# State and Change of Land Cover in the Grassland and Parkland Regions of Alberta: An Analysis from 1984 to 2016

by Ron McNeil, Alberta Prairie Conservation Forum

# State of the Prairie Project

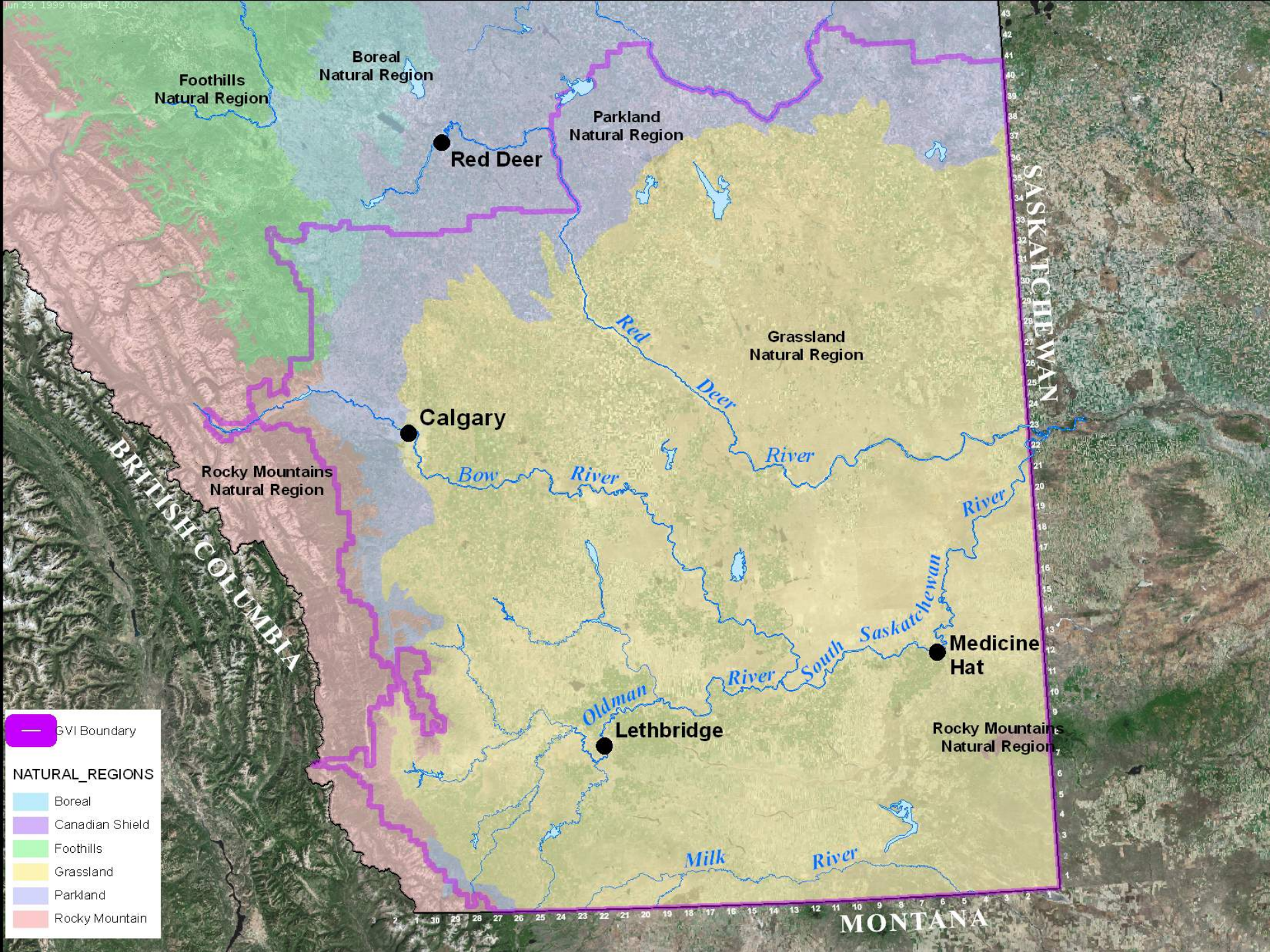
- Initiated February 2017 with AB PCF leadership
- AB PCF and AB Government (AF & EP), collaborating with organizations (ABMI) consultants & industry
- Objectives: 1) To compare and utilize recent land cover imagery and inventories vs. older versions (< 34 years old). 2) Develop products on current, & past, state; & rates of change.


- PCF acknowledges the valuable contributions of the Regional Informatics Unit of AB Environment and Parks in Lethbridge, and AB Agriculture and Forestry in Edmonton, both for GIS work, database development and imagery.

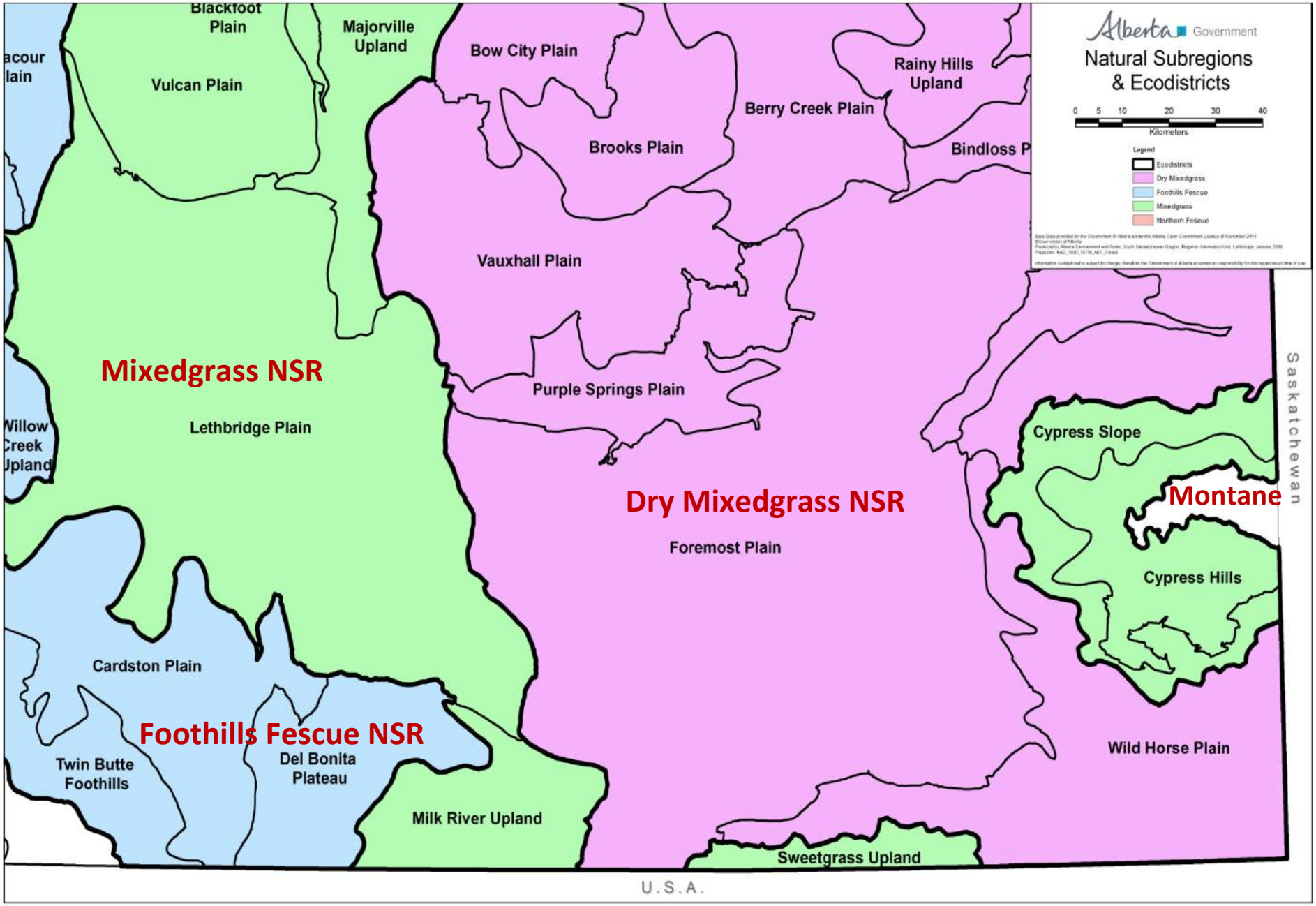
# PCF State of the Prairie Project

**Comparisons in this presentation focus on:**

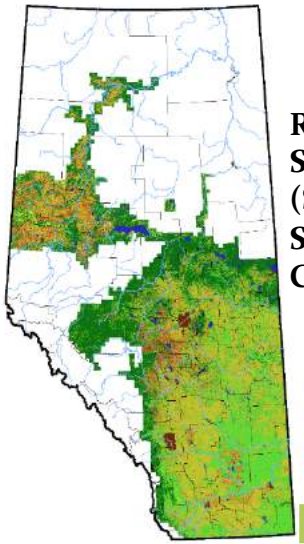
- Native Prairie Vegetation Inventory (NPVI ~1990) to the Grassland Vegetation Inventory (2006-2016)
- Selected Natural Regions, Subregions and EcoDistricts
- AB Biodiversity Monitoring Initiative Human Footprint
- Land disposition (Private, Provincial, First Nations etc.)
- Grassland Vegetation Inventory (GVI) site type groups:
  - 1) wetlands (all lentic, lotic and water);
  - 2) all terrestrial native (eg. Loamy, Sands, Badlands)
  - 3) all non-native (agriculture, industrial & settled)
- Native Cover & change on a quarter section grid with portrayal of both satellite and inventory results.


