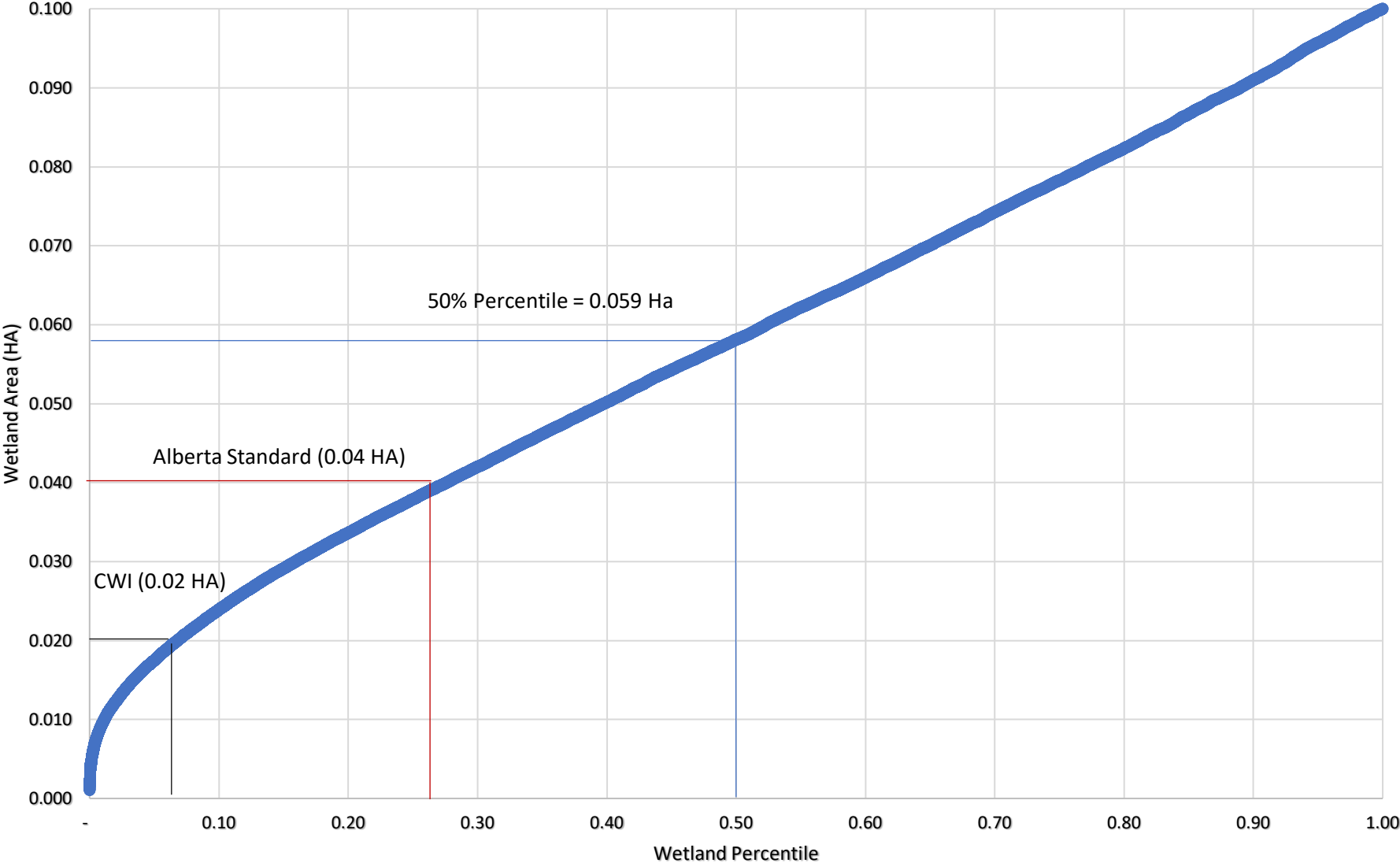


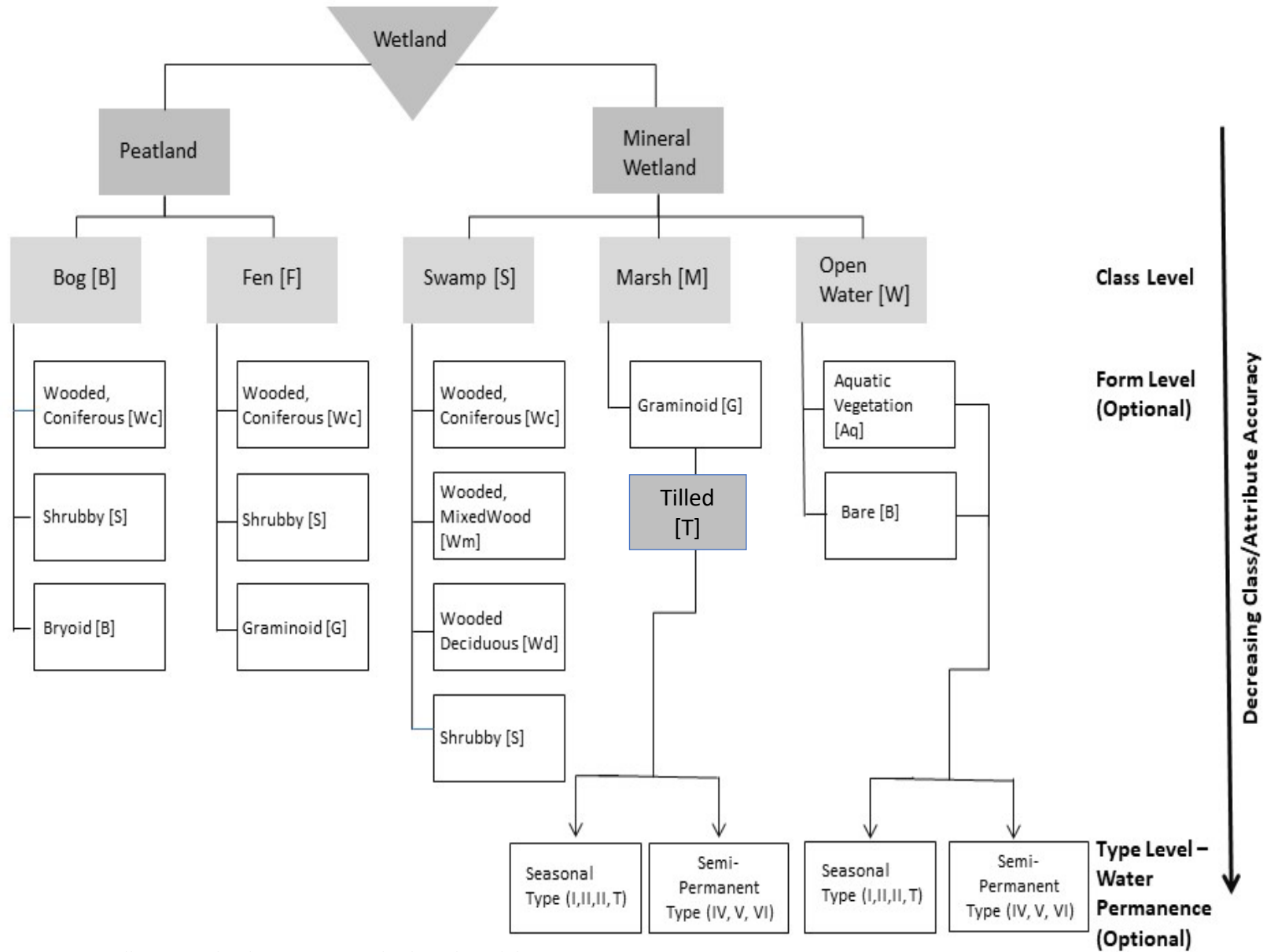
# Feature Size

Wetland Size Distribution (< 0.1 Ha)  
Exceedance Curve  
Prairie Canada



Source: Institute for Wetland and Waterfowl Research

# AWCS Classification



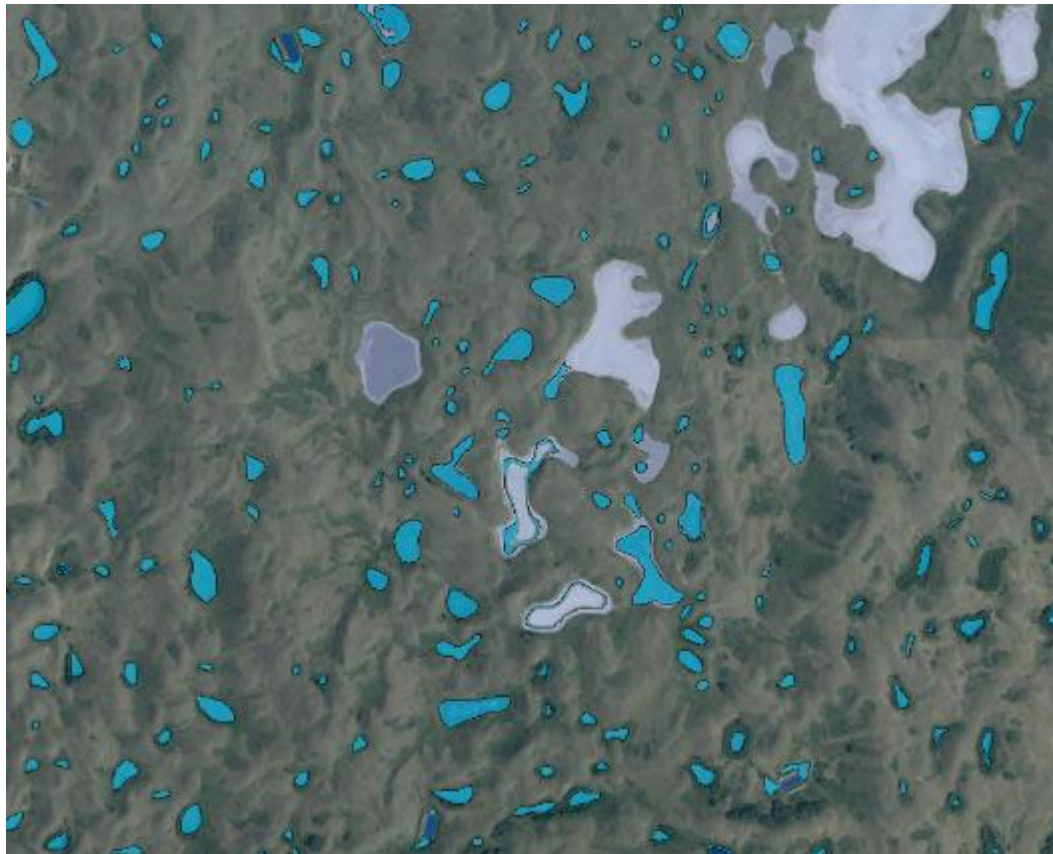
## Accuracy Requirements

- Wetland/Upland – 90%
- AWCS Class – 80%
- AWCS Form – 70%

# Reference Data

## Photogrammetry based validation

- CWI photogrammetric protocol adapted to AWCS.
- Training and validation source (i.e. 66% and 33% respectively).
- Randomly selected 5x5 Km<sup>2</sup> blocks ~5% of project area.
- Photogrammetry data used for model assessments.



Total Area of DUC Validation Basins (Pakowki)

AWCS Class	AWCS Form	Hectares
Open Water [W]		317.9
Open Water [W]	Bare (B)	366.0
Marsh [M]	Graminoid(G)	1,570.5
Marsh [M]	Tilled (T)	2,294.2
Swamp [S]	Shrubby (S)	0.1
		<b>4,548.6</b>

