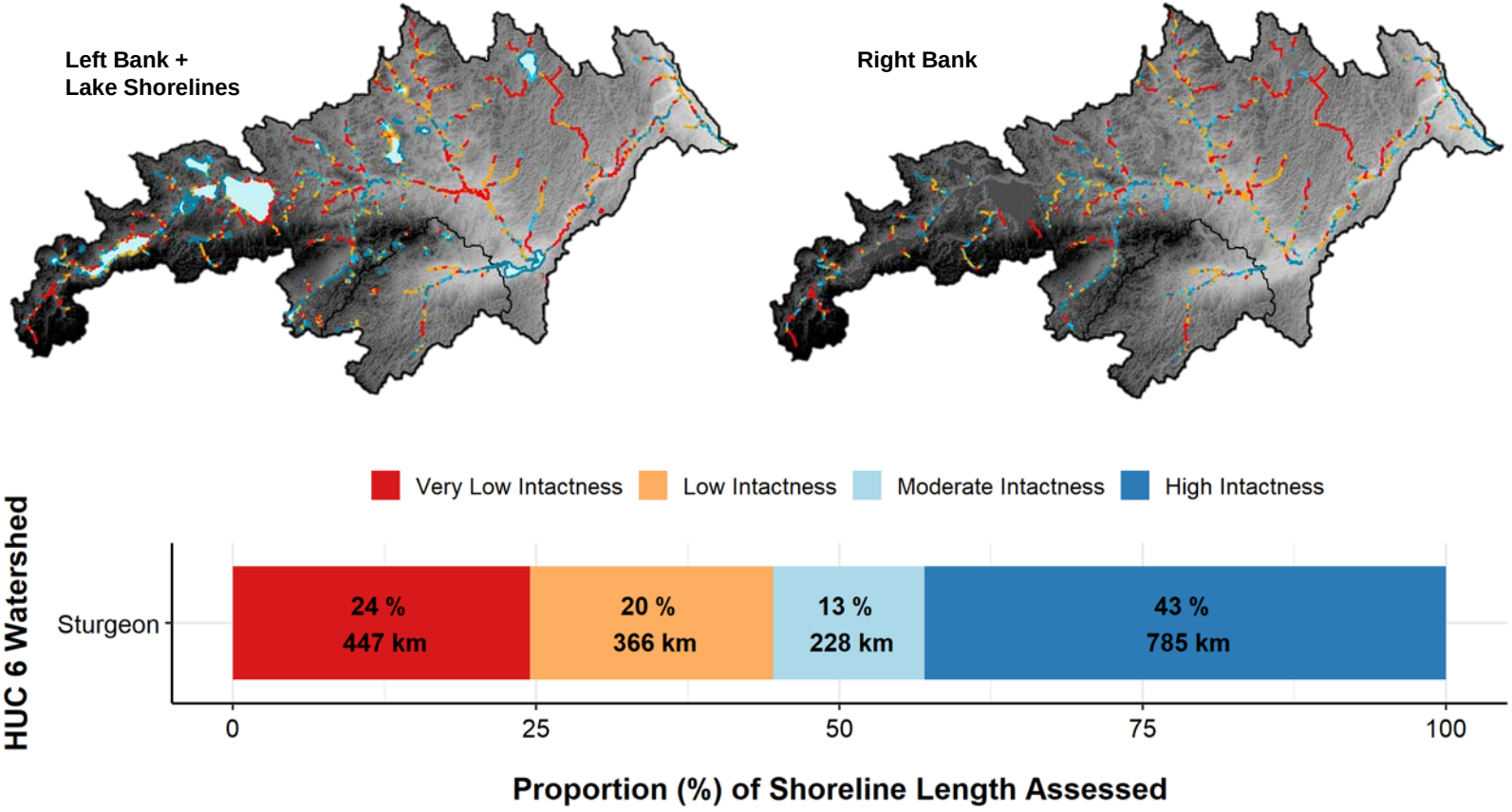
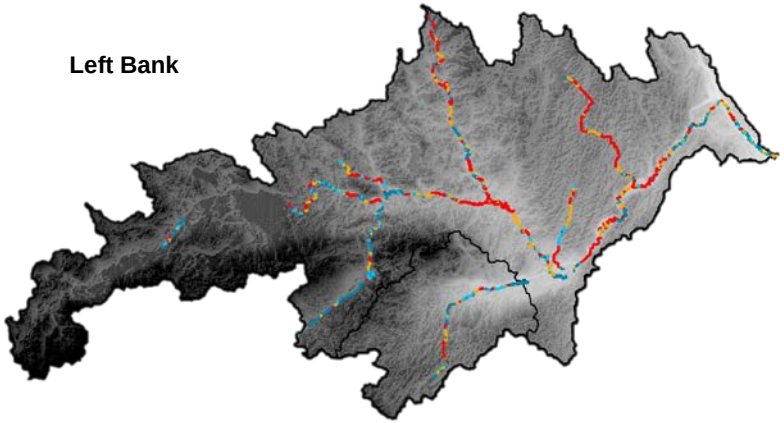