Foothills Natural Region
Boreal Natural Region
Parkland Natural Region
Red Deer
Grassland Natural Region
SASKATCHEWAN
Red Deer River
Calgary
Bow River
Rocky Mountains Natural Region
BRITISH COLUMBIA
South Saskatchewan River
Medicine Hat
Oldman River
Lethbridge
Rocky Mountains Natural Region
Milk River
MONTANA
GVI Boundary
NATURAL_REGIONS
Boreal
Canadian Shield
Foothills
Grassland
Parkland
Rocky Mountain

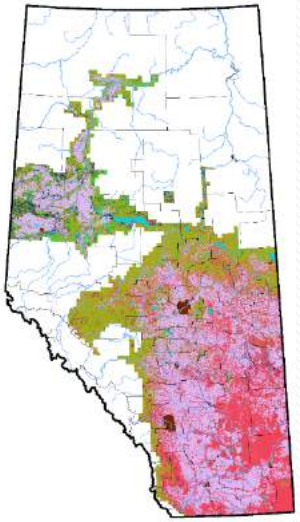
# Southern AB Natural Subregions (NSR) & EcoDistricts



# Evaluation & Summary Process

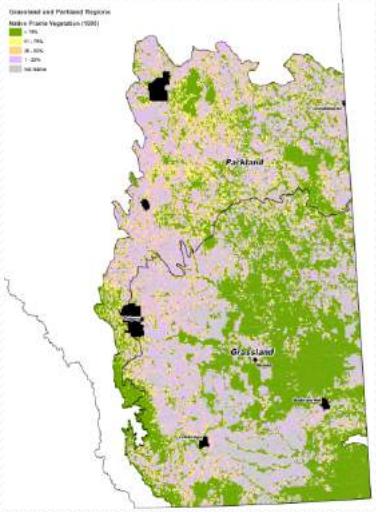


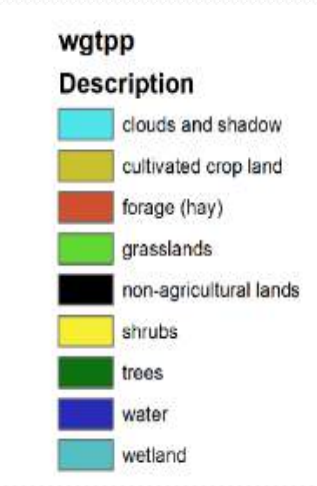

**Reclassify Pixels to State of the Prairie (SOTP) six Standard Cover Classes**

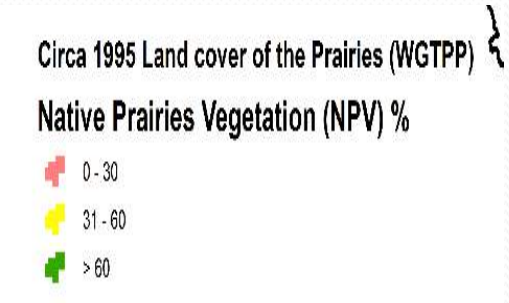


**Reclassify SOTP Pixels to a more General Native Prairie Class**

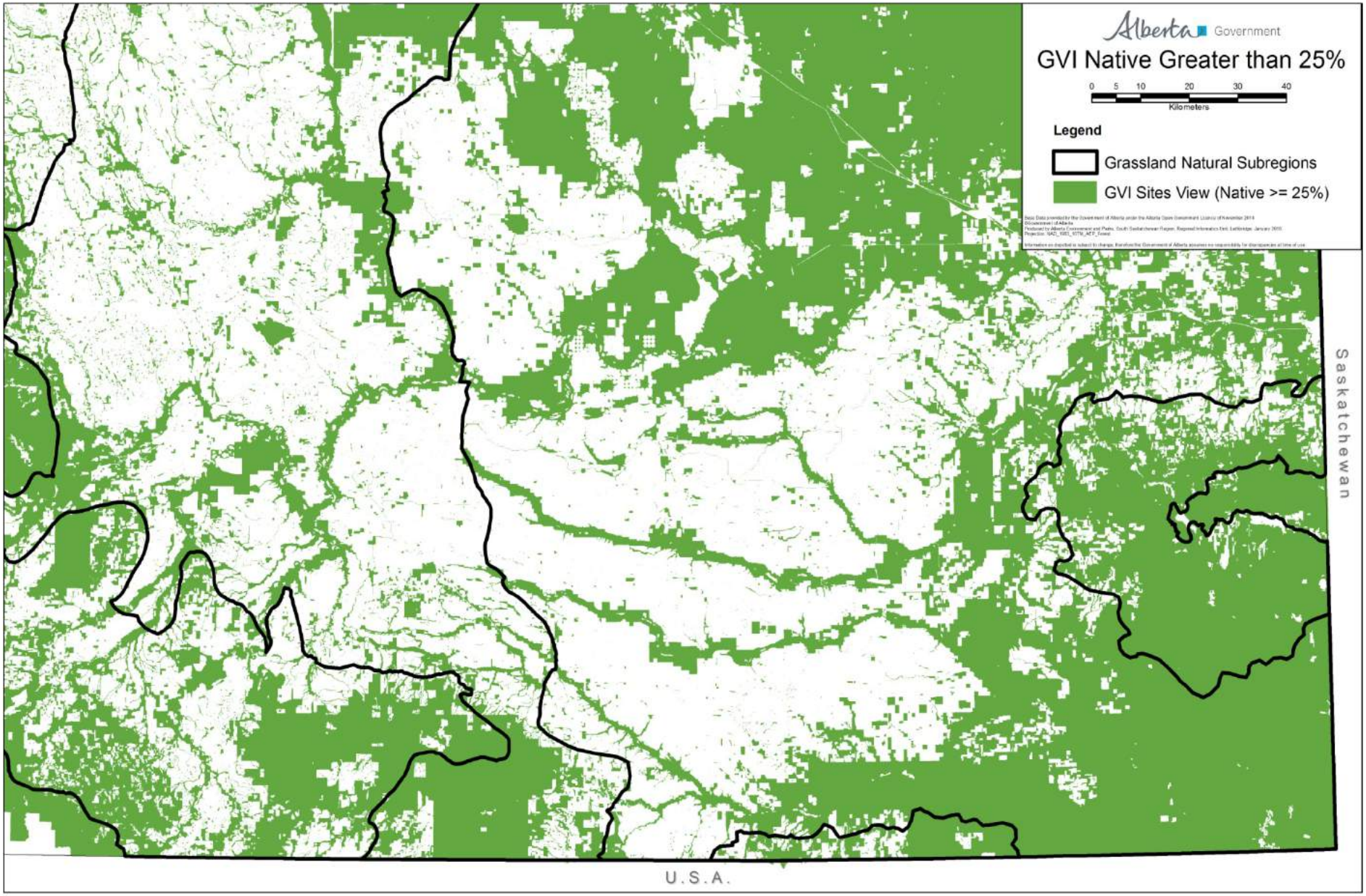
**% Native Prairie summarized on a quarter by quarter section basis**



