MINNESOTA NWI UPDATE

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U.S. FISH & WILDLIFE SERVICE
DEPARTMENT OF THE INTERIOR

DUCKS UNLIMITED

ENVIRONMENT AND NATURAL RESOURCES TRUST FUND

INTEGRATING SEMI-AUTOMATED MAPPING TECHNIQUES INTO PRODUCTION LEVEL WETLAND MAPPING

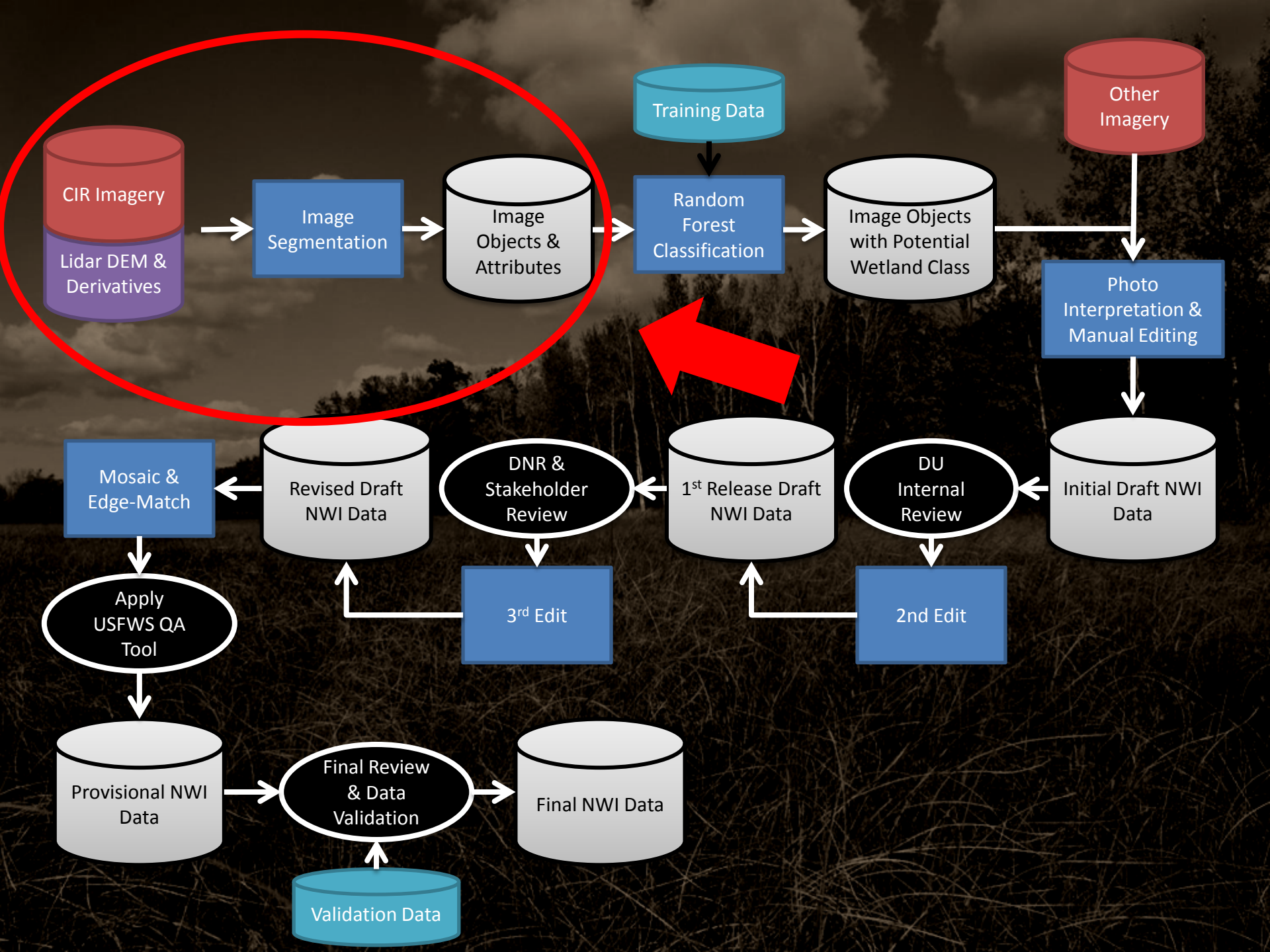
A Collaborative Effort

- Ducks Unlimited, Inc.
- Equinox Analytics, Inc.
- MN DNR Resource Assessment

DUCKS UNLIMITED

EQUINOX ANALYTICS INC

Minnesota DEPARTMENT OF NATURAL RESOURCES


CIR Imagery
Lidar DEM & Derivatives
Image Segmentation
Image Objects & Attributes
Training Data
Random Forest Classification
Image Objects with Potential Wetland Class
Other Imagery
Photo Interpretation & Manual Editing
Initial Draft NWI Data
DU Internal Review
1st Release Draft NWI Data
DNR & Stakeholder Review
Revised Draft NWI Data
Mosaic & Edge-Match
Apply USFWS QA Tool
Provisional NWI Data
2nd Edit
3rd Edit
Final Review & Data Validation
Validation Data
Final NWI Data

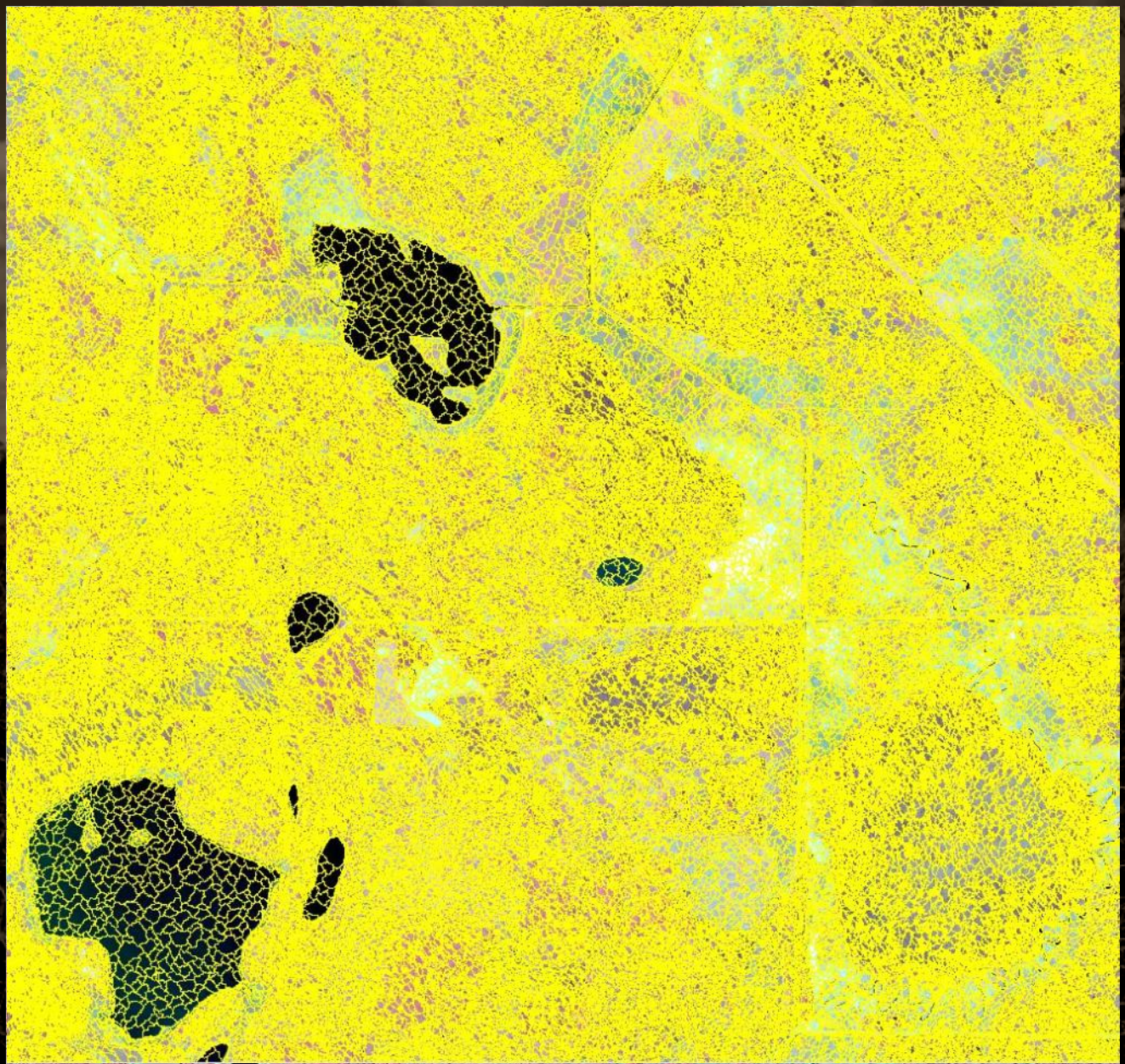
SEGMENTATION GOAL

To reduce the amount of time the photo interpreters spend on delineating wetland boundaries so they can focus their efforts on identifying the wetland class, water regime and modifiers