Sturgeon HUC6 (1,826 km)



Sturgeon HUC6: Named Creeks & Rivers

Left Bank



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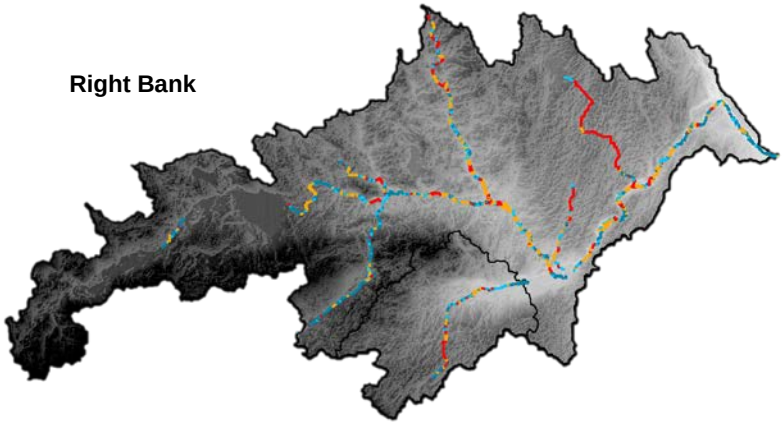

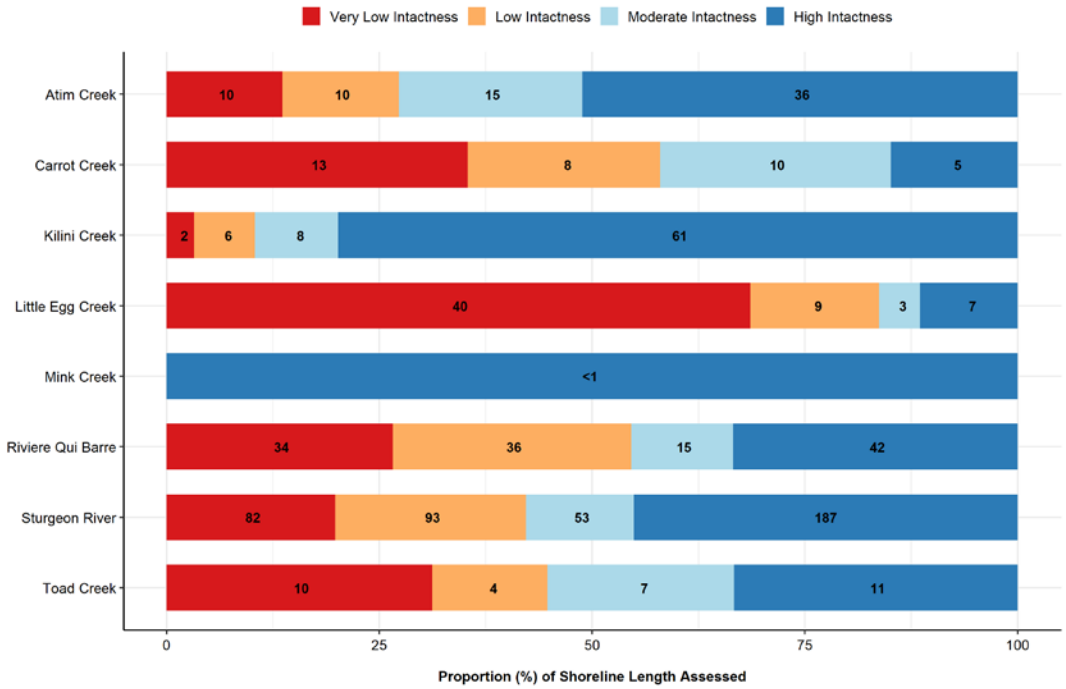

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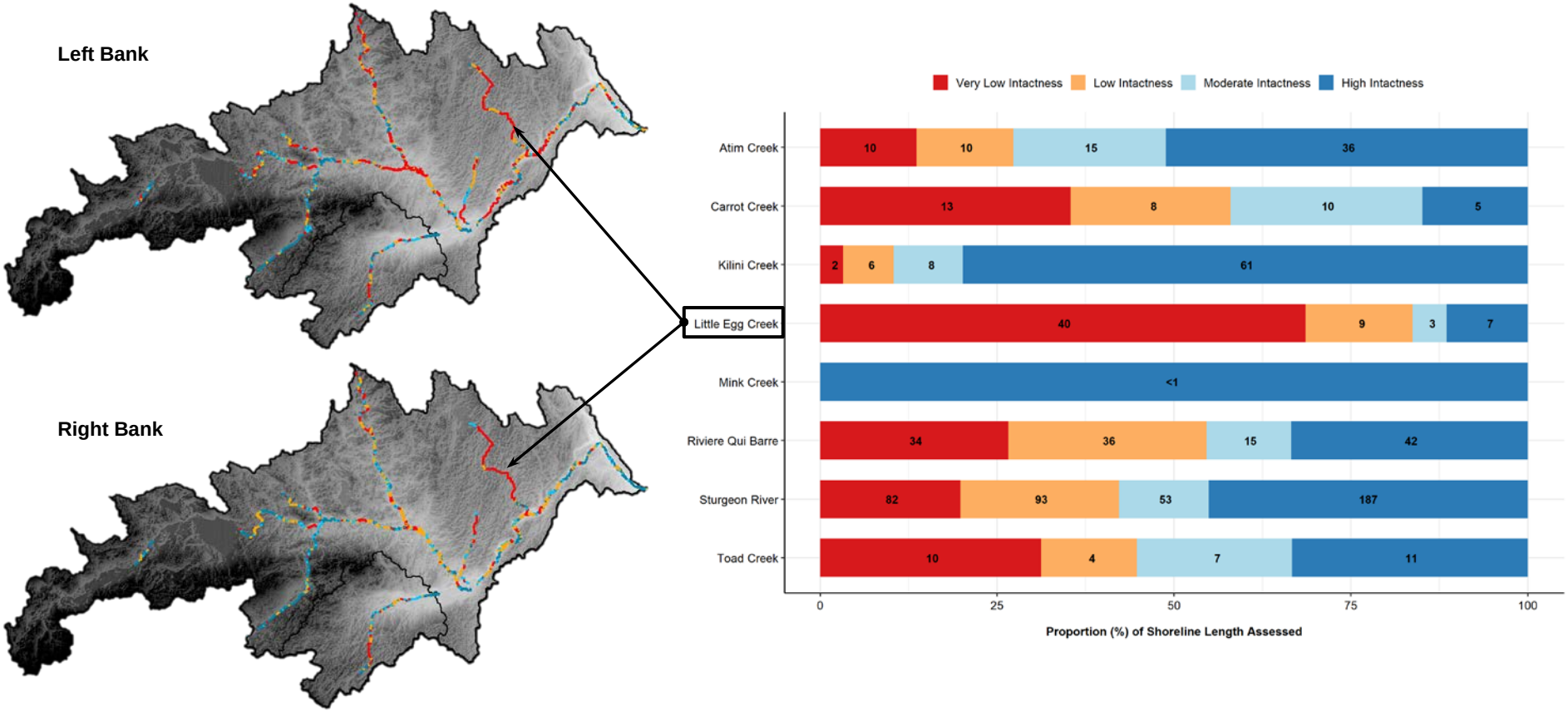
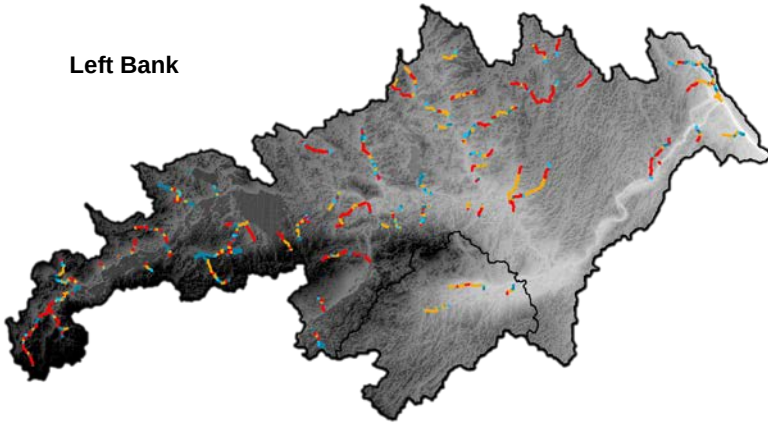