# Field Component

## Geospatial Mapping – Quick Field Protocol Form (2022)

Date: ___/___/2022 (Day / Mo / Year)	Obs. Time: ___:___ (Hr : Min)	Main Proj: _____ (ABMI_MC, EB, BERA, ALPHA_SG)	Crew: ___/___/___ (Circle recording crew member)				
Site Name: _____ (Proj. Abbrev.) (Nat. Region: BOREL, PARK, GRSS, etc.) (Date: yymmdd) (Crew Initials, without '/') (Wetland point no. for the day)							
GPS Location:		Coord. Sys.: UTM / Lat&Long (decimal degrees)	Projection: _____ Datum: _____				
Lat./North: _____		Long./East: _____					
1. Photos:	Direction (N,S, ...):	1. _____	2. _____	3. _____	4. _____	3. <u>Ground</u>	4. <u>Canopy</u>
	Scale Object <sup>2</sup> :						
	Obj. Ht. (m):						
	Obj. Dist. (m):						
	Dist. to Edge <sup>2</sup> (m):						
2. Wetland Indicators	<input type="checkbox"/> Surface water -> <input type="checkbox"/> Water covers > 25% of wetland AND <input type="checkbox"/> Water < 2 m deep OR <input type="checkbox"/> >= 2 m deep						
	<input type="checkbox"/> Present: <input type="checkbox"/> Aquatic fauna (snails, etc.) <input type="checkbox"/> Saturated soil <input type="checkbox"/> Algal crust <input type="checkbox"/> Surface soil cracks						
	<input type="checkbox"/> Hydrogen sulfide odor <input type="checkbox"/> Saline crusts/salt flats <input type="checkbox"/> Influenced by beaver activity <input type="checkbox"/> Hummocky terrain						
3. Tree <sup>4</sup> Cover <input type="checkbox"/> Total tree cover > 25% of area <sup>3</sup>				4. Shrub <sup>4</sup> Cover <input type="checkbox"/> Total shrub cover > 25% of area <sup>2</sup>			
<input type="checkbox"/> 75% of tree cover is conifer <input type="checkbox"/> 75% of tree cover is deciduous				<input type="checkbox"/> Typical height: <input type="checkbox"/> < 2 m OR <input type="checkbox"/> >= 2 m			
<input type="checkbox"/> Typical tree height: <input type="checkbox"/> < 10 m OR <input type="checkbox"/> >= 10 m				Species observed <sup>5</sup> :			
Species observed <sup>5</sup> :		Species observed <sup>5</sup> :		Species observed <sup>5</sup> :		Species observed <sup>5</sup> :	
<input type="checkbox"/> Black spruce	<input type="checkbox"/> Tamarack/larch	<input type="checkbox"/> Pine (Lp/Jack)	<input type="checkbox"/> White spruce	<input type="checkbox"/> Balsam fir	<input type="checkbox"/> Labrador tea	<input type="checkbox"/> Bog birch	<input type="checkbox"/> Blueberry
<input type="checkbox"/> Balsam poplar	<input type="checkbox"/> Alaska birch	<input type="checkbox"/> Wht/Pap. birch	<input type="checkbox"/> Trembl. Apsen	<input type="checkbox"/> Dogwood	<input type="checkbox"/> Bracted honeysuckle	<input type="checkbox"/> Lowbush cranberry	<input type="checkbox"/> Marsh Cinquefoil
<input type="checkbox"/> Leatherleaf	<input type="checkbox"/> Alder	<input type="checkbox"/> Rose	<input type="checkbox"/> Bearberry	<input type="checkbox"/> Dewberry	<input type="checkbox"/> Willow	<input type="checkbox"/> Bunchberry	<input type="checkbox"/> Buffalo-berry
5. Ground Cover <input type="checkbox"/> Sphagnum and/or brown mosses dominate cover OR <input type="checkbox"/> Sedges and grasses dominate cover							
Bryophyte spp. observed <sup>5</sup> :		Forb spp. observed <sup>5</sup> :		Grass, sedge, and rush spp. observed <sup>5</sup> :			
<input type="checkbox"/> Sphagnum moss	<input type="checkbox"/> Brown moss	<input type="checkbox"/> Feather moss	<input type="checkbox"/> Lichen	<input type="checkbox"/> Buckbean	<input type="checkbox"/> Cloudberry	<input type="checkbox"/> Horsetails	<input type="checkbox"/> Common water parsnip
<input type="checkbox"/> Fireweed	<input type="checkbox"/> Ferns	<input type="checkbox"/> Wtr hemlock	<input type="checkbox"/> 3-leaved Solomon's seal	<input type="checkbox"/> Grass general	<input type="checkbox"/> Bluejoint	<input type="checkbox"/> Fowl bluegrass	<input type="checkbox"/> Sloughgrass
<input type="checkbox"/> Fireweed	<input type="checkbox"/> Ferns	<input type="checkbox"/> Wtr hemlock	<input type="checkbox"/> 3-leaved Solomon's seal	<input type="checkbox"/> Rush general	<input type="checkbox"/> Wire rush	<input type="checkbox"/> Great bulrush	<input type="checkbox"/> Sloughgrass
<input type="checkbox"/> Sedge general	<input type="checkbox"/> Cattails	<input type="checkbox"/> Awnded sedge	<input type="checkbox"/> 3-square rush	<input type="checkbox"/> Reed canary grass	<input type="checkbox"/> Needle spikerush	<input type="checkbox"/> 3-square rush	
Aquatic submersed and/or floating spp. Observed <sup>5</sup> :				General floating spp. <input type="checkbox"/> General submersed spp. <input type="checkbox"/>			
<input type="checkbox"/> Bladderwort	<input type="checkbox"/> Water smartweed	<input type="checkbox"/> Milfoils	<input type="checkbox"/> Algae	<input type="checkbox"/> Hornworts	<input type="checkbox"/> Pondweeds	<input type="checkbox"/> Common duckweed	<input type="checkbox"/> Large-leaved white water crowfoot
<input type="checkbox"/> Large-leaved white water crowfoot	<input type="checkbox"/> Common duckweed	<input type="checkbox"/> Large-sheath pondweed					
6. Water Permanence <sup>6</sup> <input type="checkbox"/> Temporary <input type="checkbox"/> Seasonal <input type="checkbox"/> Semi-permanent <input type="checkbox"/> Permanent <input type="checkbox"/> Intermittent/saline							
7. AWCS Call							
Call Observations: _____							
Class: <input type="checkbox"/> Bog <input type="checkbox"/> Fen <input type="checkbox"/> Swamp <input type="checkbox"/> Marsh (Graminoid) <input type="checkbox"/> Shallow Open Water							
Form: <input type="checkbox"/> Wooded, conif. <input type="checkbox"/> Shrubby <input type="checkbox"/> Open		<input type="checkbox"/> Wooded, conif. <input type="checkbox"/> Shrubby <input type="checkbox"/> Graminoid		<input type="checkbox"/> Wooded, conif. <input type="checkbox"/> Wooded, decid. <input type="checkbox"/> Wooded, mixed <input type="checkbox"/> Shrubby		<input type="checkbox"/> Bare <input type="checkbox"/> Submersed and/or aquatic veg	
Other Notes/Comments: _____							

### Footnotes:

1. What object in the photo is being used for scale?
2. Estimated distance from the GPS point location to the edge of the homogeneous area being sampled (metres), in the given cardinal direction
3. Percent of the homogeneous area being represented by current data collection location (e.g., homogeneous wetland form)
4. Tree cover defined as: tree/woody vegetation species >= 3 m tall; shrub cover is woody vegetation < 3 m tall
5. First box indicates >=5% cover and second box indicates >= 20% cover
6. Only for marsh and shallow open water classes; only required in Grassland and Parkland Natural Regions, optional elsewhere

## Background

- Alberta Wetland Classification System Field Guide
- Designed for both Boreal and Prairie Wetlands
- Expanded species list (Prairie)
- ArcGIS Survey 123 / ArcGIS Collector

## Variables

- Wetland Indicators
- Tree cover (% , height, species)
- Shrub cover (% , height, species)
- Ground cover (% , species)
- Aquatic (% , species)
- Permanence (zone)
- AWCS (class, form)