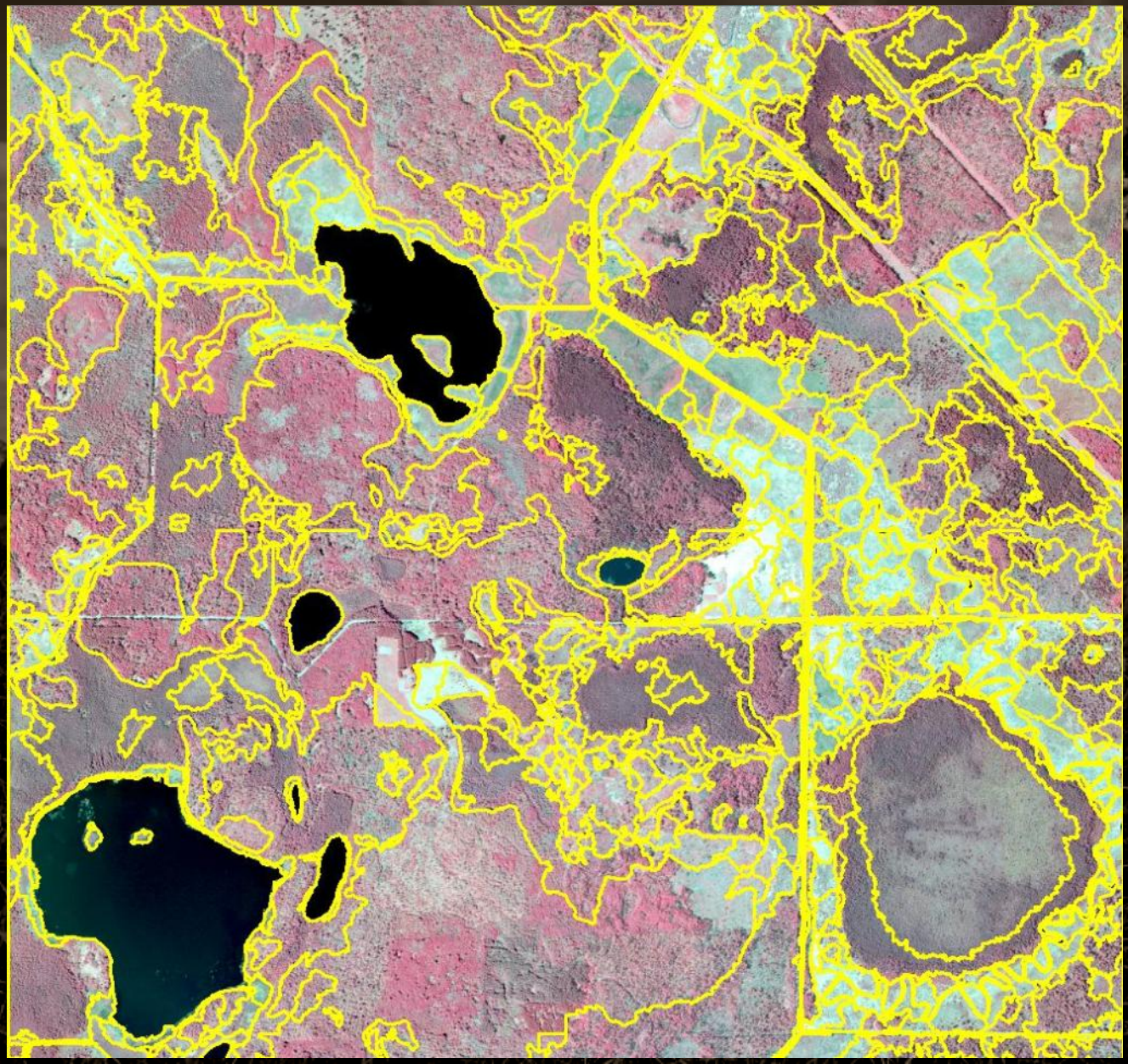
BY UTILIZING

An automated segmentation process with high resolution aerial imagery and Lidar data

GENERIC VS TRAINED SEGMENTS



GENERIC VS TRAINED SEGMENTS

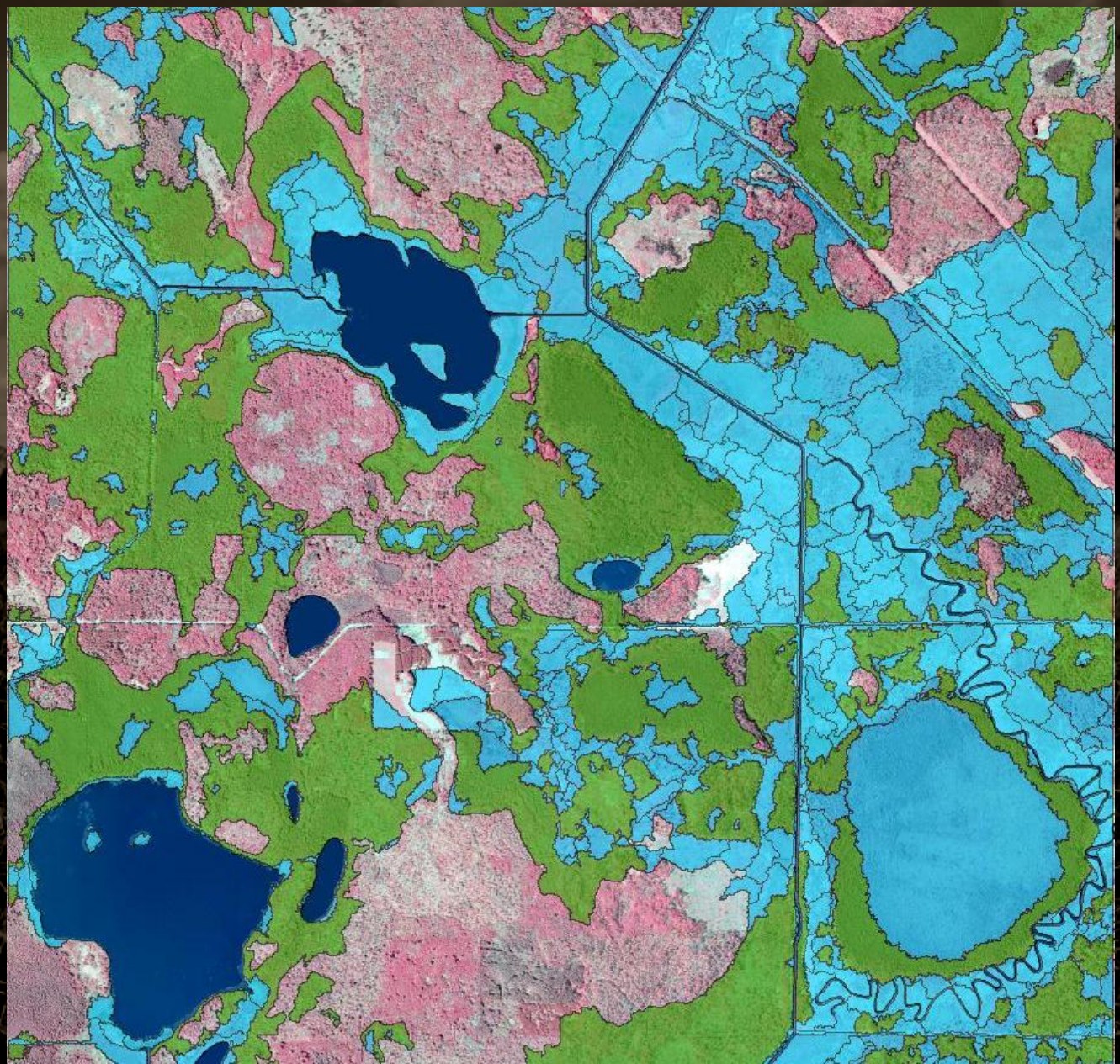


GENERIC VS TRAINED SEGMENTS

Water

Forested Wetlands

All Other Wetlands



PROCESS

"Layer Stack"