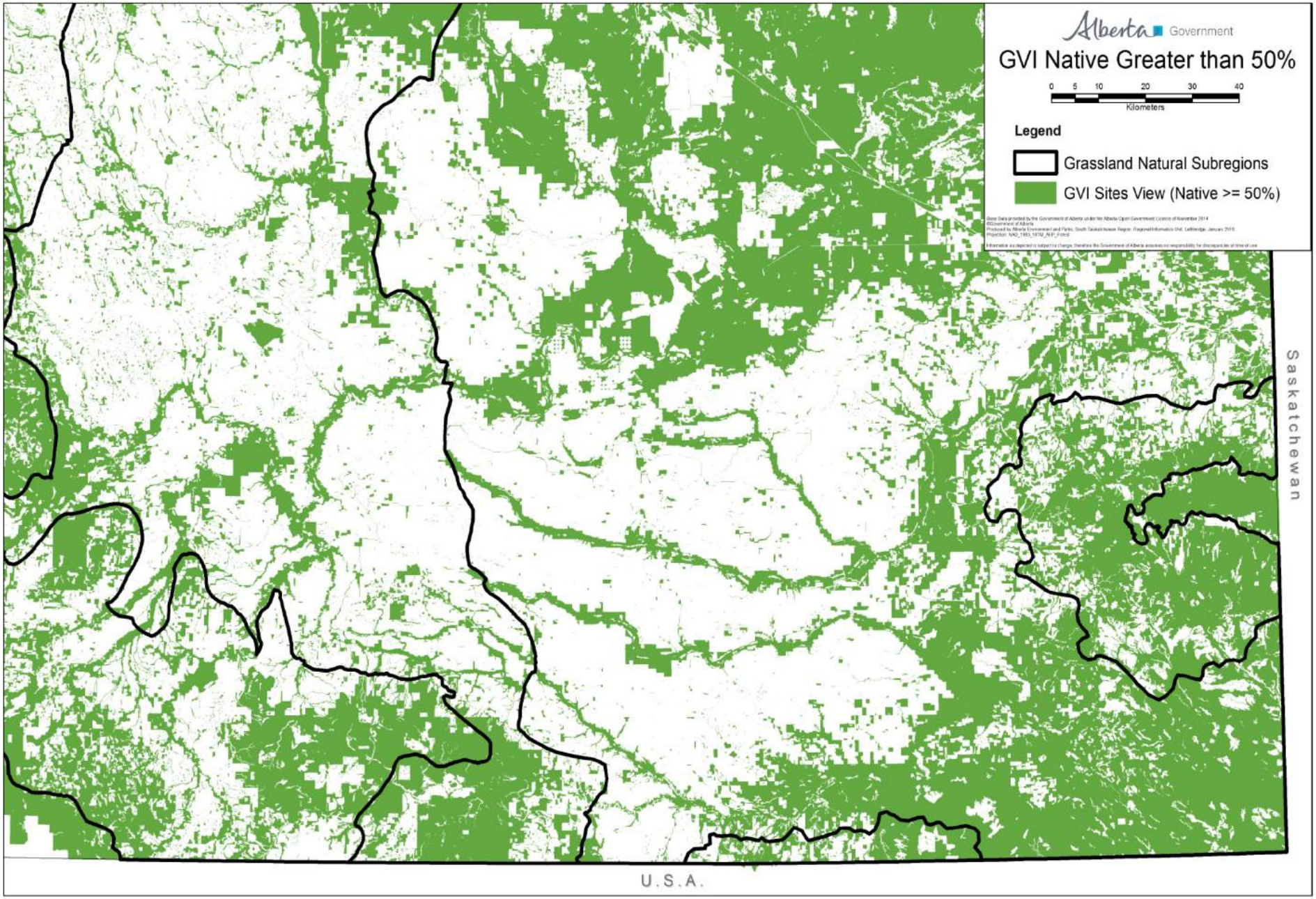




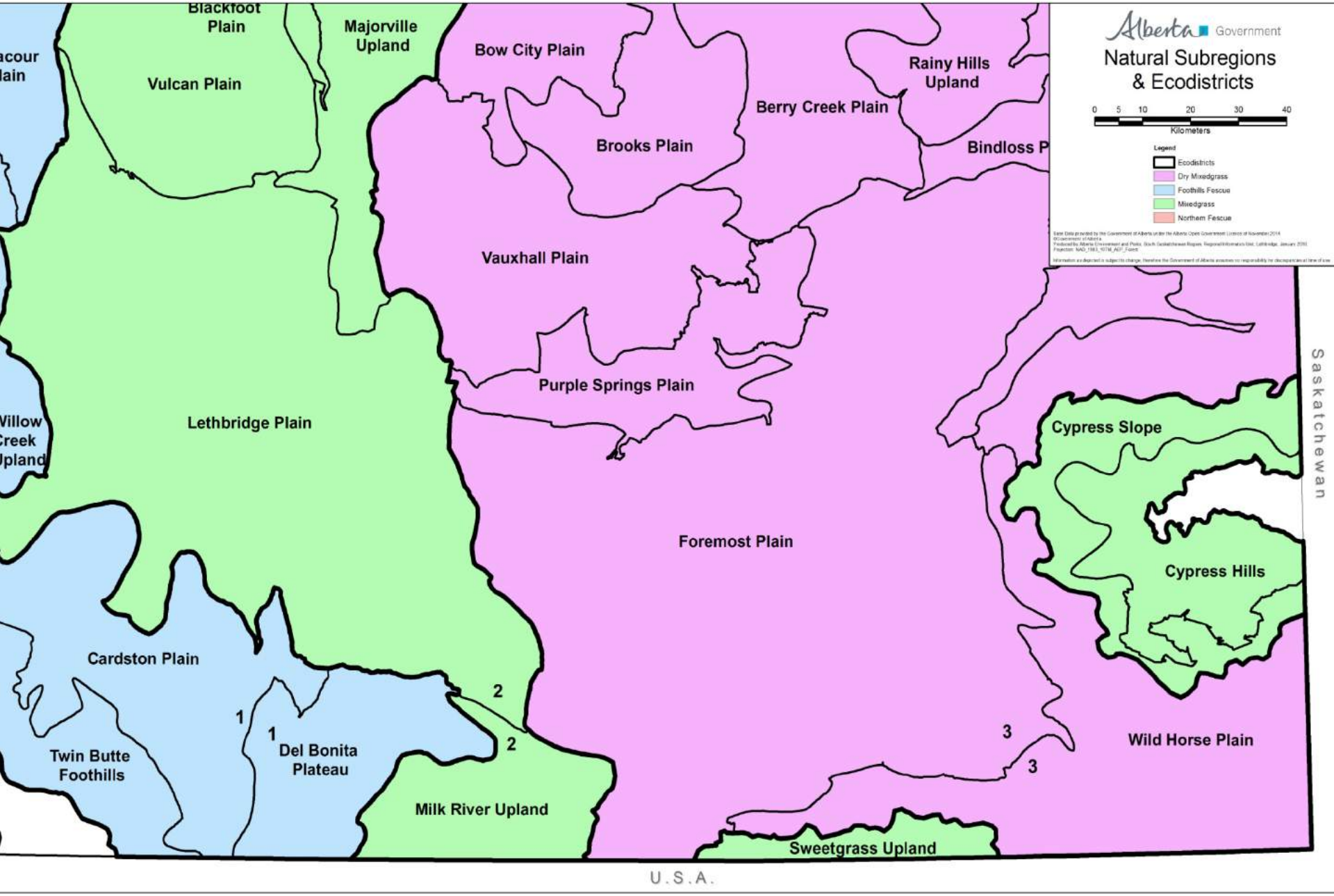
# Grassland Vegetation Inventory (GVI) ~ 2006-16 simplified showing quarters with >25% Native Grassland



# GVI simplified showing quarters with >50% Native Grassland



# S. AB EcoDistrict Analysis in State of Prairie Project



# Land Ownership

Base Data provided by the Government of Alberta under the Alberta Open Government Licence of November 2014
©Government of Alberta
©Airbus, Licenced by Planet Labs Geomatics Corp.
©Imagery Data provided by Vaultus Imagery Services.
Produced by Alberta Environment and Parks, South Saskatchewan Region,
Regional Informatics Unit, Lethbridge, January 2018.
Projection: NAD_1983_10TM_AEP_Forest

Information as depicted is subject to change, therefore the Government of Alberta assumes no responsibility for discrepancies at time of use.

Alberta Government

0 12.5 25 50 75 100
Kilometers

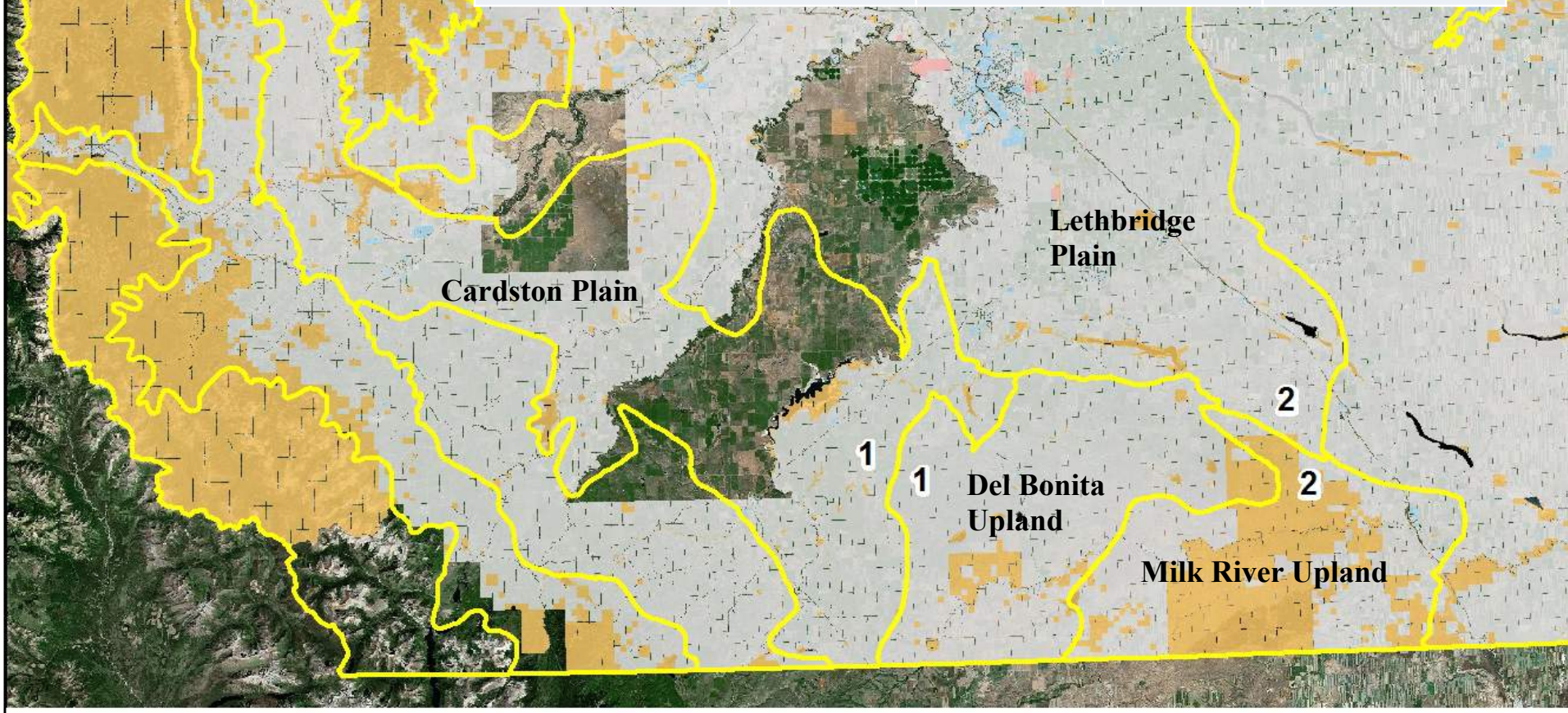
Ecodistrict Boundary

**Ownership Classes**

Federal
Private
Municipal
Provincial

## Land Ownership % of EcoDistrict

| EcoDistrict | Private | First Nations | Prov-incial | Dev. Road Allowance |
|---|---|---|---|---|
| Cardston | 65.2 | 26.7 | 3.8 | 3.9 |
| Del Bonita | 88.5 | 0 | 9.2 | 2.3 |
| Milk River | 50.6 | 0 | 46.6 | 2.6 |
| Lethbridge | 81.3 | 11.3 | 2.8 | 3.4 |