# Field Component

## Cactus Lake Basin#3001



## UAV Obliques

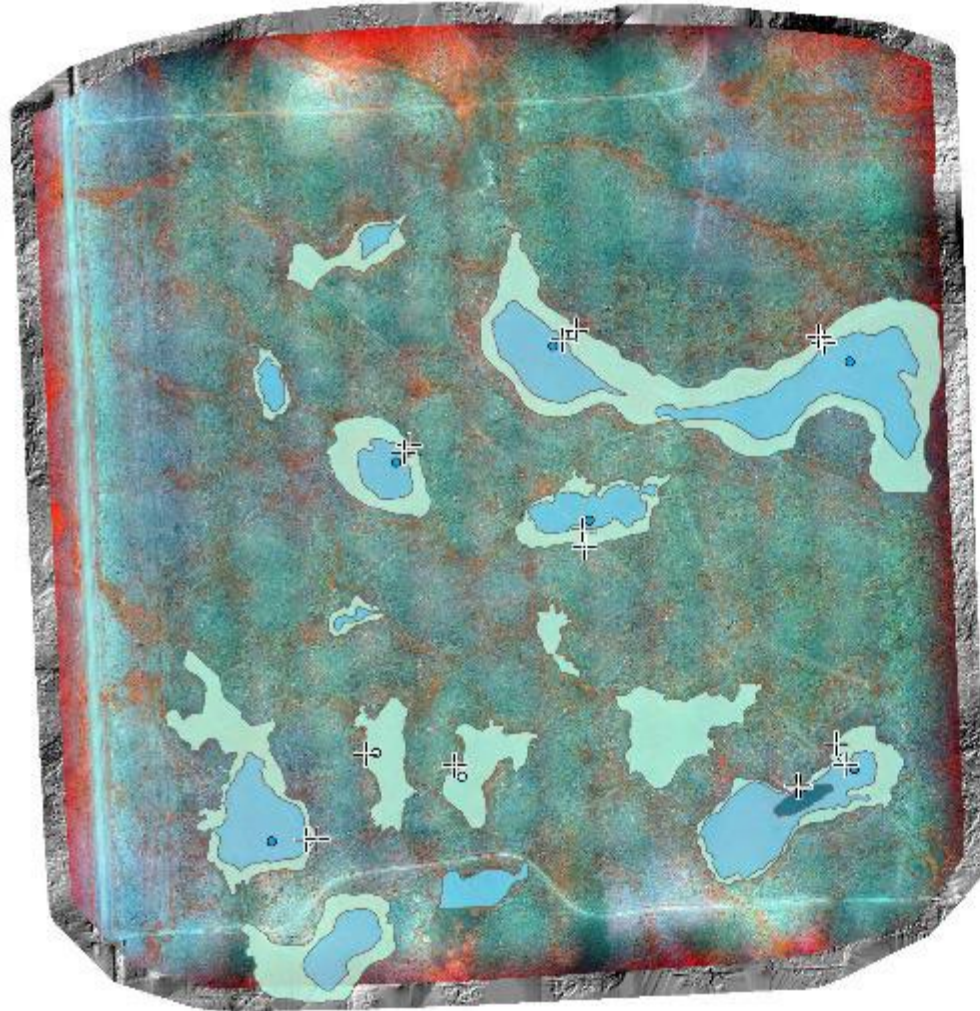


## Ground Photos



# Field Component – UAV Integration

Field Site #6 - SW15-17-11-W4

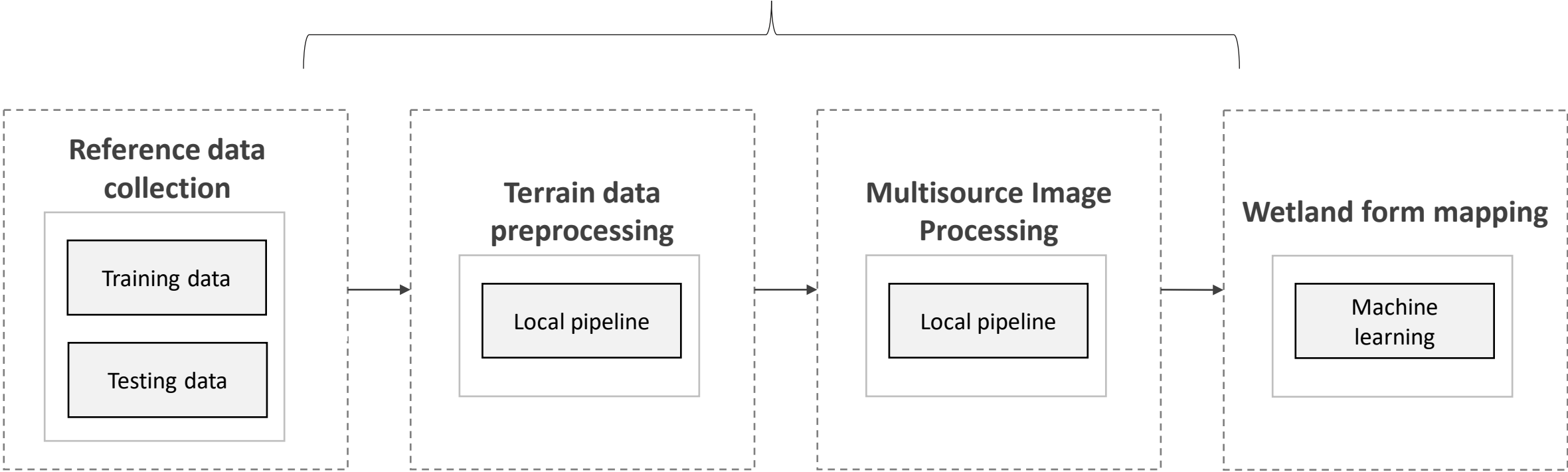


- + Edge Observations
- Zone Observations**
- Marsh - Ephemeral
- Marsh - Temporary
- Site 6 Field 2023**
- Marsh, Ephemeral
- Marsh, Temporary
- Marsh, Seasonal