Lidar data and derivates

Minnesota Department of Natural Resources

Equinox Analytics Inc

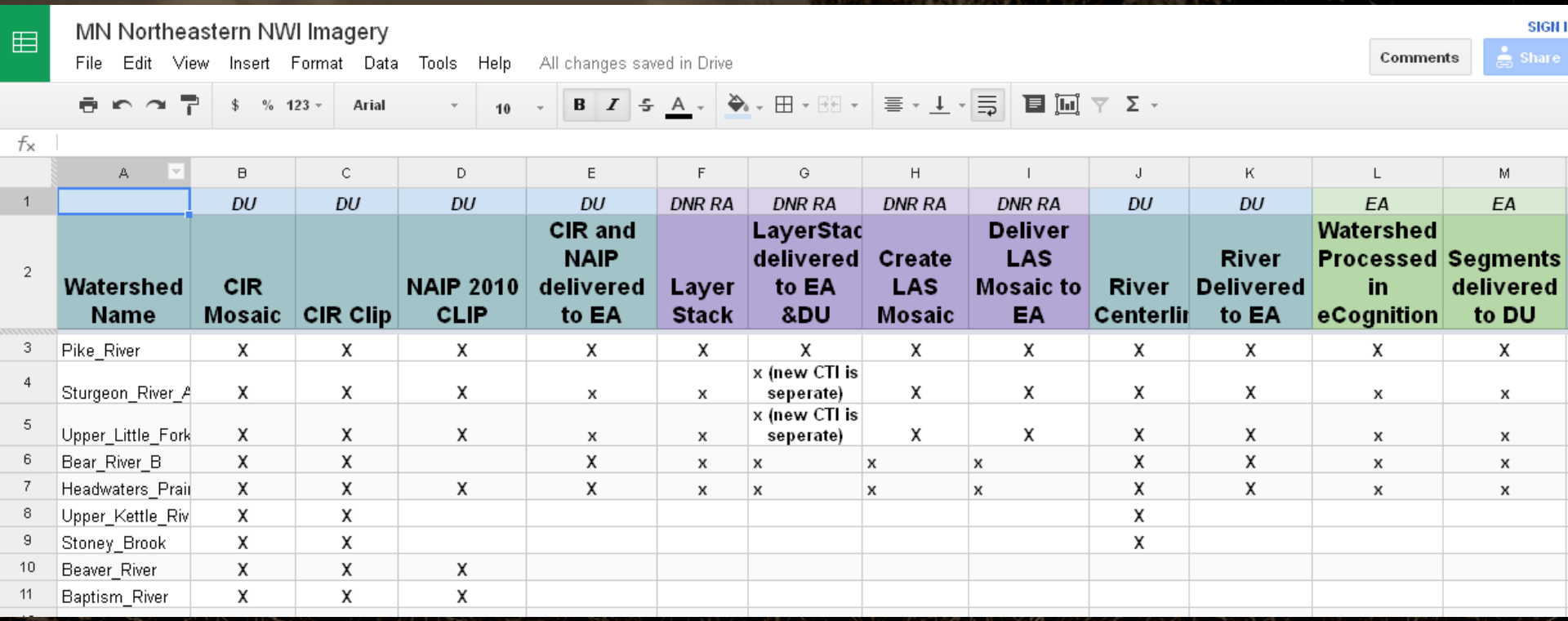
Image Segmentation

Ducks Unlimited

Aerial photo mosaics, River Centerlines, and Bathymetric data

Results: wetland polygons for the DU Photo Interpreters to classify

GOOGLE DOC TO TRACK PROGRESS



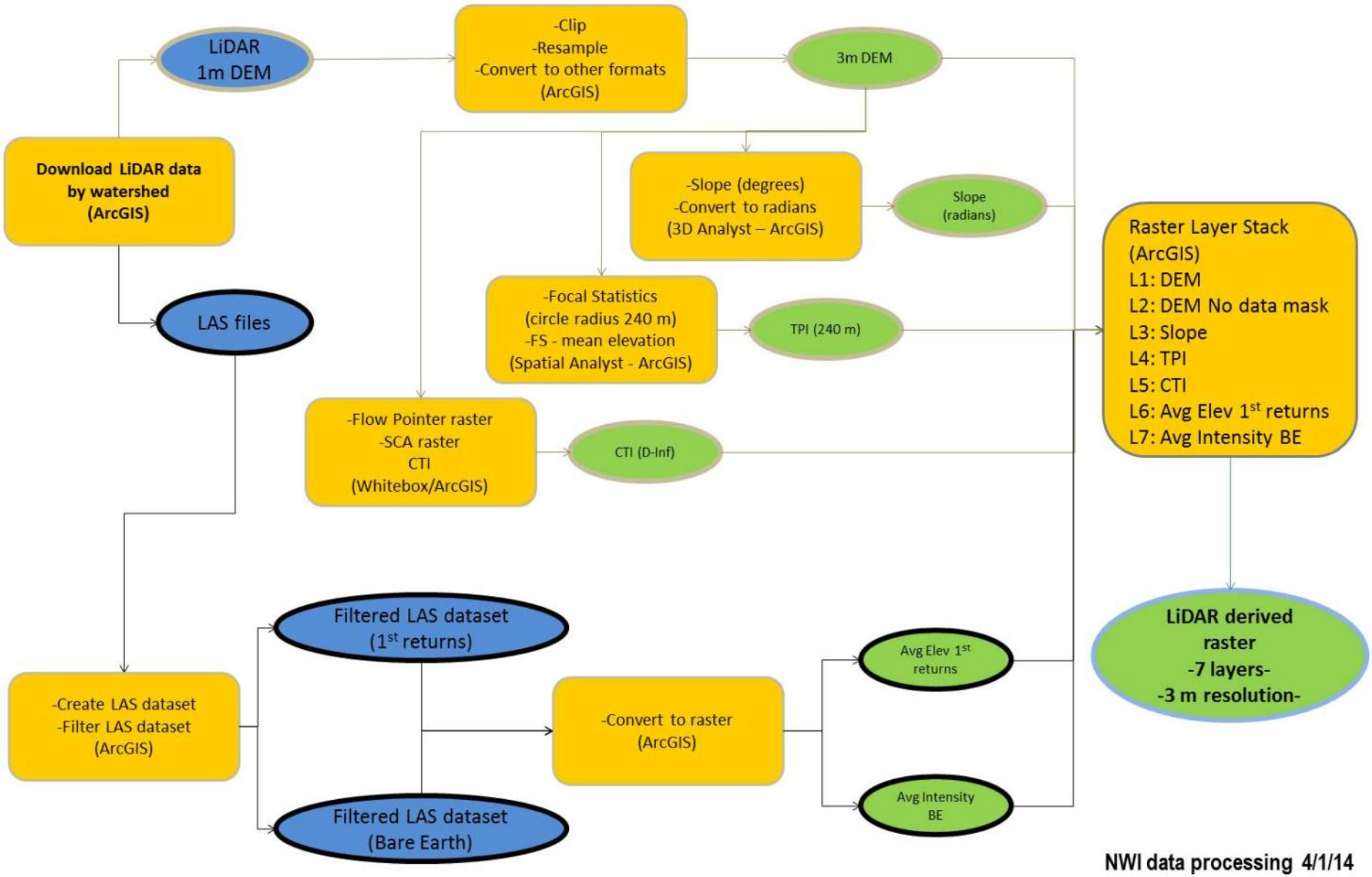
MN Northeastern NWI Imagery

File Edit View Insert Format Data Tools Help All changes saved in Drive

Comments Share

	A	B	C	D	E	F	G	H	I	J	K	L	M
1		DU	DU	DU	DU	DNR RA	DNR RA	DNR RA	DNR RA	DU	DU	EA	EA
2	Watershed Name	CIR Mosaic	CIR Clip	NAIP 2010 CLIP	CIR and NAIP delivered to EA	Layer Stack	LayerStac delivered to EA &DU	Create LAS Mosaic	Deliver LAS Mosaic to EA	River Centerlir	River Delivered to EA	Watershed Processed in eCognition	Segments delivered to DU
3	Pike_River	X	X	X	X	X	X	X	X	X	X	X	X
4	Sturgeon_River_A	X	X	X	x	x	x (new CTI is seperate)	X	X	X	X	x	x
5	Upper_Little_Fork	X	X	X	x	x	x (new CTI is seperate)	X	X	X	X	x	x
6	Bear_River_B	X	X		X	x	x	x	x	X	X	x	x
7	Headwaters_Prair	X	X	X	X	x	x	x	x	X	X	x	x
8	Upper_Kettle_Riv	X	X							X			
9	Stoney_Brook	X	X							X			
10	Beaver_River	X	X	X									
11	Baptism_River	X	X	X									