Sturgeon HUC6: Unnamed Tributary Streams

Left Bank



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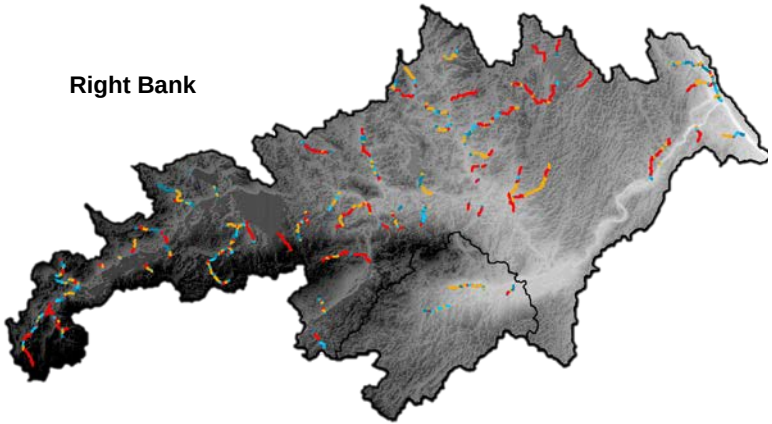
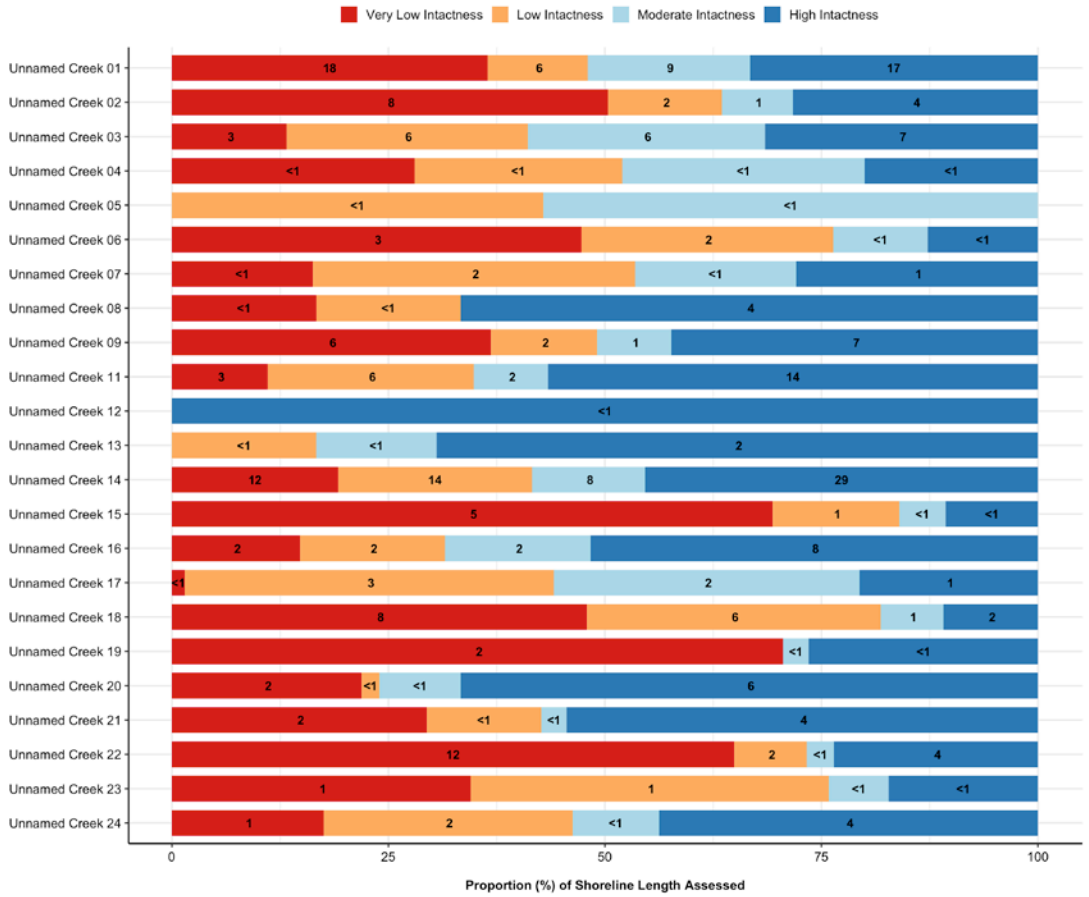
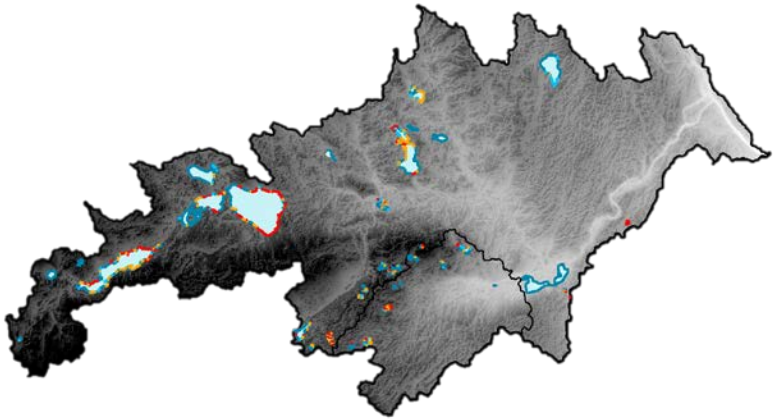
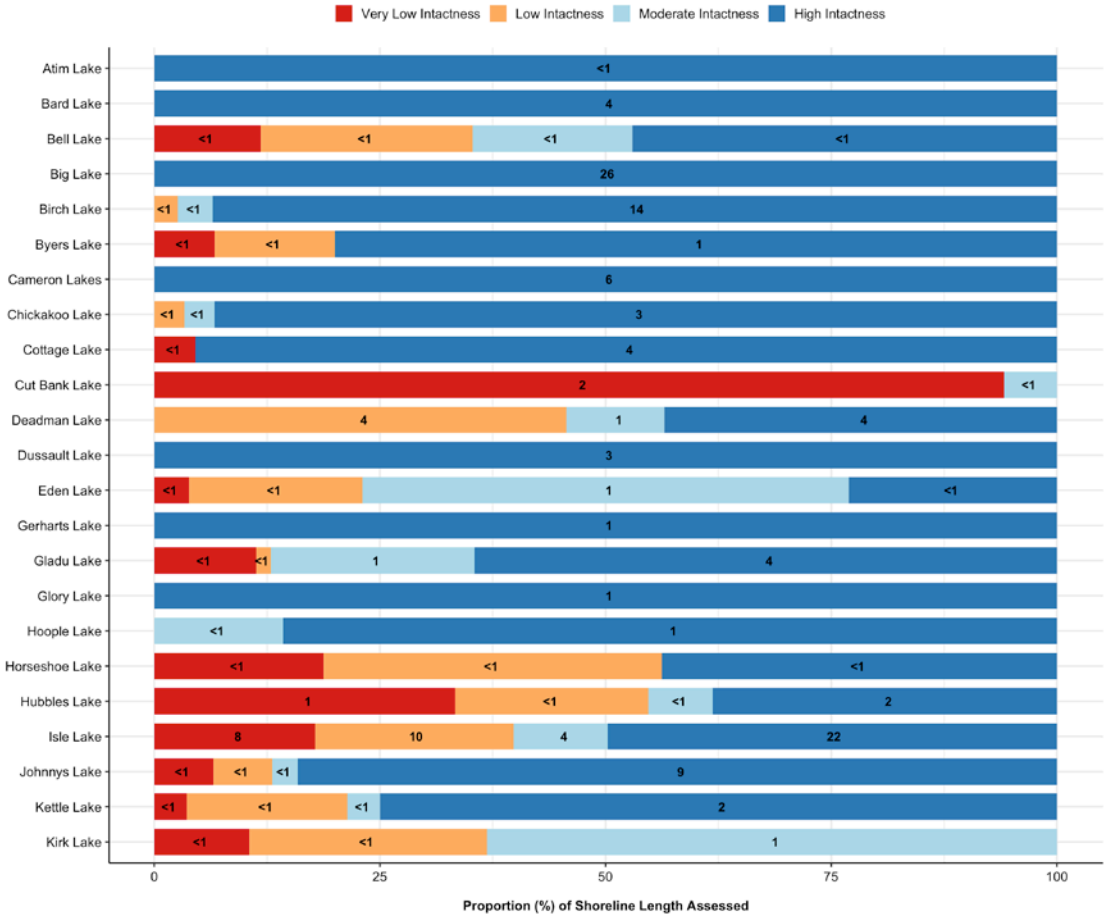