# Land Ownership % by EcoDistricts

Dept. Nat. Defence
Canada; Suffield

**Foremost Plain**
Private 78.0 %
Provincial 17.4%
Road Allw. 3.7%

**Wildhorse Plain**
Provincial 78.0 %
Private 19.4%
Road Allw. 2.5%

1
1
2
2
3
3

Alberta Government

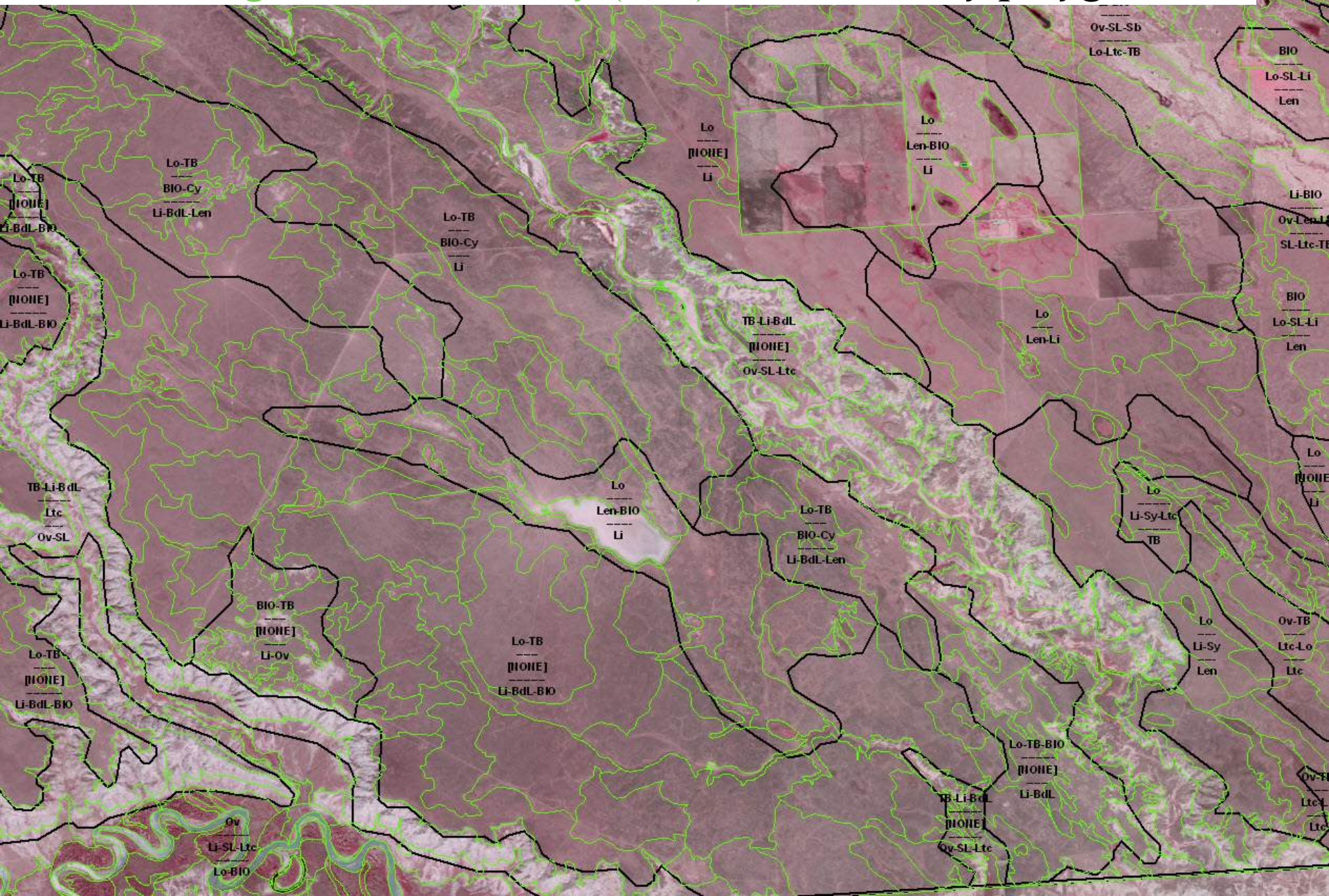
0 12.5 25 50 75 100
Kilometers

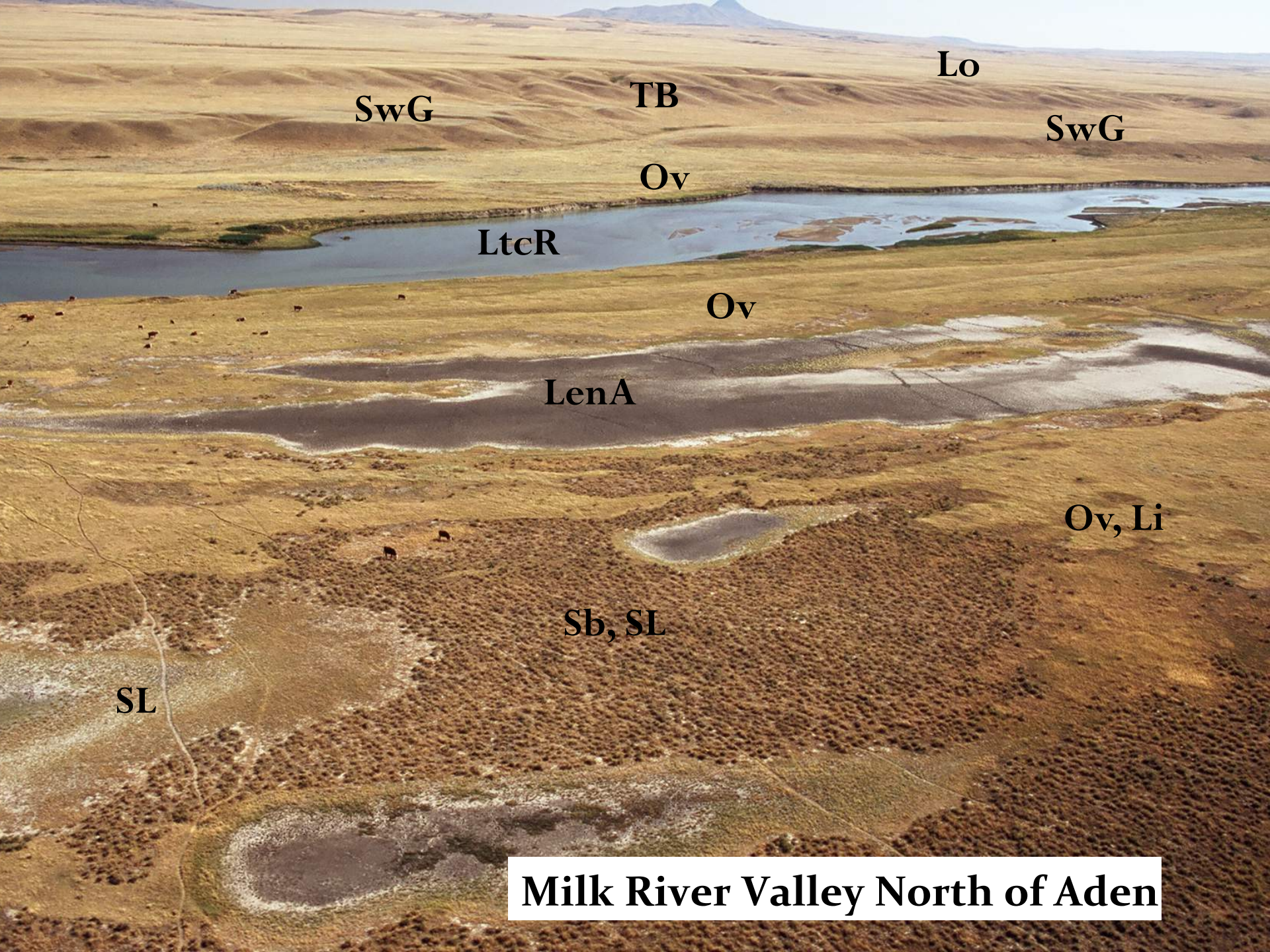
Ecodistrict Boundary

Ownership Classes

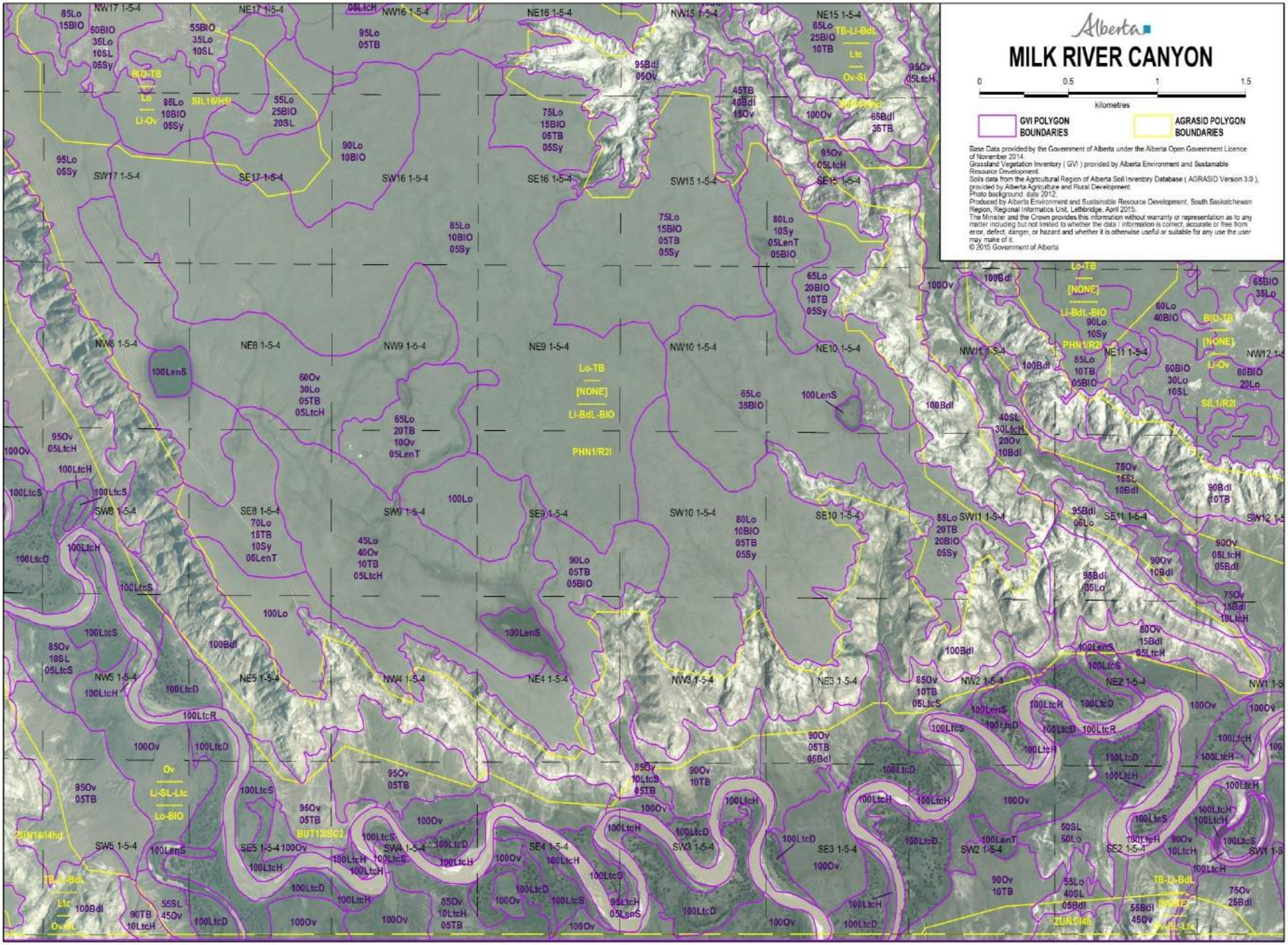
Federal
Private
Municipal
Provincial

# Grassland Vegetation Inventory (GVI) vs. Soil Survey polygons






Milk River Valley North of Aden


Alberta
MILK RIVER CANYON
0
0.5
1
1.5
kilometres
GVI POLYGON BOUNDARIES
AGRASID POLYGON BOUNDARIES
Base Data provided by the Government of Alberta under the Alberta Open Government Licence of November 2014.
Grassland Vegetation Inventory ( GVI ) provided by Alberta Environment and Sustainable Resource Development.
Soils data from the Agricultural Region of Alberta Soil Inventory Database ( AGRASID Version 3.0 ), provided by Alberta Agriculture and Rural Development.
Photo background: date 2012.
Produced by Alberta Environment and Sustainable Resource Development, South Saskatchewan Region, Regional Informatics Unit, Lethbridge, April 2015.
The Minister and the Crown provides this information without warranty or representation as to any matter including but not limited to whether the data / information is correct, accurate or free from error, defect, danger, or hazard and whether it is otherwise useful or suitable for any use the user may make of it.