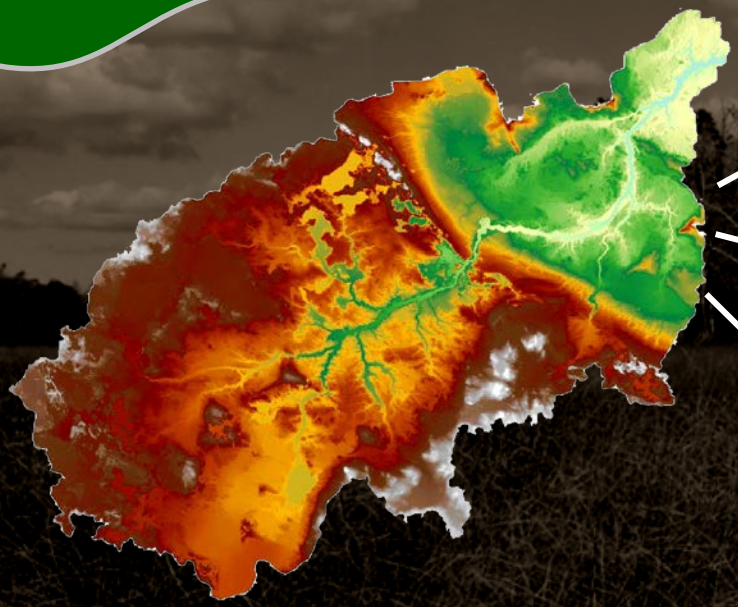
LAYER STACK



NWI data processing 4/1/14

LAYER STACK

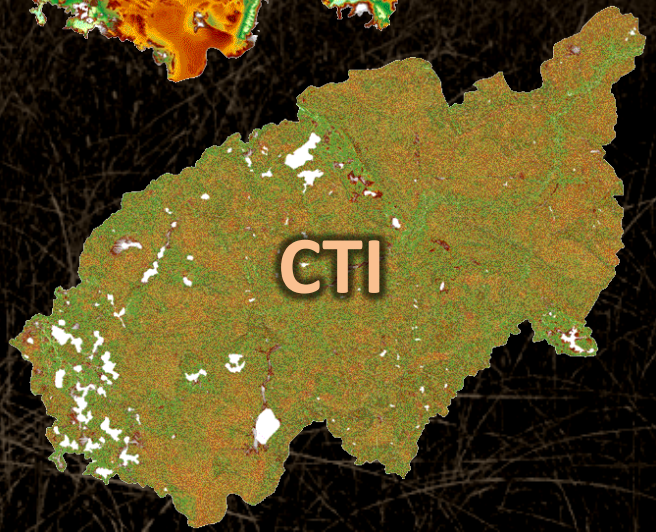
DEM
Slope
TPI
CTI
Height
Intensity



Lidar 3m DEM

SLOPE

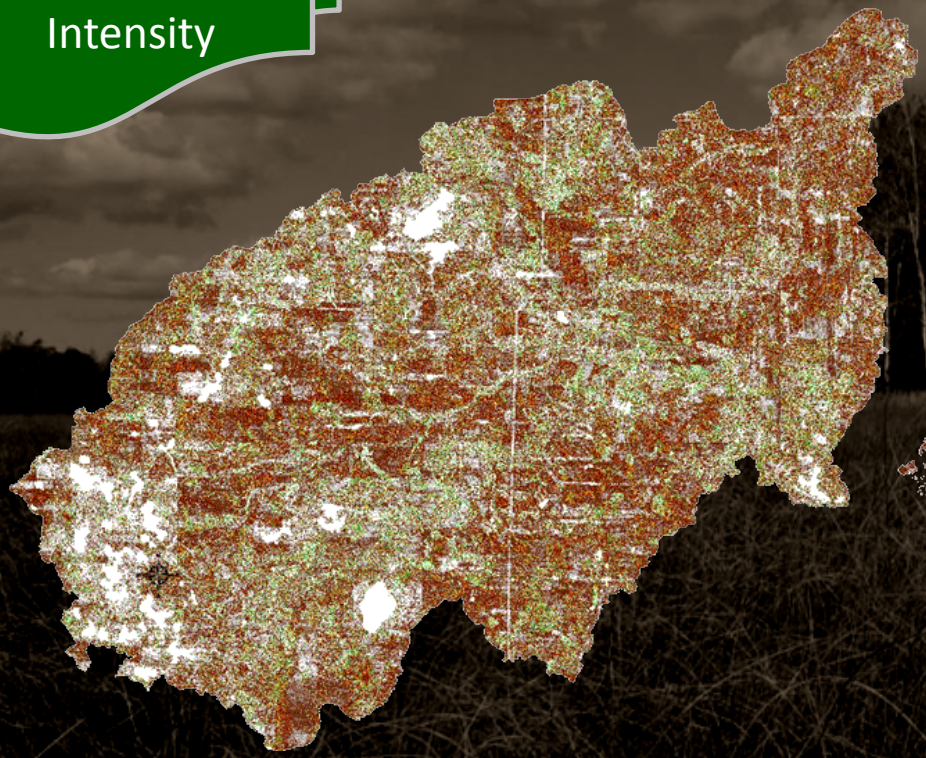
TPI

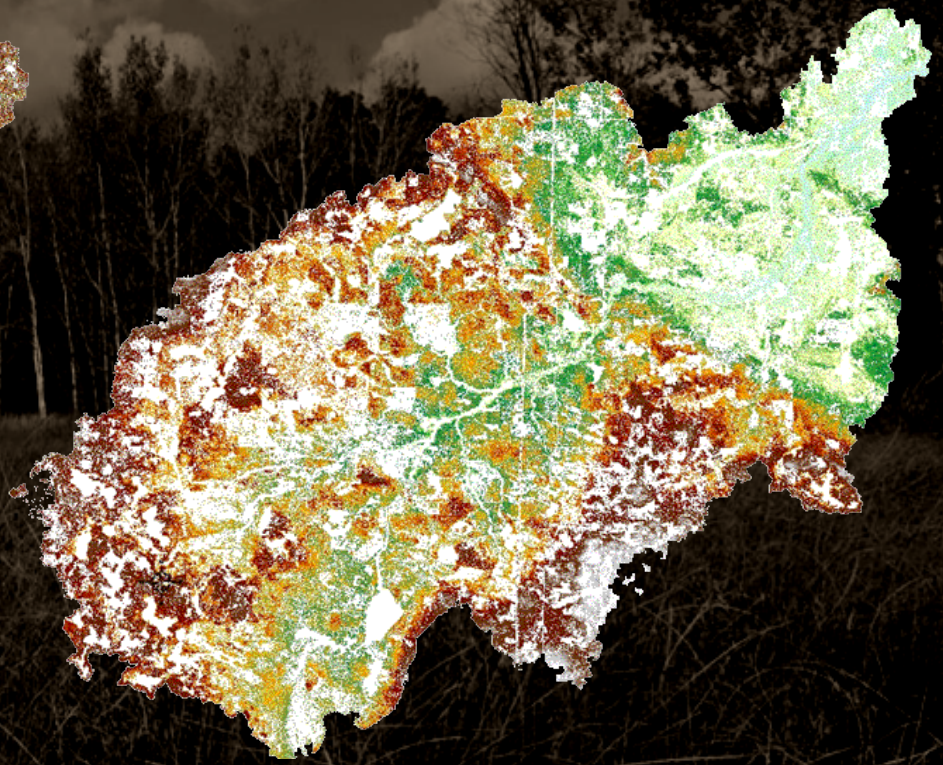


CTI

LAYER STACK

DEM
Slope
TPI
CTI
Height