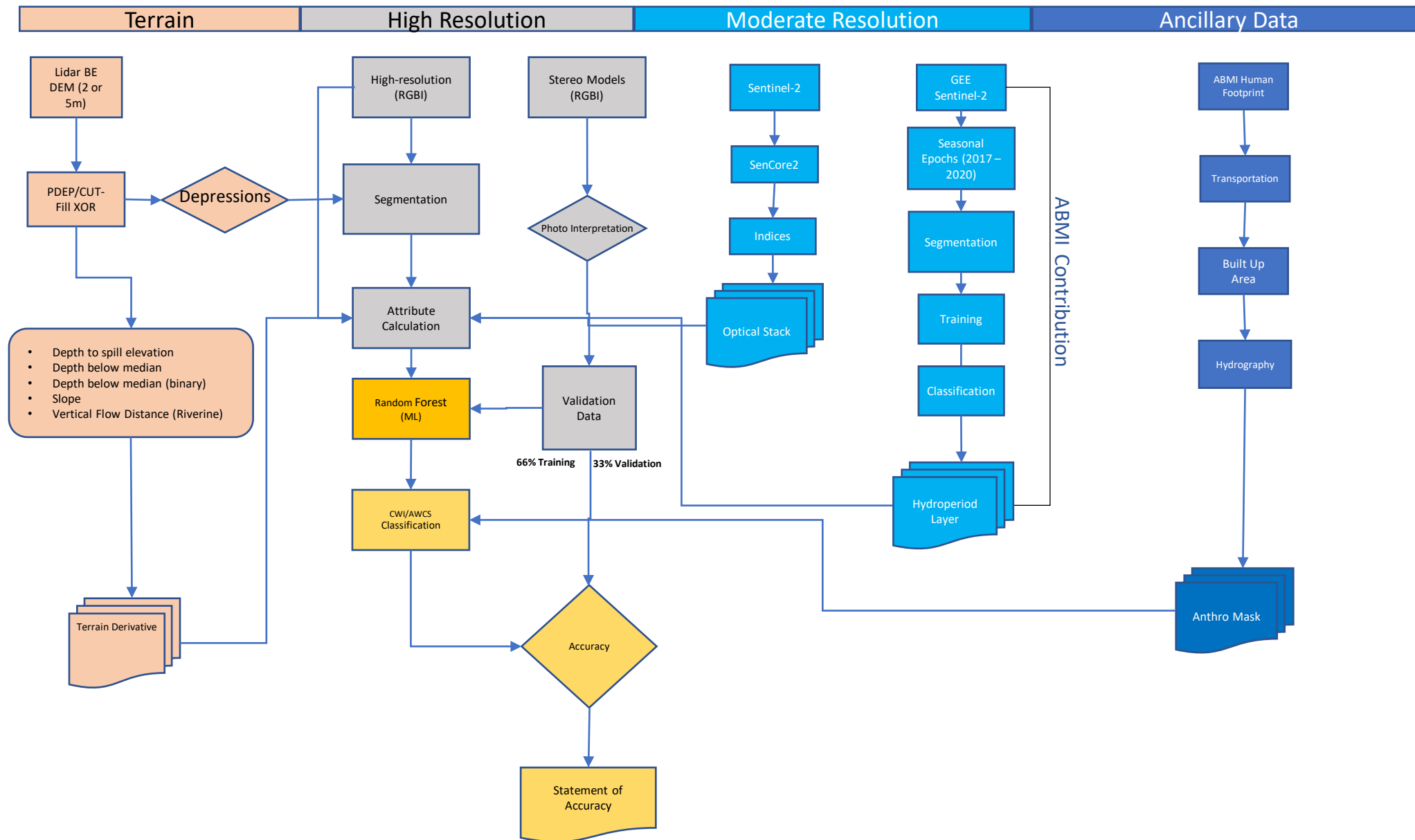
0 0.05 0.1 0.2 Miles

# DUC Prairie Wetland Mapping

## Prairie Mapping Steps

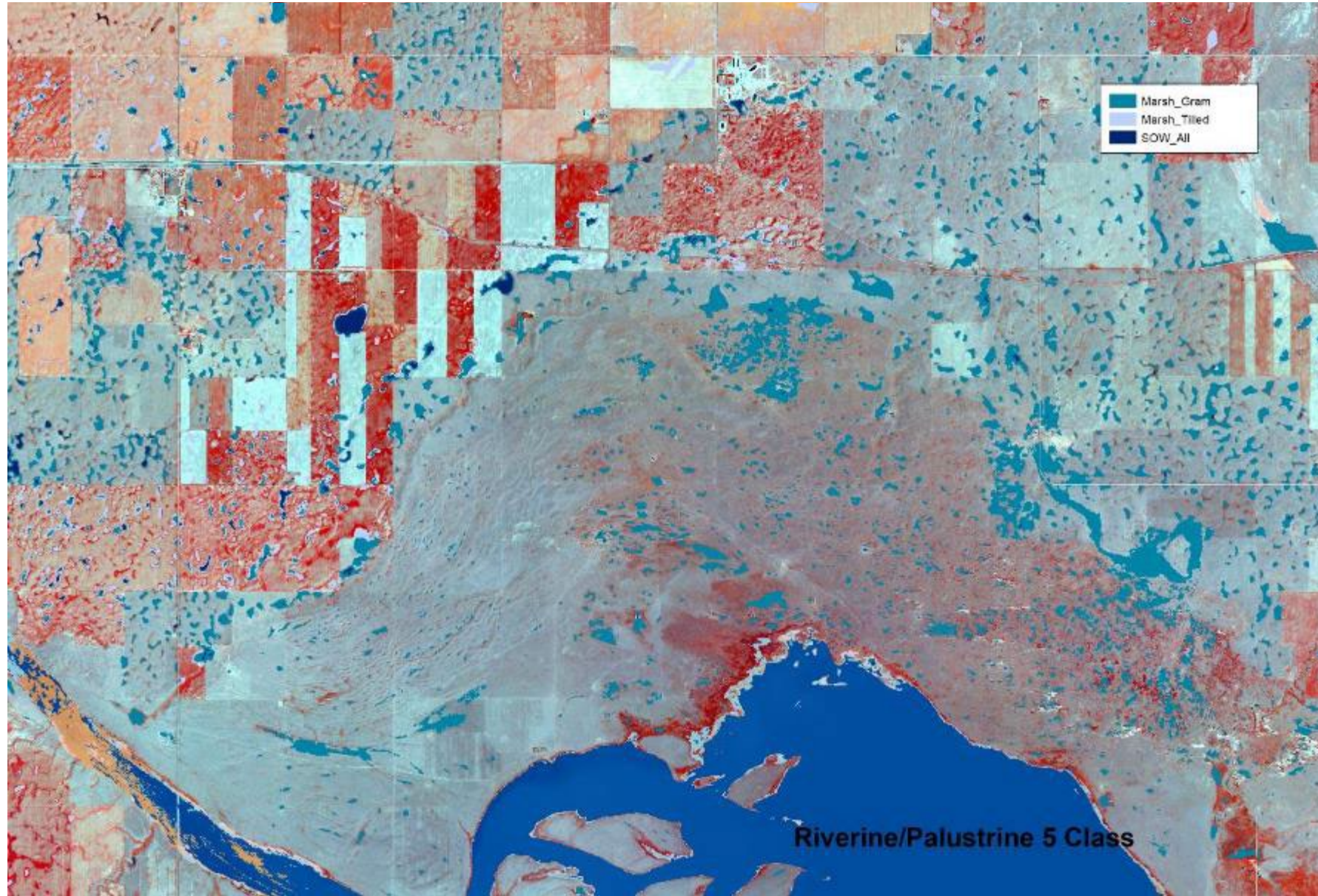


# Object Based Image Analysis (OBIA)





# Method Workflow



# OBIA Workflow – Data Sources & Classification Variables

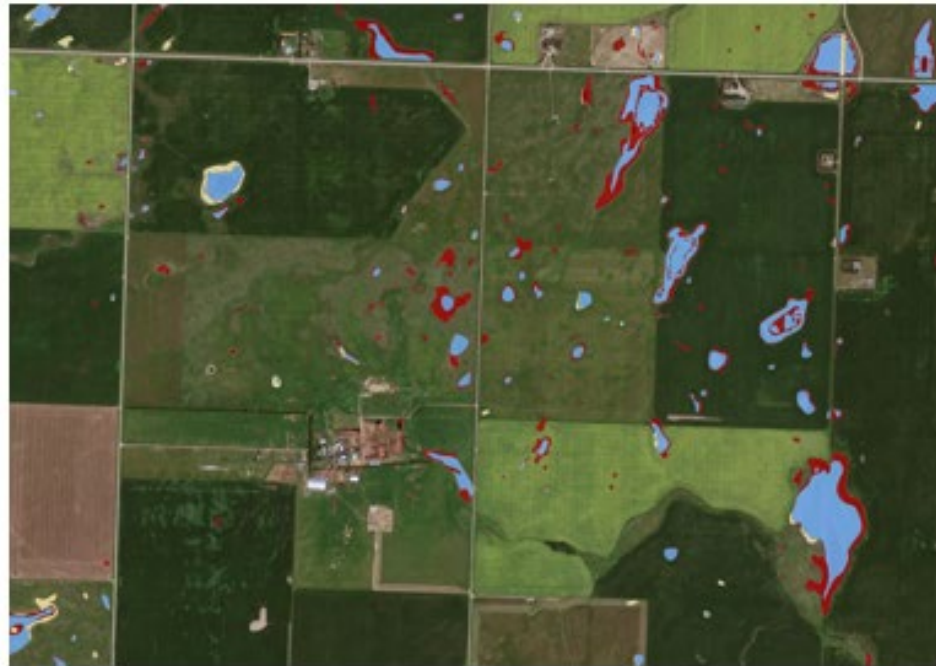
Source	SPRING	Late Spring	SUMMER
Planet Scope (3m)	2018-04-27		2018-08-06
Sentinel-2 scenes (10m)	2018-04-26_UVA 2018-04-26_UWA	2018-05-21_UWA	2018-07-30_UVA 2018-07-30_UWA
LiDAR DEM (5m)			
Hydroperiod (10m)	2016 - 2020	2016 - 2020	2016 - 2020