© 2015 Government of Alberta

# Grassland Vegetation Inventory (GVI) Site Type Group %

| Natural Subregion | EcoDistrict | Wetland | Terrestrial Native | Non-native | Portion of NSR | Native portion of NSR |
|---|---|---|---|---|---|---|
| Foothills Fescue | All | 6.1 | 33.7 | 60.2 | 100 | 39.8 |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

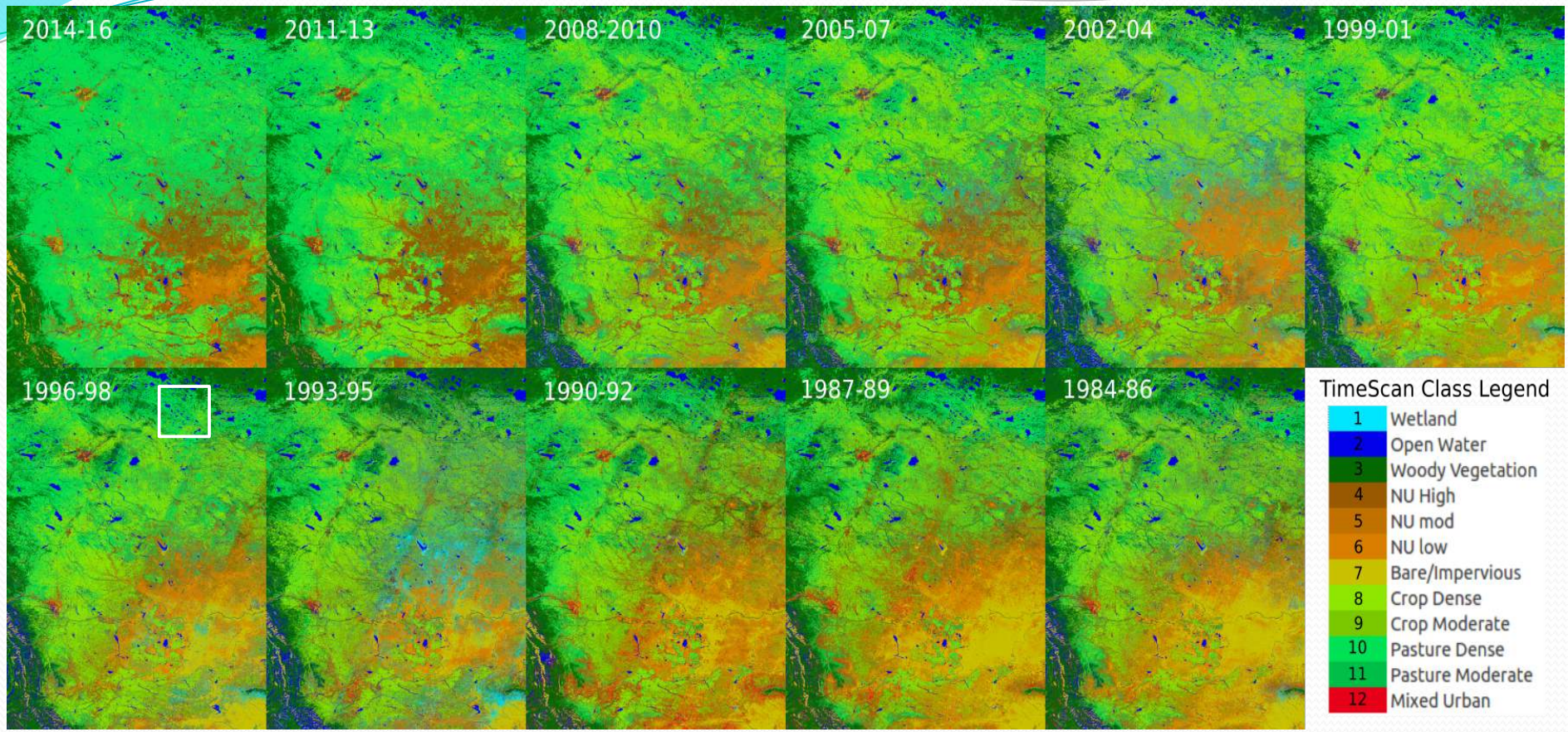
# Grassland Vegetation Inventory (GVI) Site Type Group %

| Natural Subregion | EcoDistrict | Wetland | Terrestrial Native | Non-native | Portion of NSR | Native portion of NSR |
|---|---|---|---|---|---|---|
| Foothills Fescue | All | 6.1 | 33.7 | 60.2 | 100 | 39.8 |
| Foothills Fescue | Cardston | 6.9 | 35.9 | 57.2 | 22.5 | 24.2 |
| Foothills Fescue | Del Bonita | 10.6 | 64.3 | 25.1 | 9.4 | 17.8 |
| | | | | | | |
| | | | | | | |

# Grassland Vegetation Inventory (GVI) Site Type Group %

| Natural Subregion | EcoDistrict | Wetland | Terrestrial Native | Non-native | Portion of NSR | Native portion of NSR |
|---|---|---|---|---|---|---|
| Foothills Fescue | All | 6.1 | 33.7 | 60.2 | 100 | 39.8 |
| Foothills Fescue | Cardston | 6.9 | 35.9 | 57.2 | 22.5 | 24.2 |
| Foothills Fescue | Del Bonita | 10.6 | 64.3 | 25.1 | 9.4 | 17.8 |
| Dry Mixed-grass | All | 7.8 | 51.2 | 41.0 | 100 | 59.0 |
| Dry Mixed-grass | Wildhorse | 6.8 | 84.2 | 9.0 | 6.7 | 10.4 |