Intensity



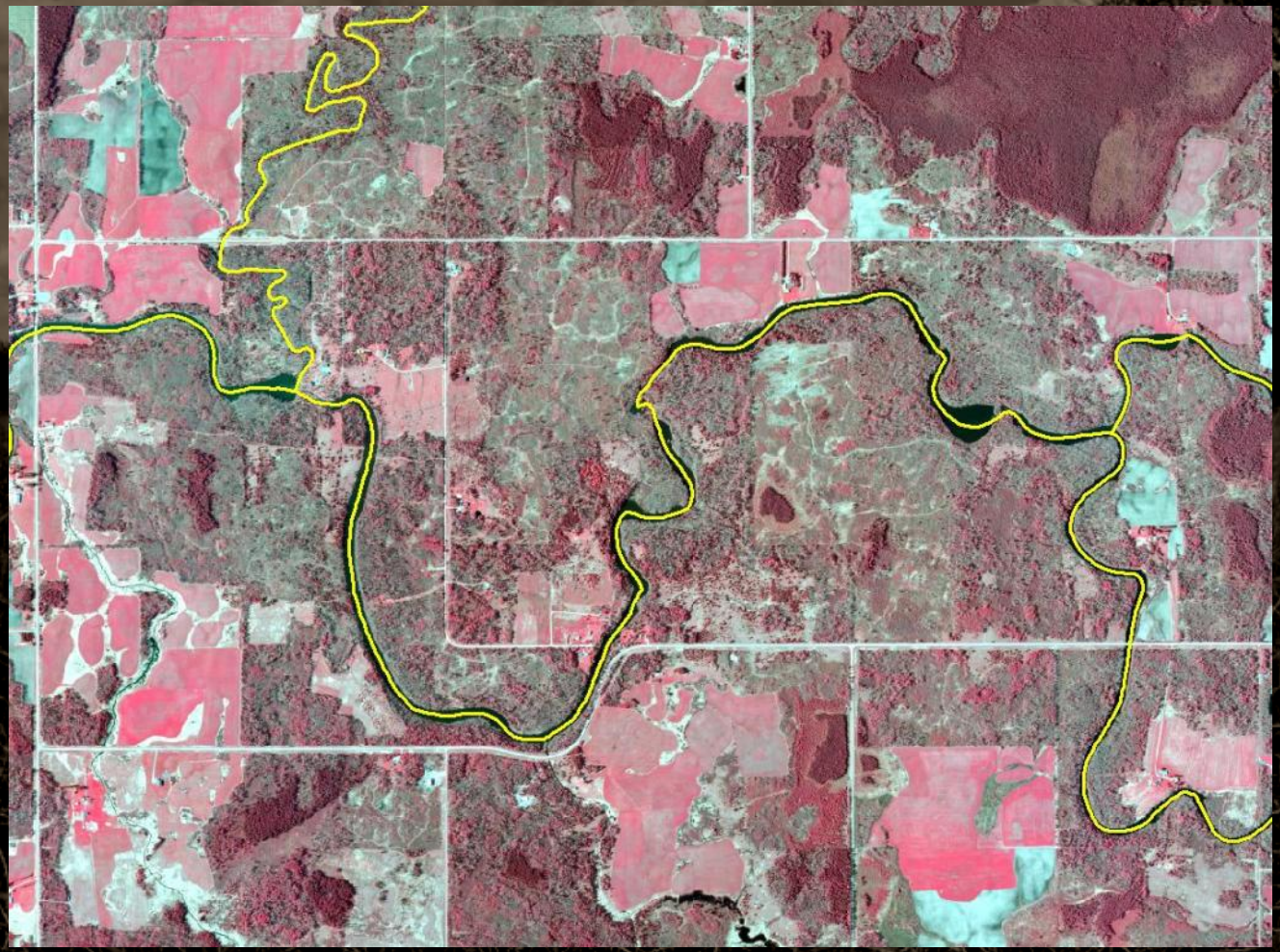


Lidar Intensity

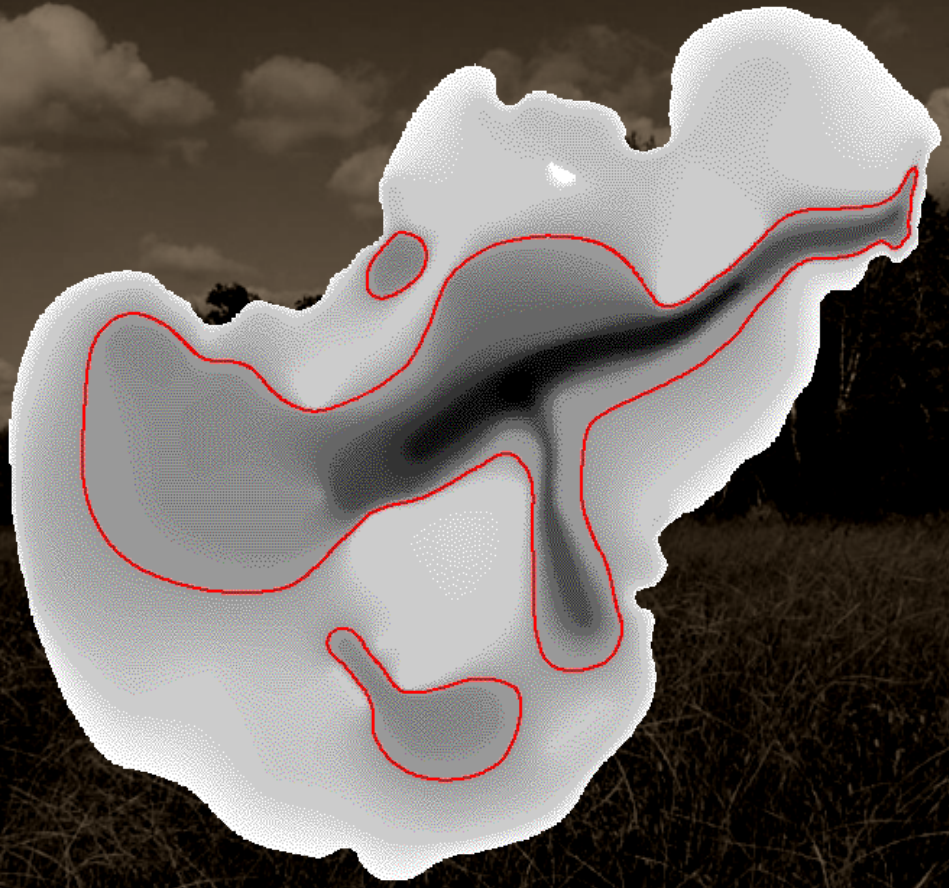
Lidar Height of 1st Return

IMAGE MOSAIC

RIVER CENTERLINES



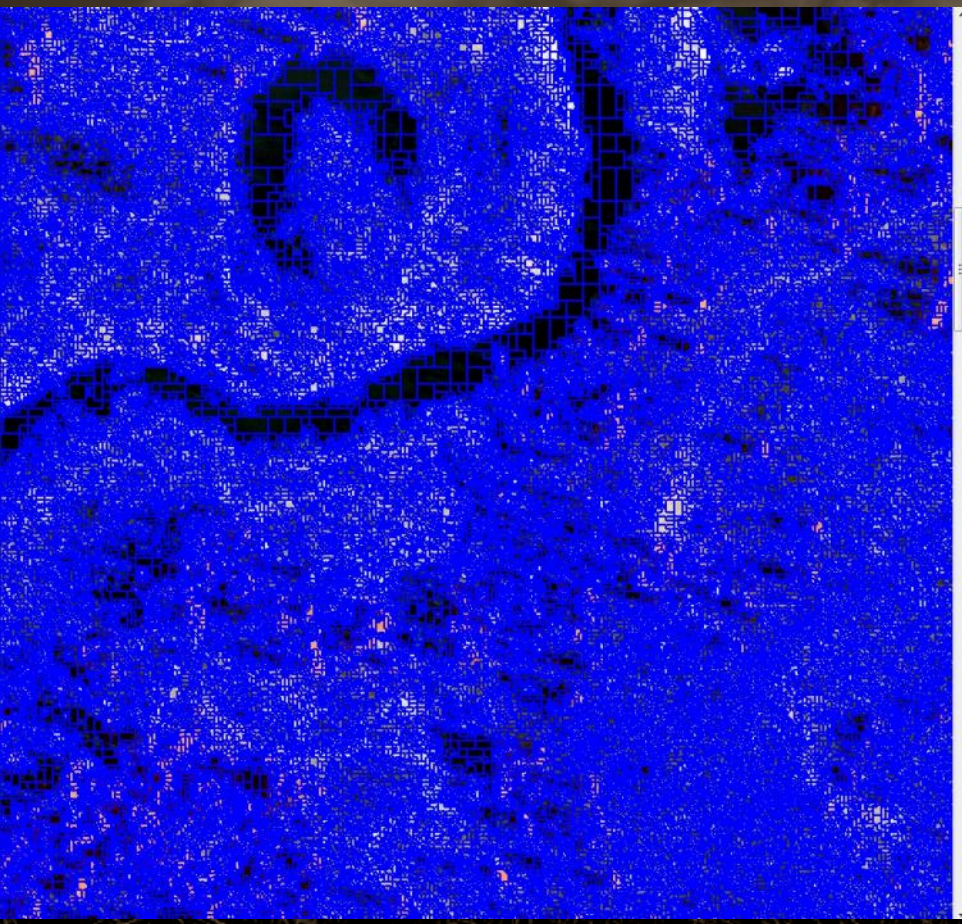
BATHYMETRIC DATA



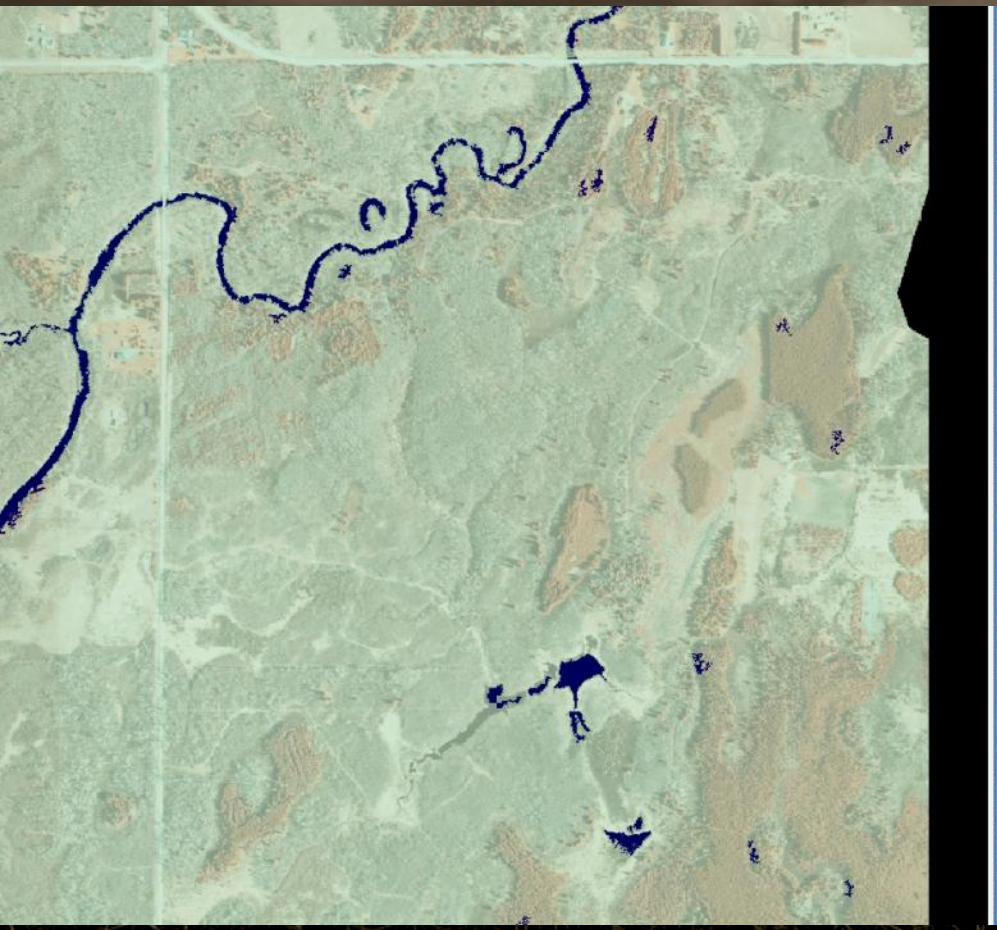
L1/L2 break at 2.5 meters

SEGMENTATION INPUTS