Sturgeon River HUC 6 – Lakes





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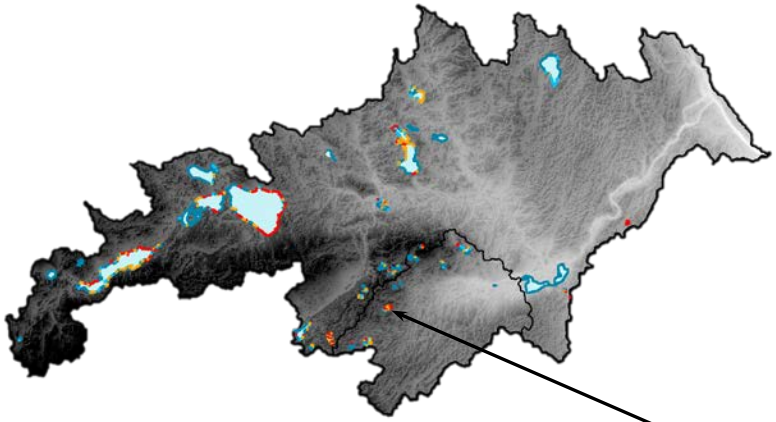
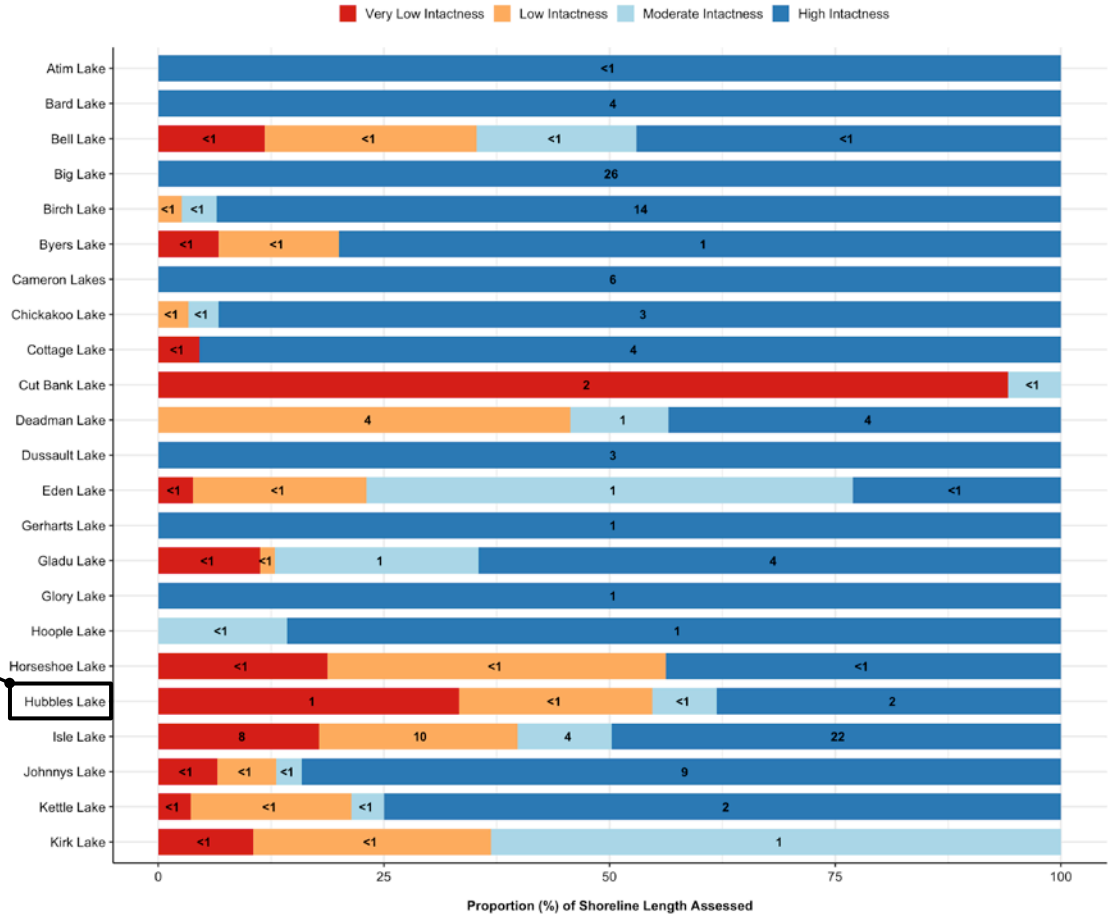
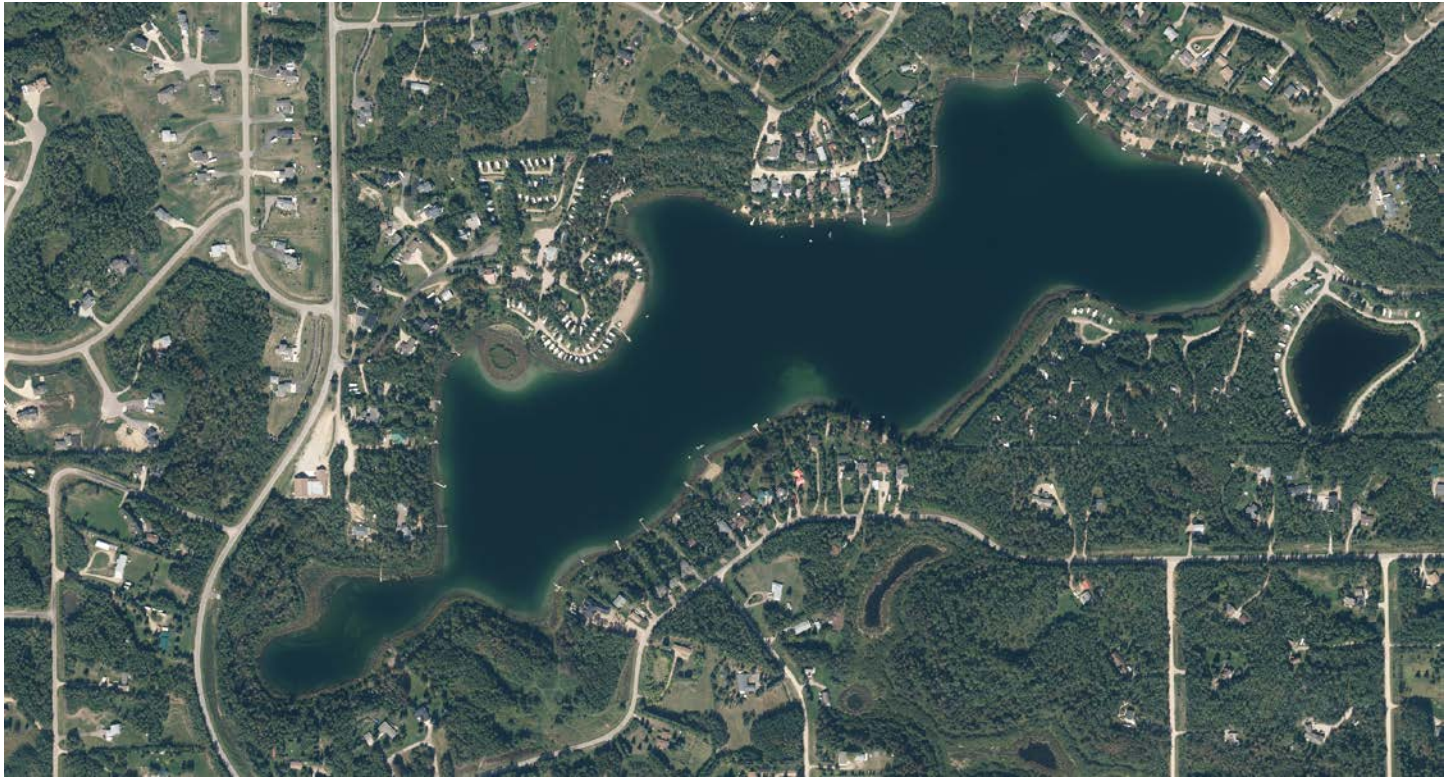