# TimeScan Results:3 year period classification maps

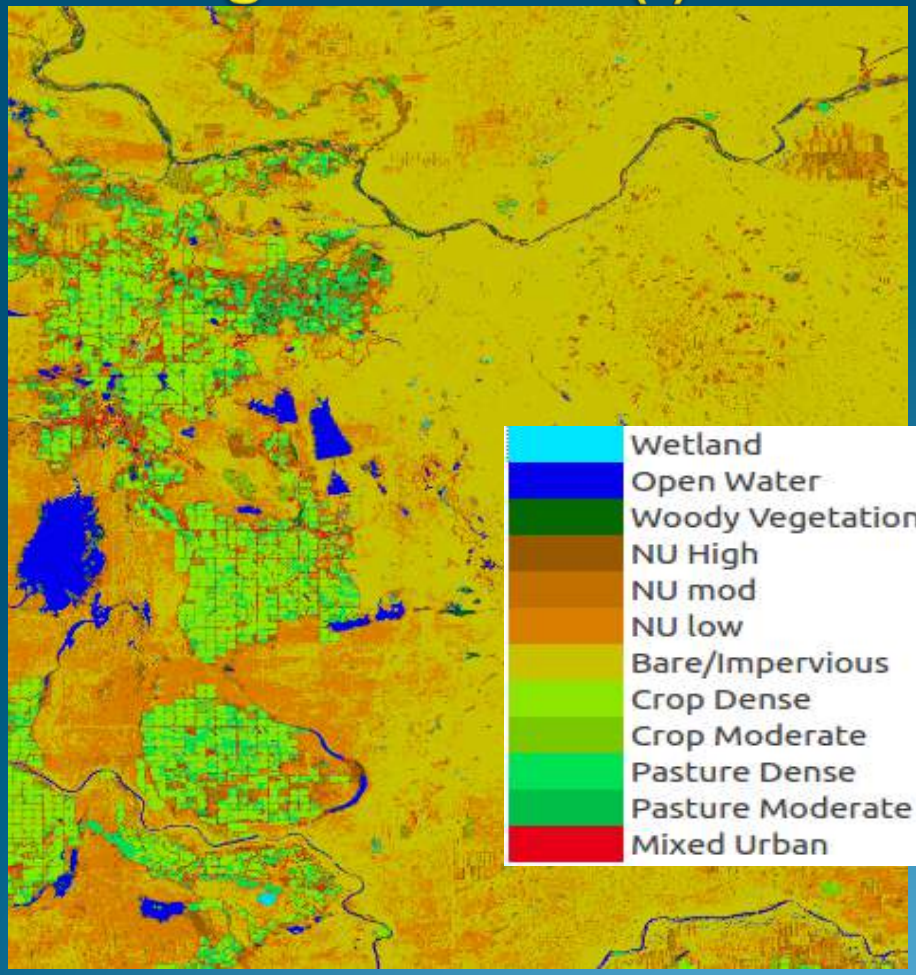


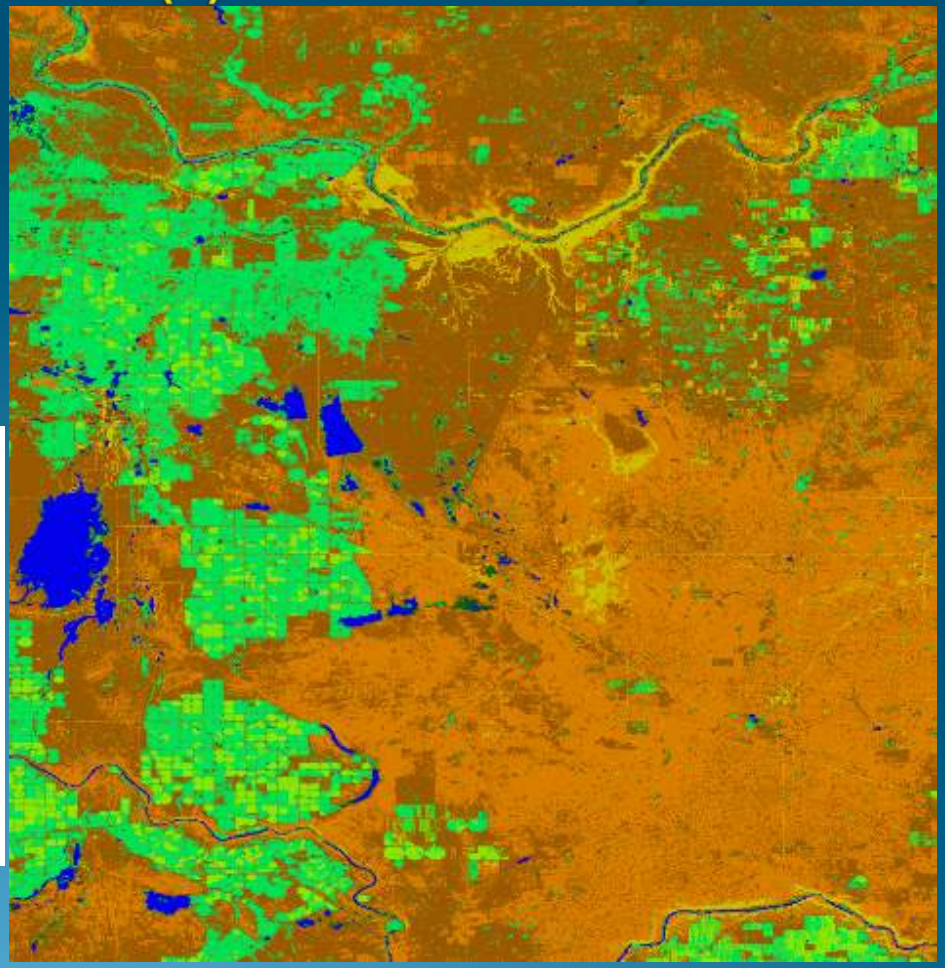

**AB Agriculture & Forestry and AB PCF**

DLR

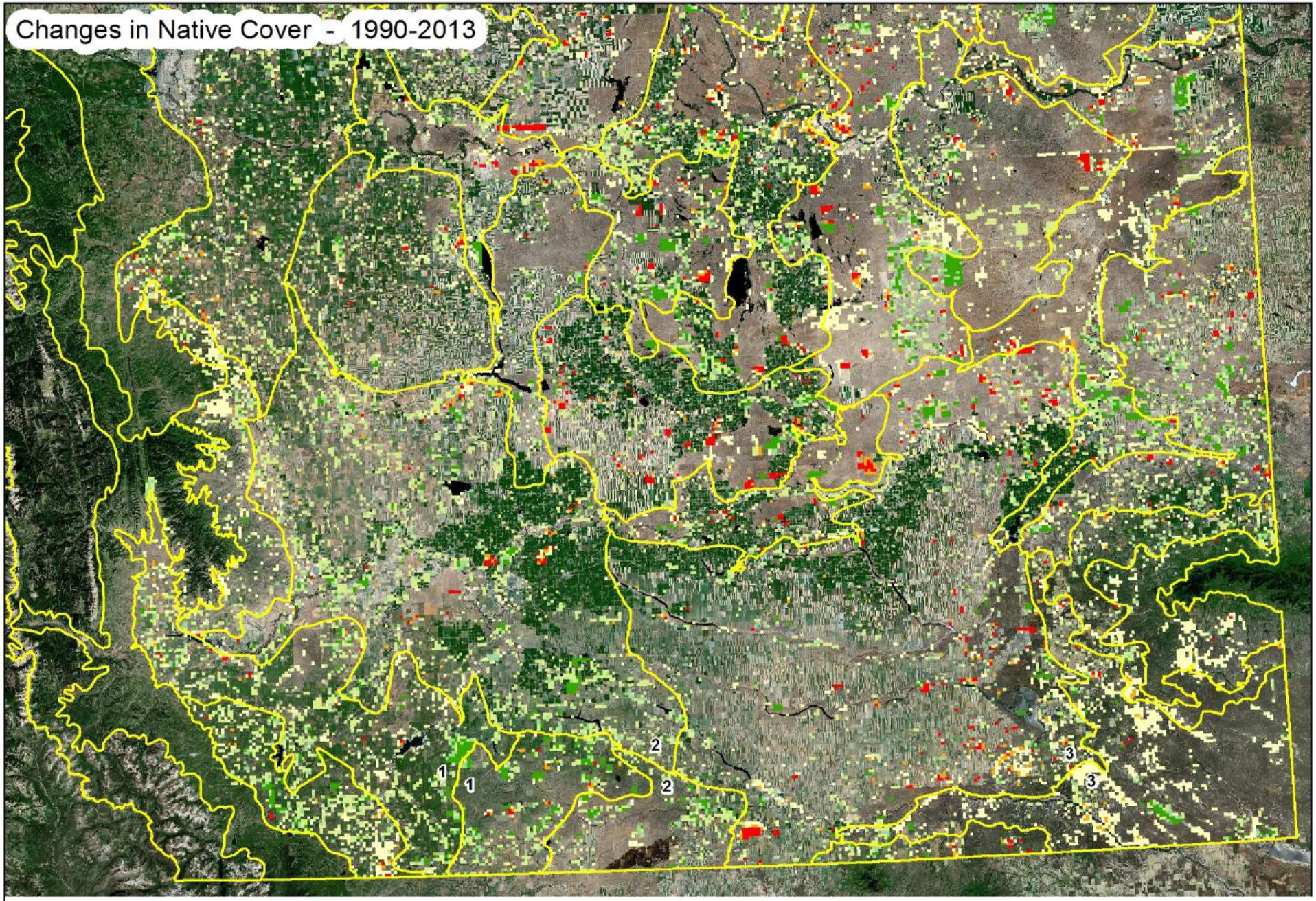
Maapera

# Change 1984-86 (l) to 2014-16(r) Brooks AB, Area



# Changes in Native Cover - 1990-2013




Base Data provided by the Government of Alberta under the Alberta Open Government License of November 2014
©Government of Alberta
©Airbus, Licensed by Planet Labs Geomatics Corp.
©Imagery Data provided by Vaultus Imagery Services.
Produced by Alberta Environment and Parks, South Saskatchewan Region.
Regional Informatics Unit, Lethbridge. January 2018.
Projection: NAD_1983_10TM_AEP_Forest

Information as depicted is subject to change, therefore the Government of Alberta assumes no responsibility for discrepancies at time of use.