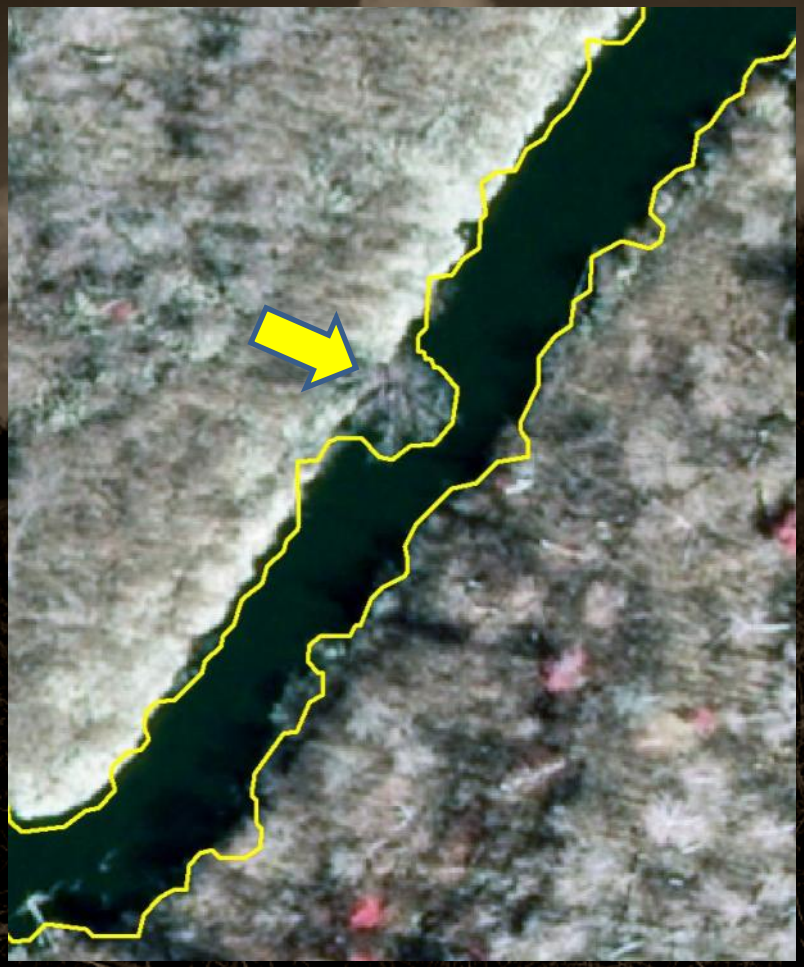
INITIAL SEGMENTATION

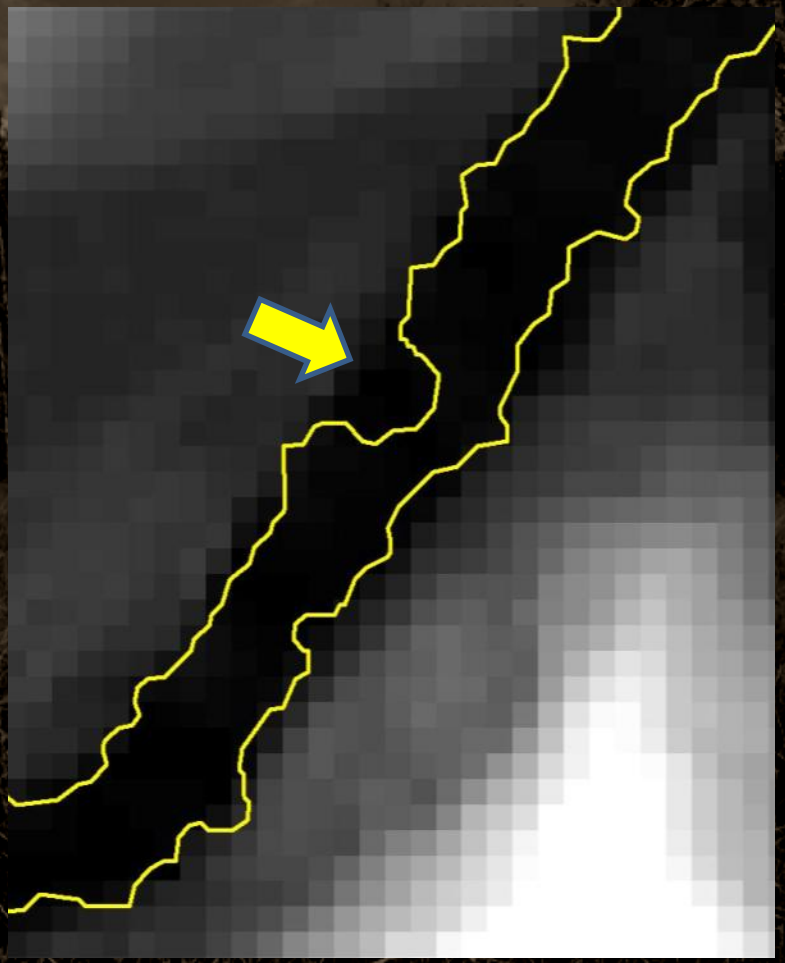


SEGMENTATION – INITIAL ID OF OPEN WATER



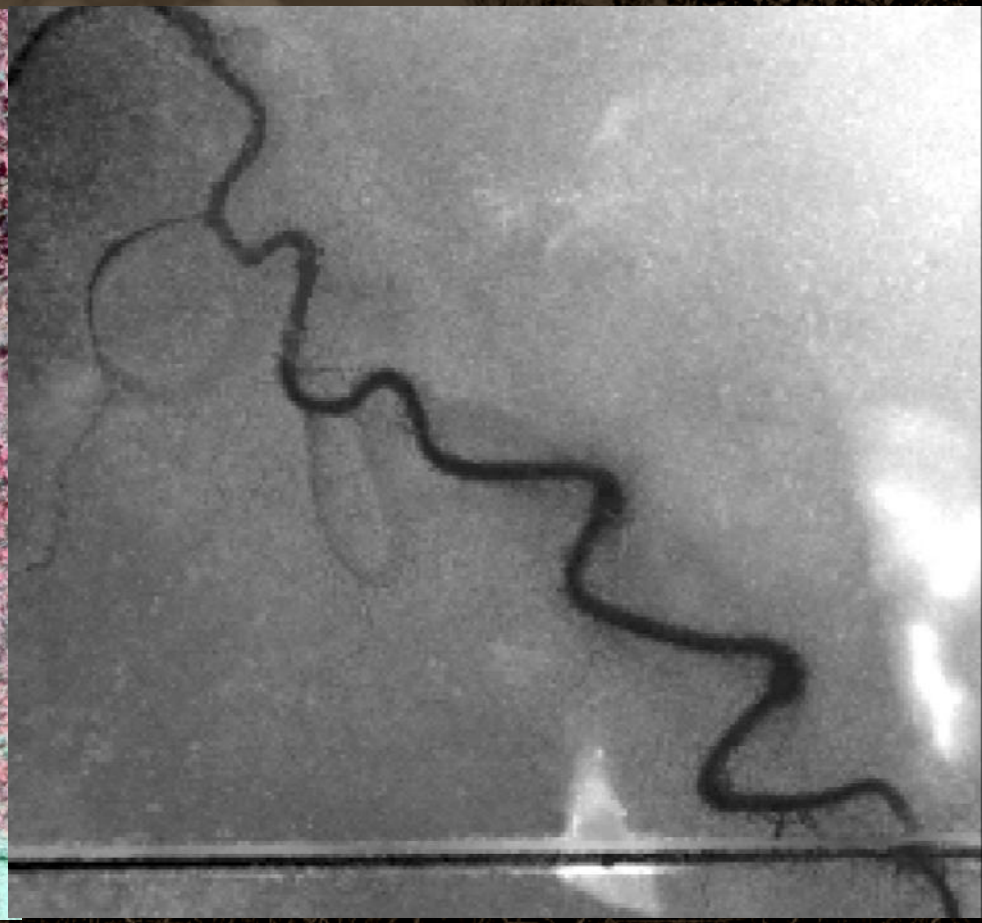
SEGMENTATION – RIVERS & STREAMS



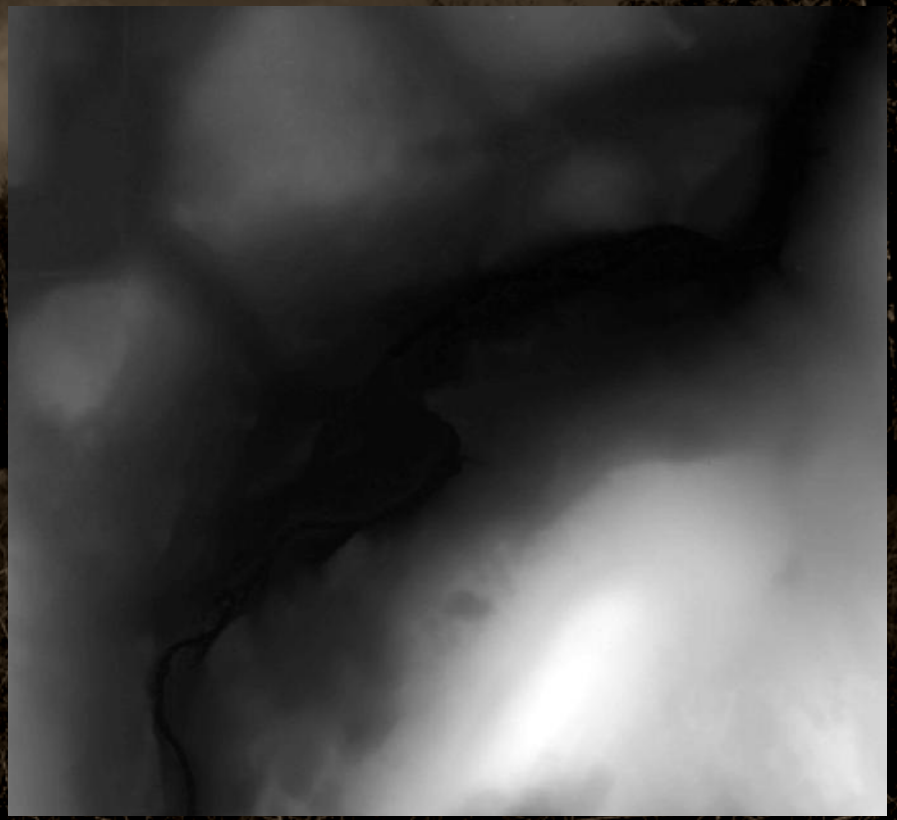


Problem: Trees along rivers. Solution: DEM

SEGMENTATION – RIVERS & STREAMS