Image Source	Band (script)	Description	Information
PS Sum	B01	BLUE	Planet Summer blue band
PS Sum	B02	GREEN	Planet Summer green band
PS Sum	B03	RED	Planet Summer red band
PS Sum	B04	NIR	Planet Summer NIR band
PS Spr	PSSprNIR	NIR	Planet Spring NIR band
Sen2 ISpr	B14	RE1	Sen2 lateSpring red edge 1 band
Sen2 ISpr	IR7	SWIR1	Sen2 lateSpring swir1 band
Sen2 ISpr	IR8	SWIR2	Sen2 lateSpring swir2 band
Sen2 ISpr	B17	RVI	Sen2 lateSpring RVI index
Sen2 ISpr	B18	AFRI16	Sen2 lateSpring AFRI16 index (PCI VEGINDEX)
Sen2 ISpr	B19	AFRI21	Sen2 lateSpring AFRI21 index (PCI VEGINDEX)
Sen2 ISpr	B20	RENDVI	Sen2 lateSpring RENDVI index (PCI VEGINDEX)
Sen2 ISpr	B21	MRENDVI	Sen2 lateSpring MRENDVI index (PCI VEGINDEX)
Sen2 Sum	B22	Green	Sen2 Summer green band
Sen2 Sum	B23	Red	Sen2 Summer red band
Sen2 Sum	B24	MNDWI	Sen2 Summer MDNWI index
AAFC	B25	CropProb	Crop probability (AAFC up to 2018)
ABMI	B26	Hydroperiod	ABMI's Hydroperiod normalized (0 – 100 values)
LiDAR	B28	Slope	LiDAR Slope
LiDAR	B29	MDB	LiDAR Depth to Spill
LiDAR	B30	MBE	LiDAR Median Basin Elevation (Value /Binary)

# Quantitative Challenges

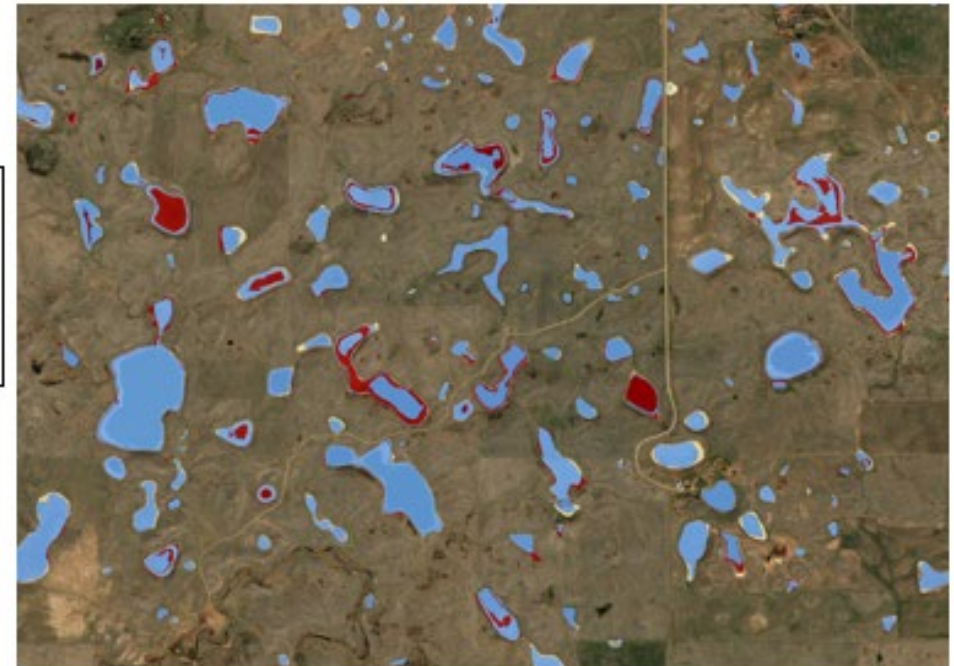
## Upland/Wetland Split – Prairie OBIA sites

Calgary West



Source: Planet Labs Inc. 2022

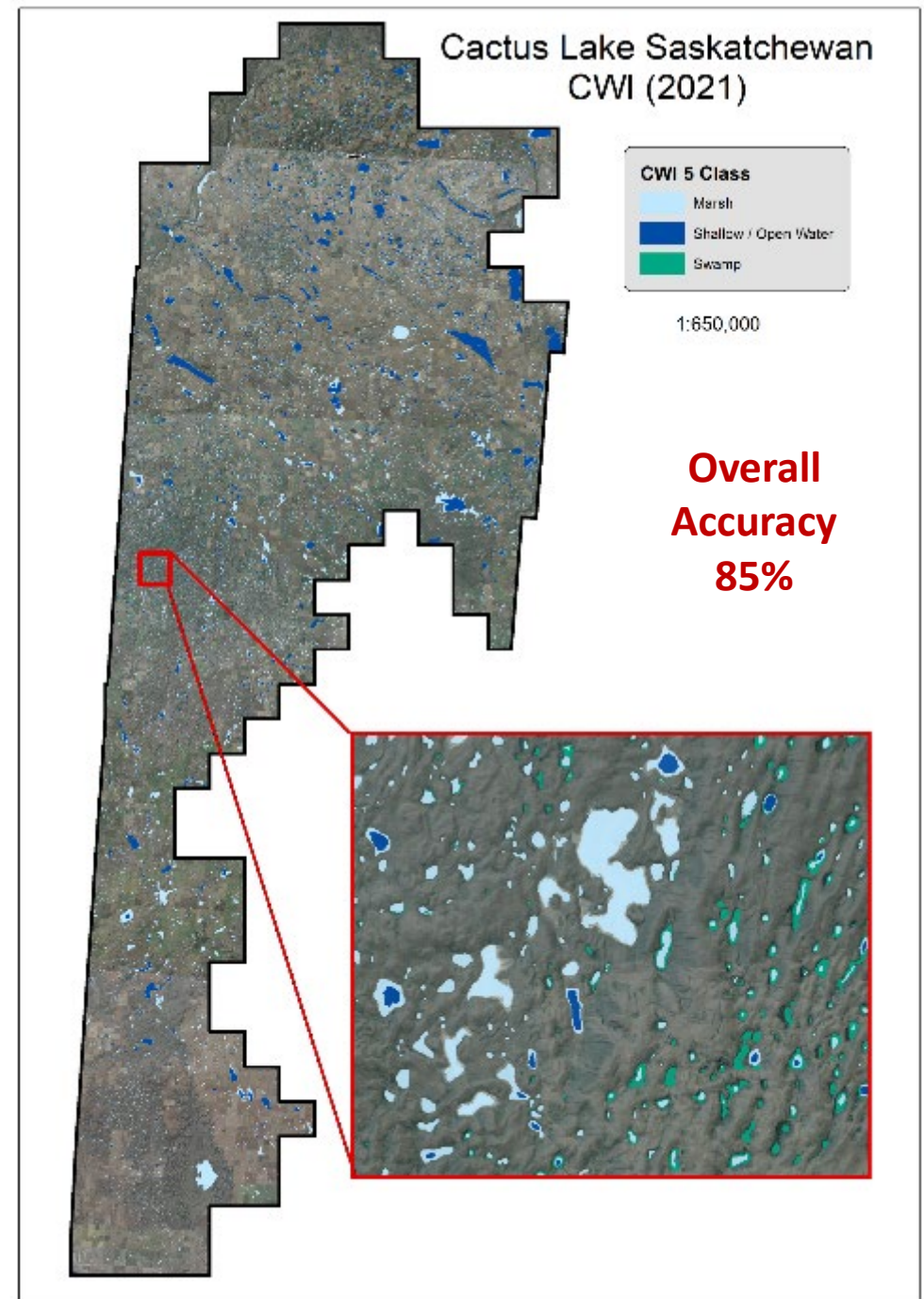
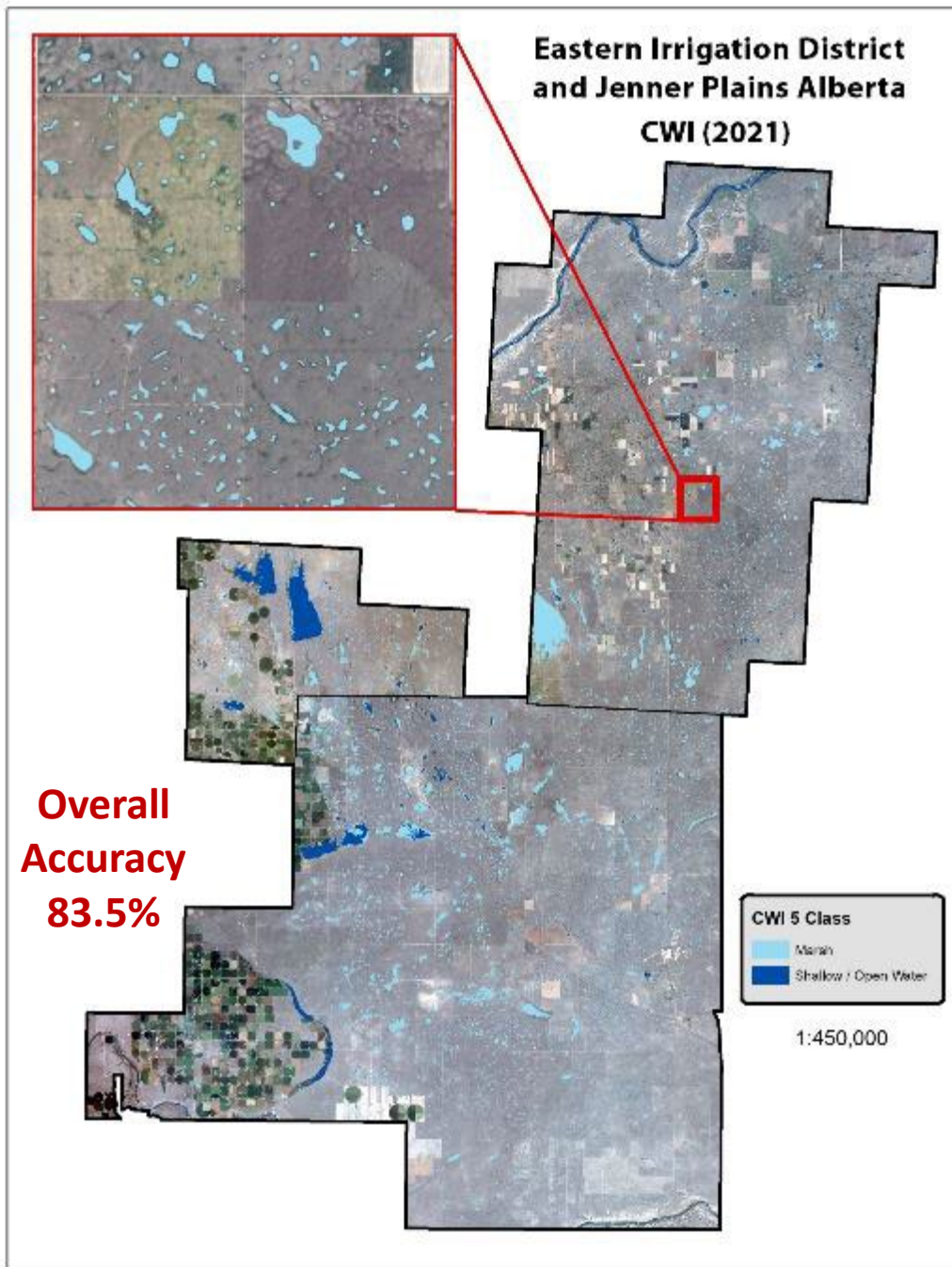
Cypress