Hubbles Lake



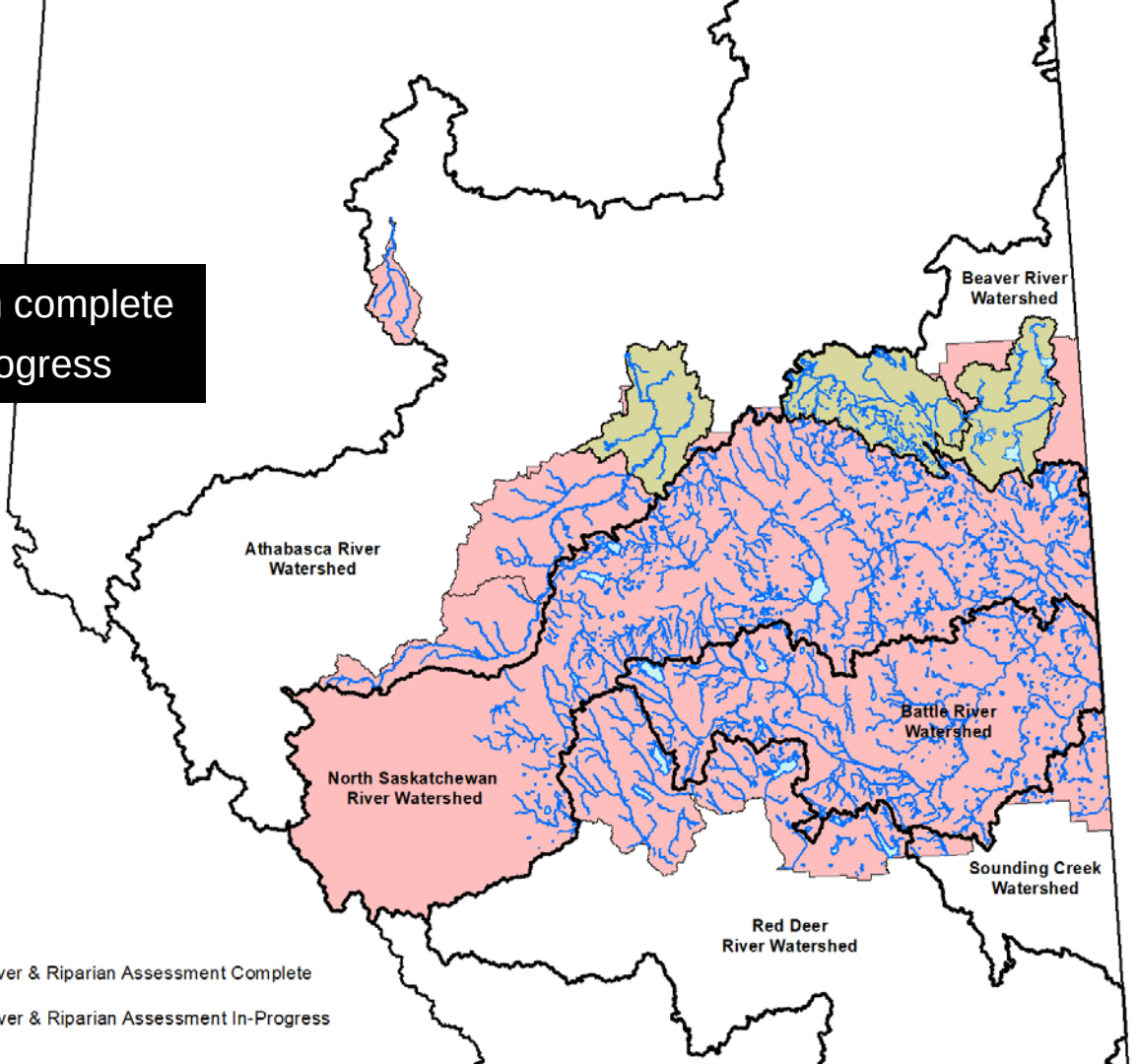
Hubbles Lake

Closing Thoughts

- This GIS tool provides a general assessment of riparian management areas that allows for the targeting of areas for restoration or conservation
- Fine scale field evaluation may still be required to assess riparian condition within smaller areas, or to address specific management questions
- By using a semi-automated approach that relies on provincial data, riparian assessments can be conducted at regular intervals to assess condition over time
- This method also allows for a standardized comparison of riparian condition between different water bodies and across jurisdictions

To-date …

~38,300 km complete or in-progress



Questions?

FIERA
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Contact Information: Shari Clare | sclare@fieraconsulting.ca | 780.466.6554 | @FieraBiological | www.fieraconsulting.ca