SEGMENTATION – RIVERS & STREAMS

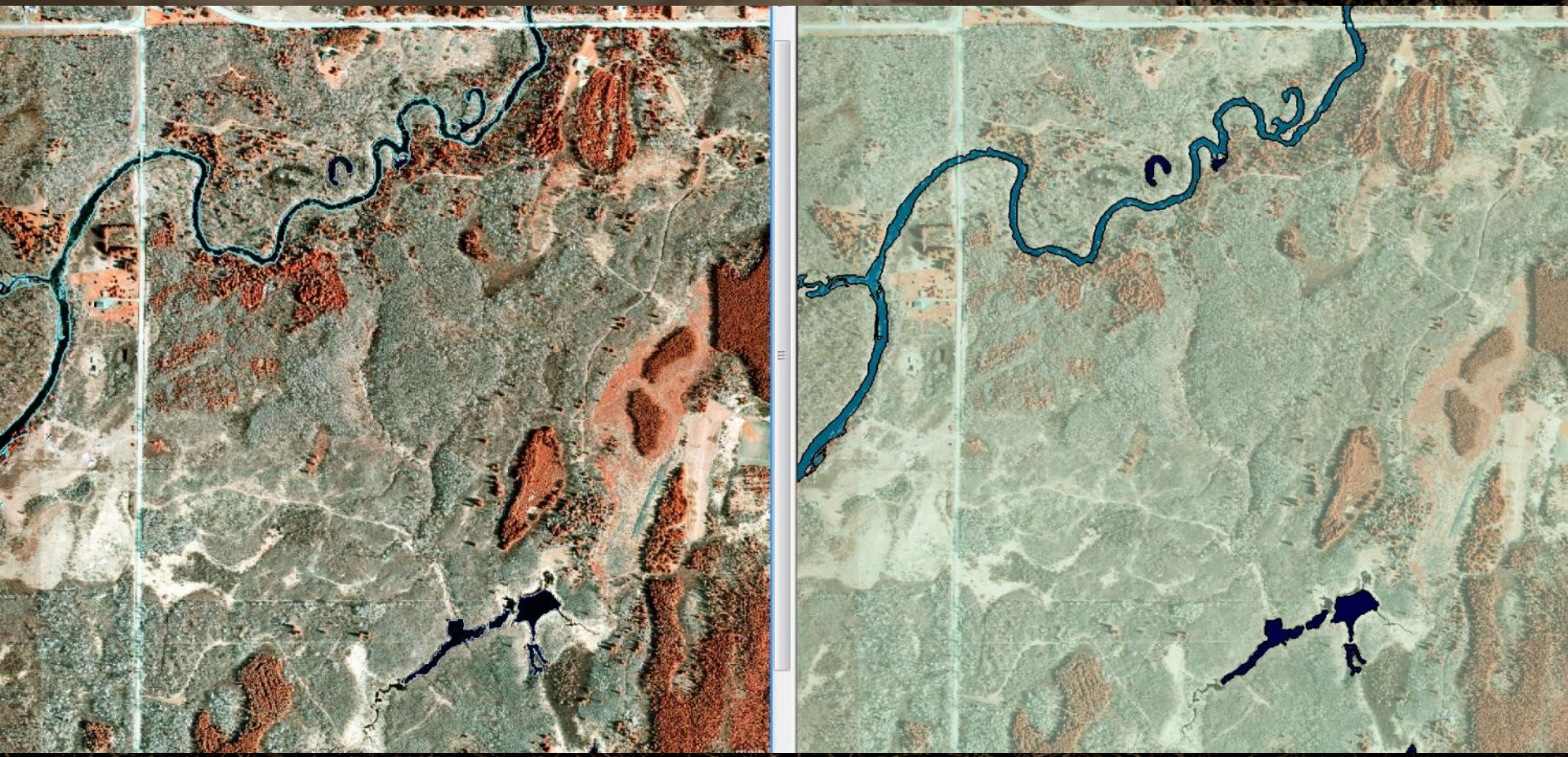


What to do when there is not enough elevation change?

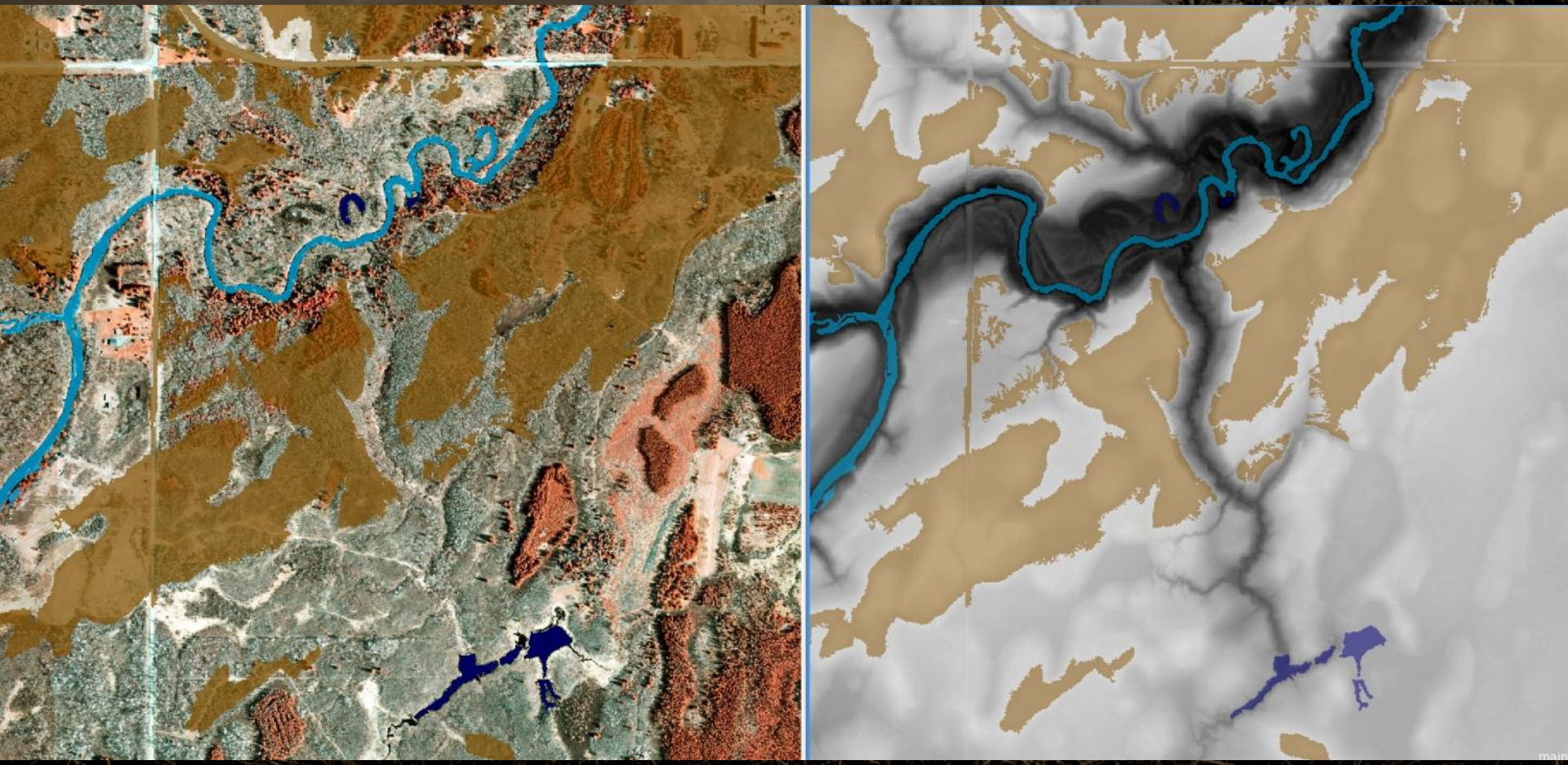
SEGMENTATION – RIVERS & STREAMS

- Automation verses Digitizing
- Cost/Benefit of finding a solution
- Quick fix with options for solutions in the future