Alberta Government

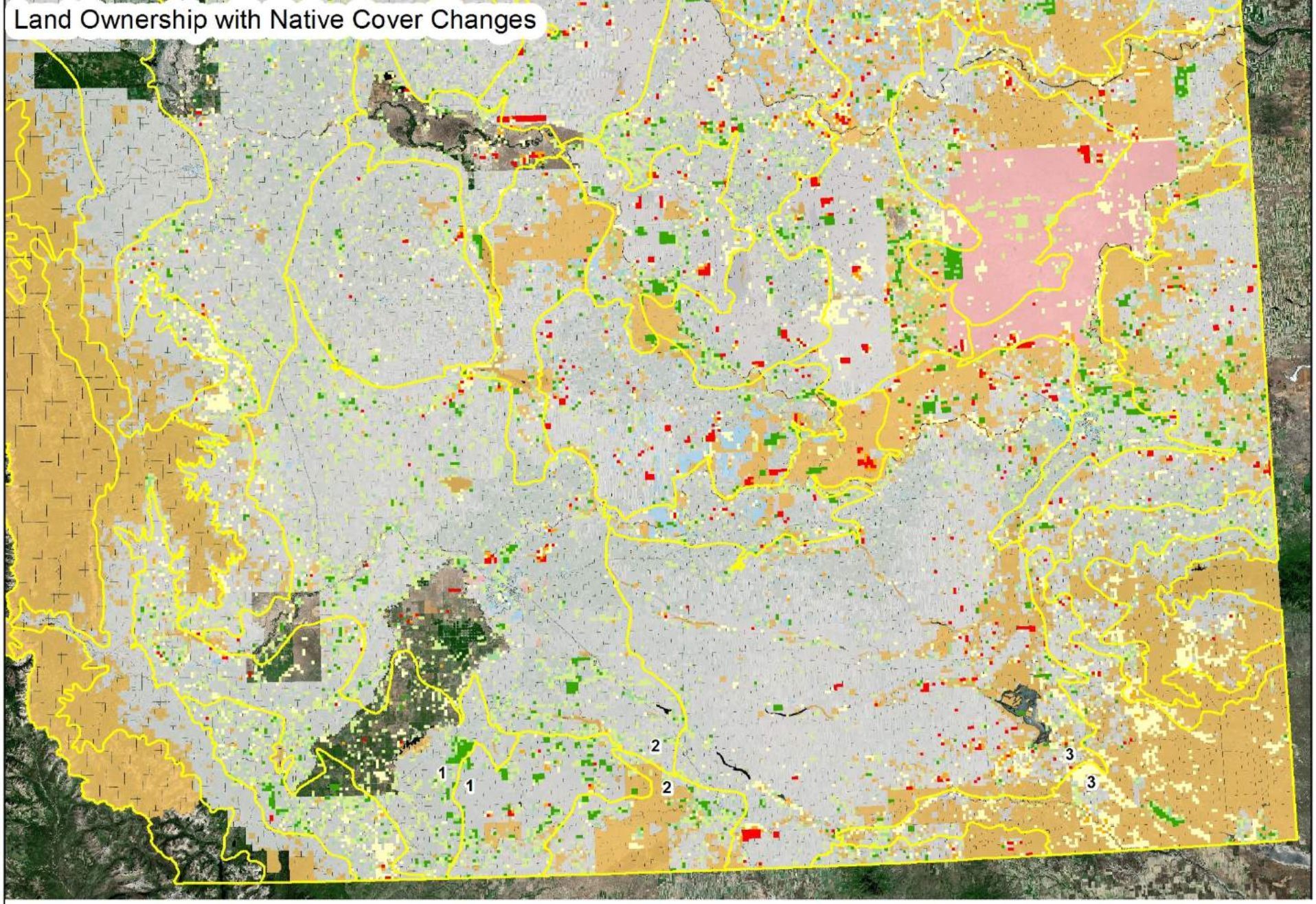
0 12.5 25 50 75 100
Kilometers

Ecodistrict Boundary

**GVI_NPVI**
**Total Native Prairie Comparison**

- -100.00 - -80.00
- -79.99 - -56.33
- -56.32 - -20.00
- 20.01 - 56.33
- 56.34 - 80.00
- 80.01 - 100.00

# Land Ownership with Native Cover Changes




Base Data provided by the Government of Alberta under the Alberta Open Government License of November 2014
©Government of Alberta
©Airbus. Licensed by Planet Labs Geomatics Corp
©Imagery Data provided by Vexcel Imagery Services
Produced by Alberta Environment and Parks, South Saskatchewan Region,
Regional Informatics Unit, Lethbridge, January 2018.
Projection: NAD_1983_10TM_AEP_Forest

Information as depicted is subject to change, therefore the Government of Alberta
assumes no responsibility for discrepancies at time of use.

Alberta Government

0 12.5 25 50 75 100
Kilometers

Ecodistrict Boundary

**Ownership Classes**

- Federal
- Private
- Municipal
- Provincial

**GVI_NPVI**
**Total Native Prairie Comparison**

- -100.00 - -80.00
- -79.99 - -56.33
- -56.32 - -20.00
- 20.01 - 56.33
- 56.34 - 80.00
- 80.01 - 100.00

# 2015 Status of Human Footprint in Parkland Natural Region of AB (AB Biodiversity Monitoring Initiative 2018)

| Human Footprint Type | Area ($km^2$) | Area(%) |
|---|---|---|
| Total Human Footprint | 47,359 | 77.96 (~22% ltd ftprint) |
| Agriculture | 41,339 | 68.05 |
| Energy | 1,245 | 2.05 |
| Forestry | 18 | 0.03 |
| Human-created Water Bodies | 164 | 0.27 |
| Transportation | 2,278 | 3.75 |
| Urban/Industrial | 2,314 | 3.81 |

**Two SOTP comparisons of 2014 vs. 1995 satellite data indicate the AB Parkland NR lost 5,300 to 7,100 square km (-8.7 to 11.7%) of native habitat**

# 2015 Status of Human Footprint in the Grassland Natural Region of AB (AB Biodiversity Monitoring Initiative 2018)

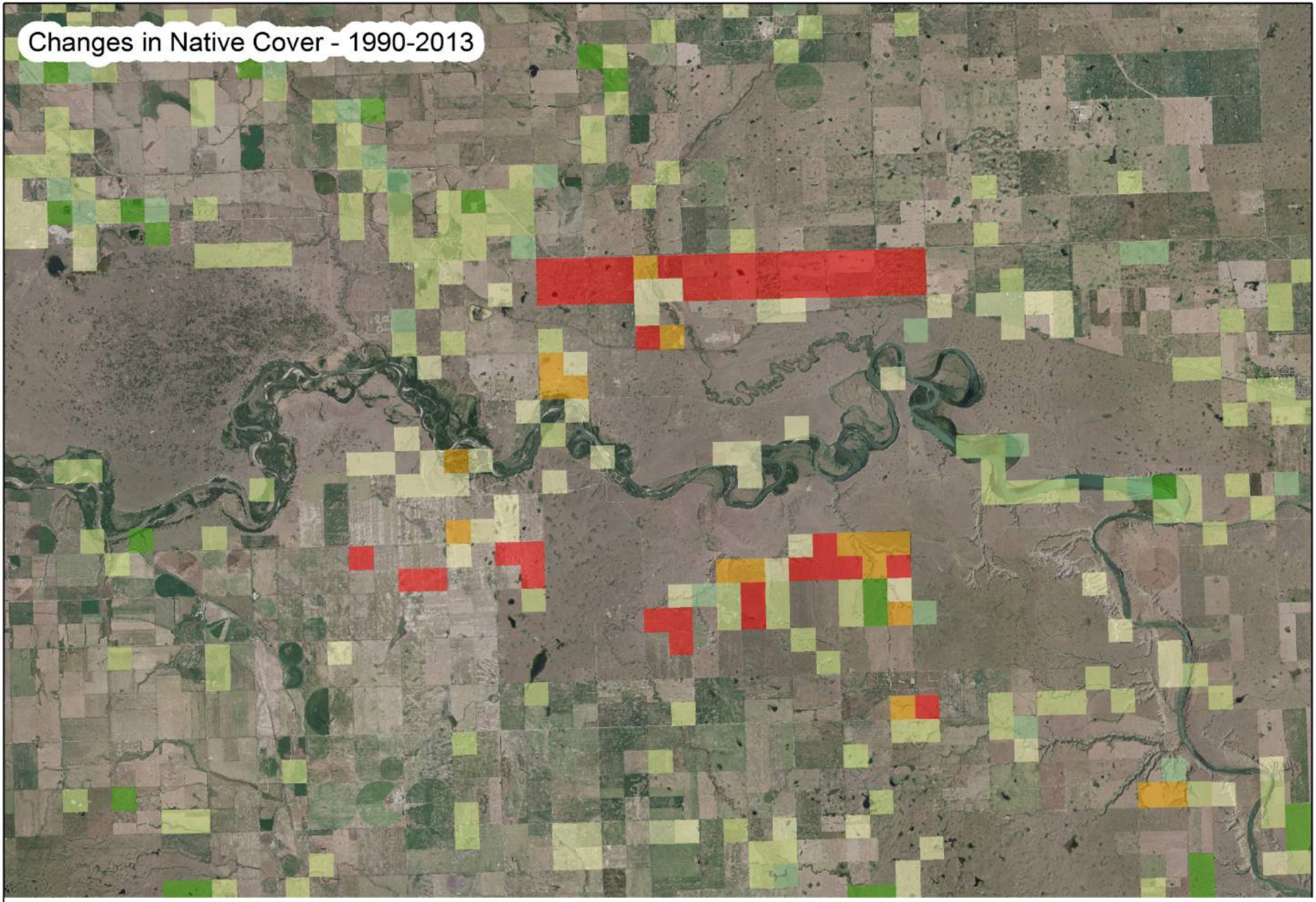
| Human Footprint Type | Area (km²) | Area(%) |
|---|---|---|
| **Total Human Footprint** | **54,568** | **57.10** (~43% ltd ftprint) |
| Agriculture | 47,401 | 49.60 |
| Energy | 2,341 | 2.45 |
| Forestry | 0 | 0.00 |
| Human-created Water Bodies | 851 | 0.89 |
| Transportation | 2,609 | 2.73 |
| Urban/Industrial | 1,405 | 1.47 |