Source: Planet Labs Inc. 2022

### Error Distribution

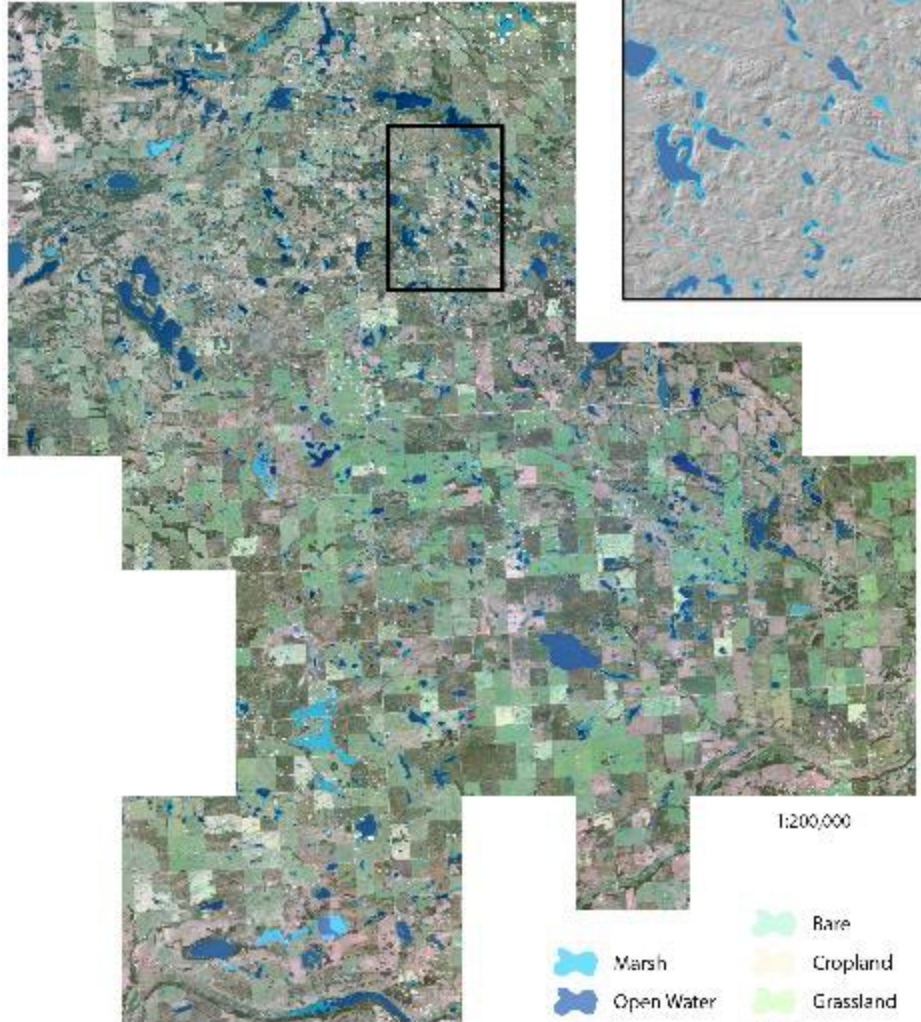
- Agreement
- Commission
- Omission



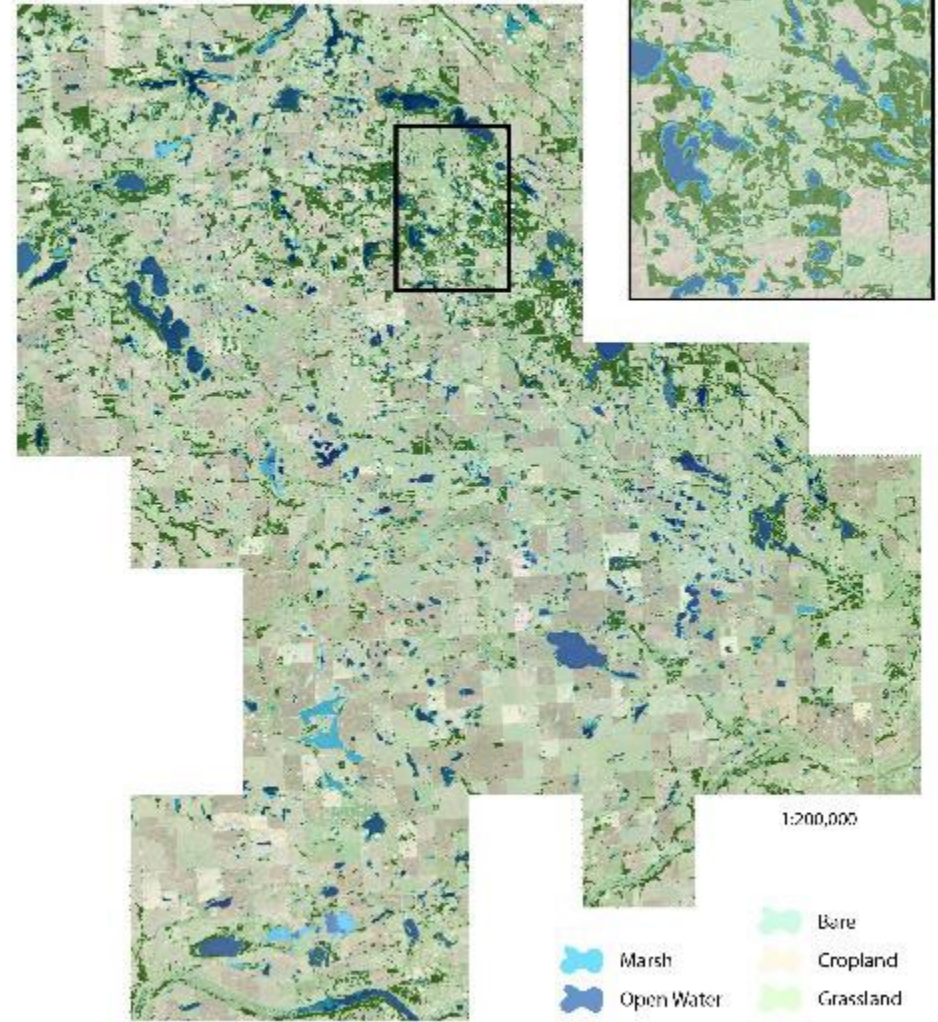
# Mapping Deliverables -- Parkland



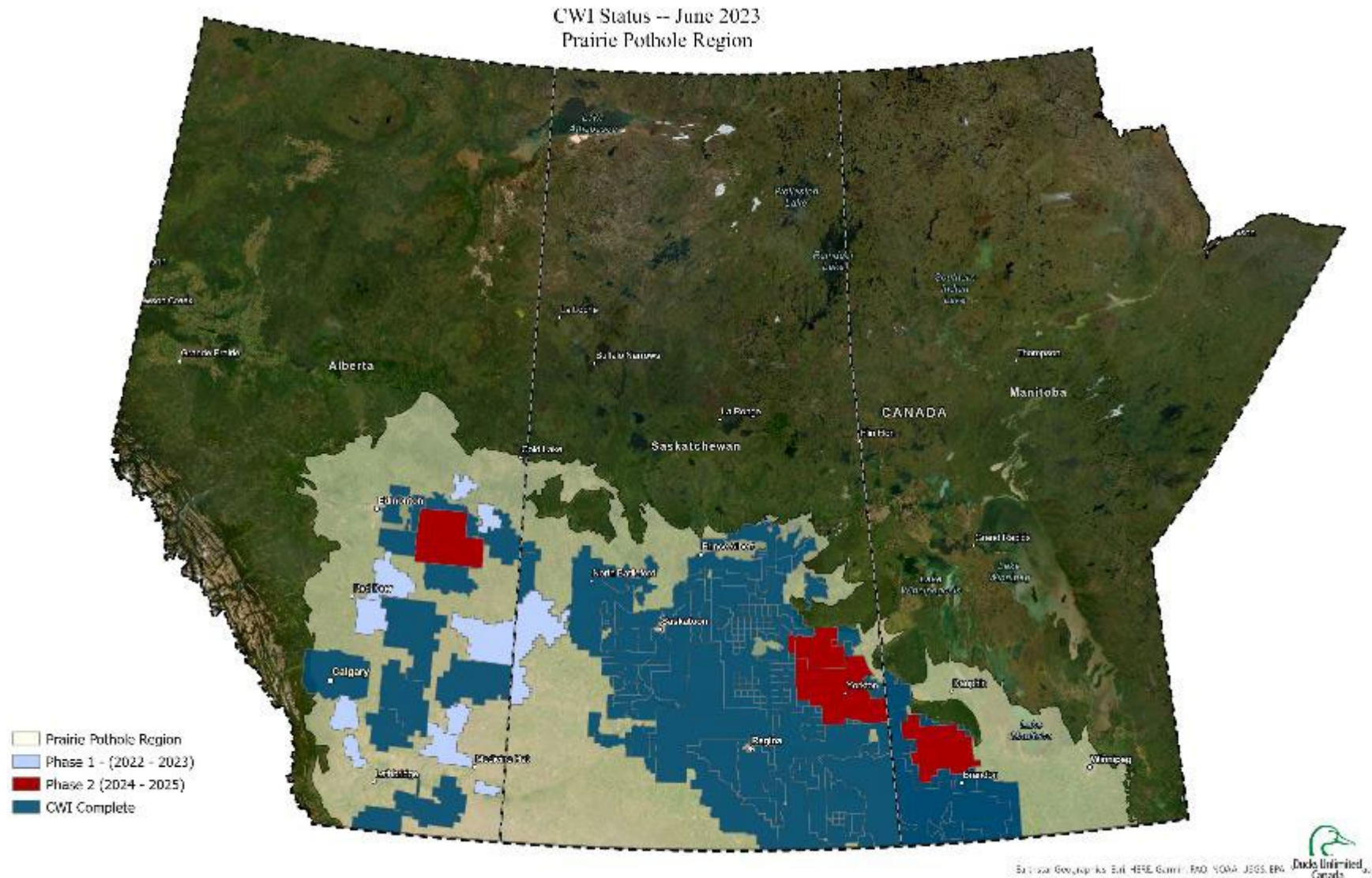
## Derwent Target Landscape



## Derwent Target Landscape



# CWI Status



## Phase 1

### Prairie Target Landscapes

- Eastern Irrigation District
- Jenner Plains
- Clear Lake
- Calgary West

### Parkland Target Landscapes

- Buffalo Lake
- Pine Lake
- Eastern Plains
- Cactus Lake

## Phase 2

### Parkland Target Landscapes

- Viking -- AB
- Conjuring Creek/ Upper Assiniboine - SK
- Minnedosa / Shoal Lake -- MB

<https://maps.ducks.ca/cwi/>

# Prairie Wetland Mapping Next Steps

## Next Steps:

- Bring additional expertise to increase DUC Prairie GIS capability and capacity
- Determine standardized accuracy reporting framework, method, and acceptance criteria
- Evaluate the repeatability of OBIA method to characterize these dynamic features
- Improve the scalability of OBIA approach
- Continue to evaluate emerging alternative approaches (i.e. XGBoost, CNN)