**A SOTP comparison of 1995 (satellite) & 2014 GVI data indicates AB Grassland NR "gained" 1,5000 square kms (+1.6%) of native habitat. A separate satellite study showed a loss of 1,900 square km (-2.0%). The comparisons require further evaluation.**

# 1999 - 2015 Trend of Human Footprint in Grassland Natural Region of AB (AB Biodiversity Monitoring Initiative 2018)

| Human Footprint Type | 1999 (%) | 2015 (%) | Change (%) |
|---|---|---|---|
| Total Human Footprint | 54.82 | 57.10 | + 2.28 |
| Agriculture | 48.39 | 49.60 | + 1.21 |
| Energy | 1.49 | 2.45 | + 0.96 |
| Forestry | 0.00 | 0.00 | 0.00 |
| Human-created Water Bodies | 0.78 | 0.89 | + 0.11 |
| Transportation | 2.45 | 2.73 | + 0.28 |
| Urban/Industrial | 1.18 | 1.47 | + 0.29 |

**Parkland NR - Increase of + 2.07 in total footprint and #1 increase by Energy + 1.09**




Base Data provided by the Government of Alberta under the Alberta Open Government Licence of November 2014
©Government of Alberta
©Airbus. Licenced by Planet Labs Geomatics Corp
©Imagery Data provided by Vaultus Imagery Services
Produced by Alberta Environment and Parks. South Saskatchewan Region.
Regional Informatics Unit, Lethbridge, January 2018.
Projection: NAD_1983_10TM_AEP_Forest

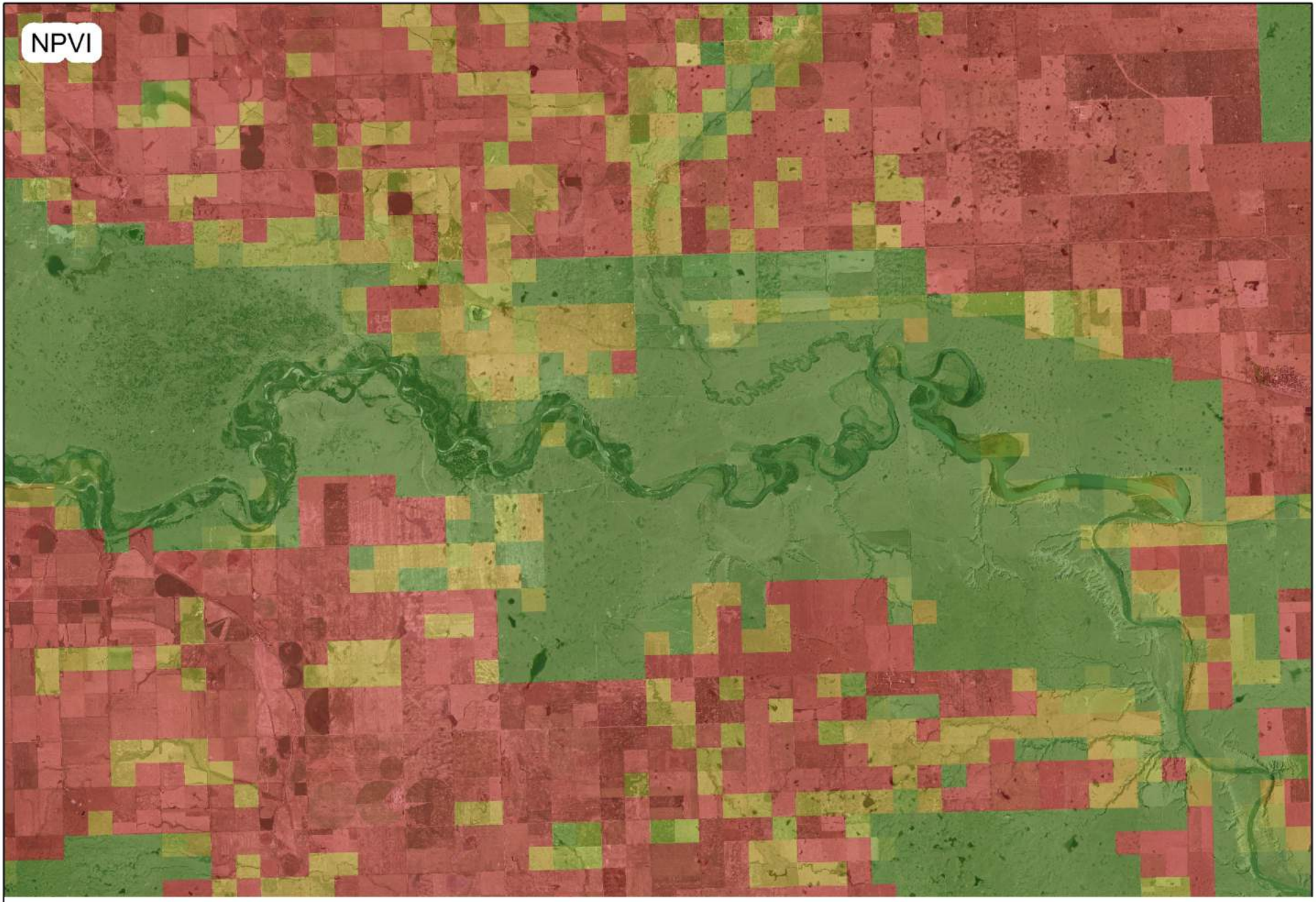
Information as depicted is subject to change, therefore the Government of Alberta assumes no responsibility for discrepancies at time of use.

Alberta Government

0 1.5 3 6 9 12
Kilometers

**GVI_NPVI**
**Total Native Prairie Comparison**

- -100.00 - -80.00
- -79.99 - -56.33
- -56.32 - -20.00
- 20.01 - 56.33
- 56.34 - 80.00
- 80.01 - 100.00




Base Data provided by the Government of Alberta under the Alberta Open Government Licence of November 2014
©Government of Alberta
©Airbus. Licenced by Planet Labs Geomatics Corp
©Imagery Data provided by Vaultus Imagery Services
Produced by Alberta Environment and Parks. South Saskatchewan Region.
Regional Informatics Unit, Lethbridge, January 2018.
Projection: NAD_1983_10TM_AEP_Forest

Information as depicted is subject to change, therefore the Government of Alberta assumes no responsibility for discrepancies at time of use.

Alberta Government

0 1.5 3 6 9 12
Kilometers

**NPVI (NPVCLS)**

1 3 5
2 4

GVI Native Prairie View

# Conclusions & Next Steps

- State of Prairie datasets provide decision makers with useful new, or updated tools, particularily based on GVI
- Collaboration has been highly efficient, effective & low cost
- Re-use & refining of past and current data is integral
- From 1995 to 2015 the loss of native habitat in the AB Parkland (9-12%) exceeds the AB Grassland (avg. ~2%)
- Further evaluation and checking is required including location evidence and/or groundtruthing
- Plan to enhance products such as 1) municipal boundaries to show change by administration; 2) watersheds & micro-watersheds; 3) fine-tune dispositions with protection (e.gs. easements, offsets) 4) finer land classes (e.g. land systems)
- Synopsis and reporting expected ~ summer 2018.

Base Data provided by the Government of Alberta under the Alberta Open Government Licence of November 2014
©Government of Alberta
©Airbus. Licenced by Planet Labs Geomatics Corp
©Imagery Data provided by Vaultus Imagery Services.
Produced by Alberta Environment and Parks, South Saskatchewan Region, Regional Informatics Unit, Lethbridge, January 2018
Projection: NAD_1983_10TM_AEP_Forest
Information as depicted is subject to change, therefore the Government of Alberta

Alberta Government

0 1.5 3 6 9 12

GVI Native Prairie View

0: < 5%
1: 5 - 25%
3: 55 - 75%
4: 80 - 100%