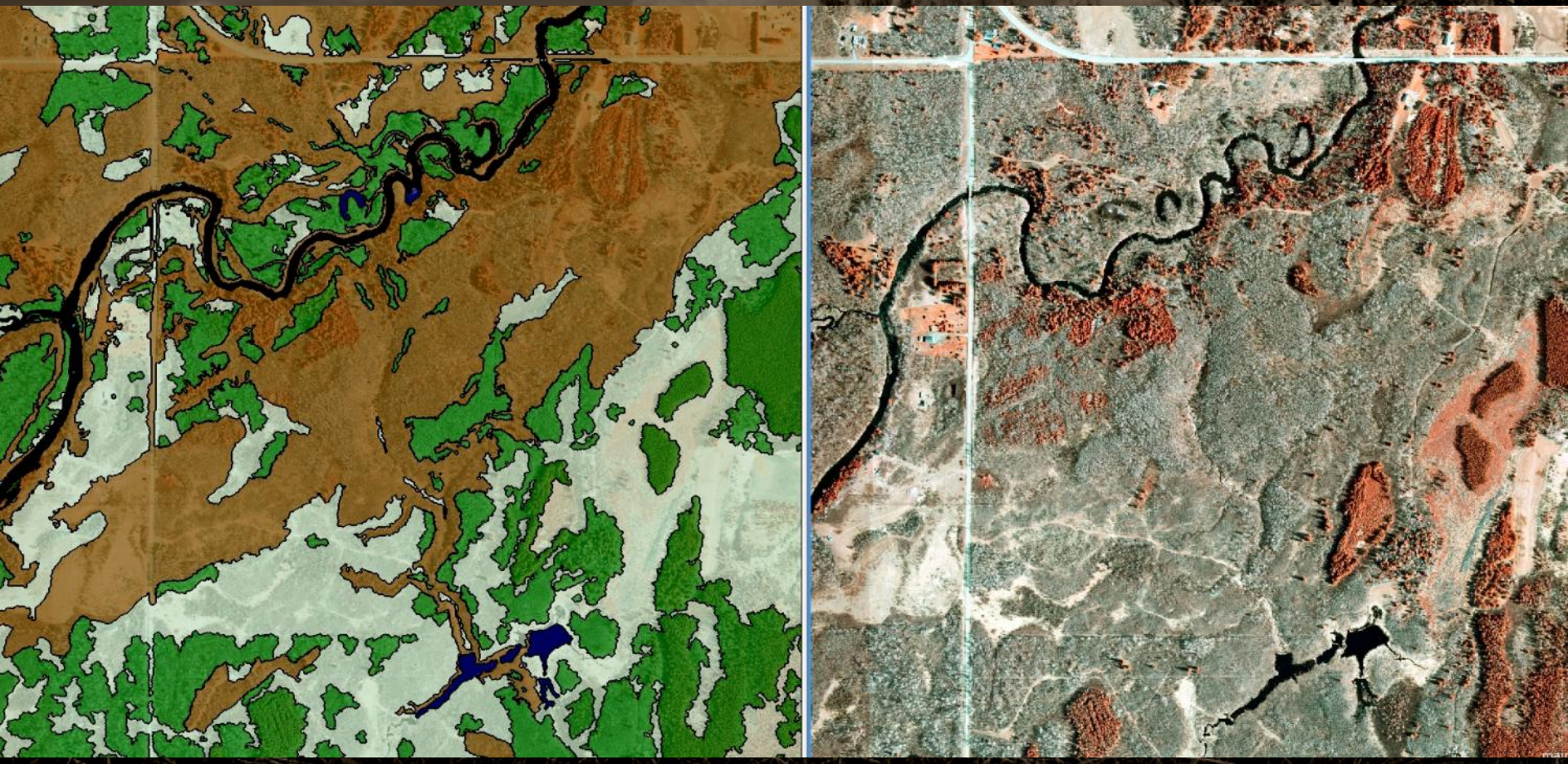
SEGMENTATION – OPEN WATER



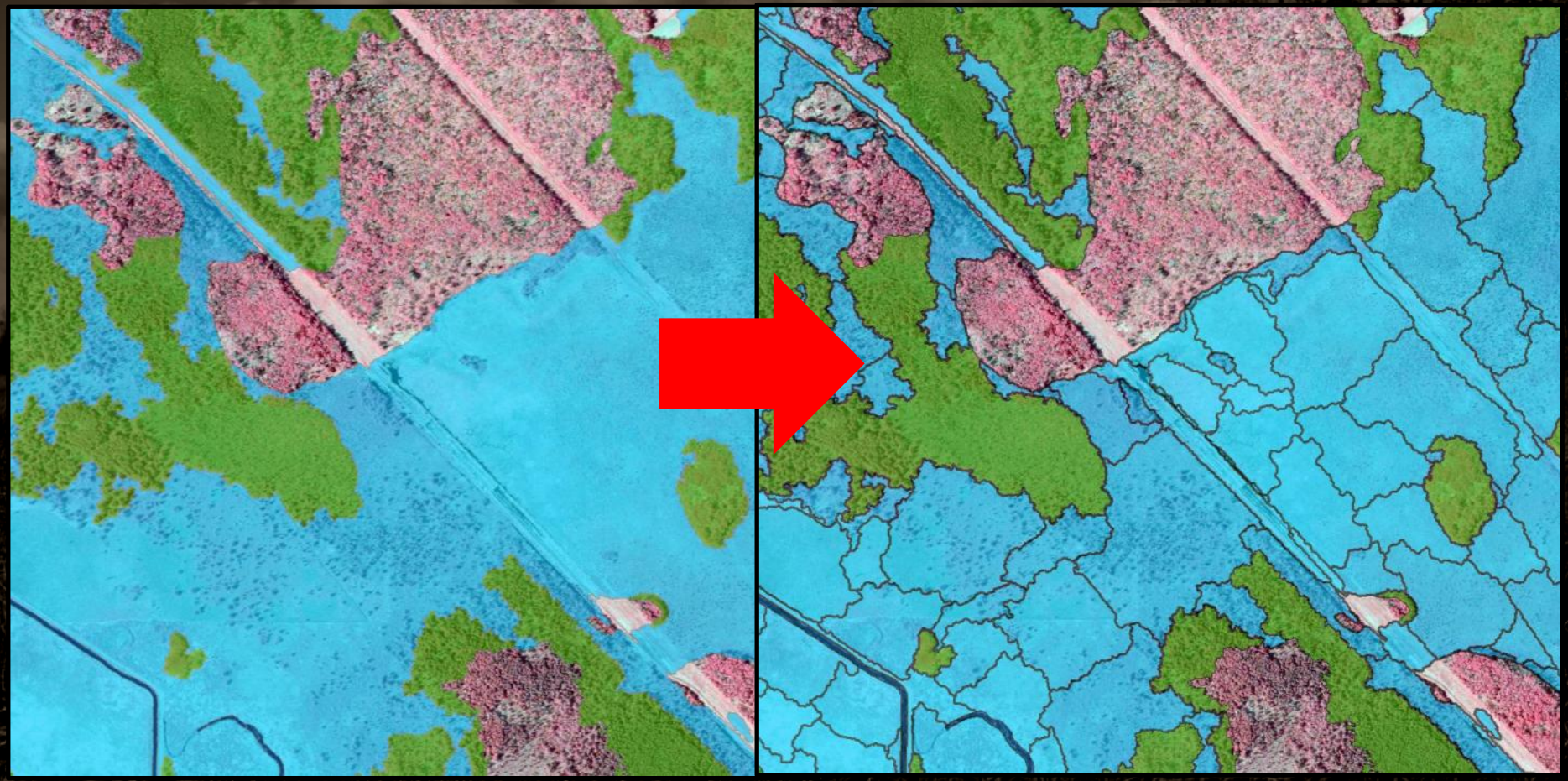
SEGMENTATION – UPLAND/WETLAND DELINEATION



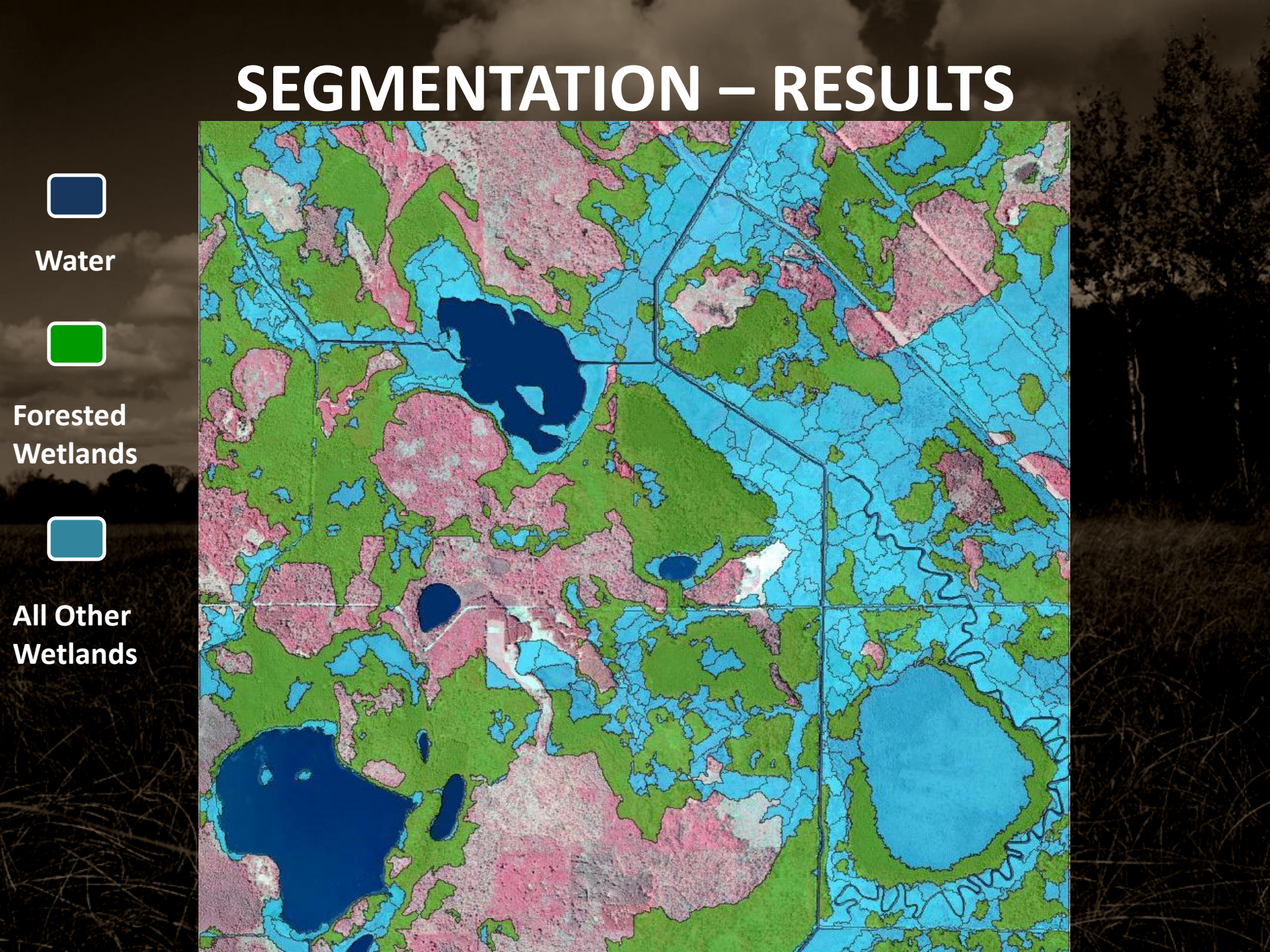
SEGMENTATION – FORESTED WETLANDS



SEGMENTATION – REMAINING WETLANDS



SEGMENTATION – RESULTS



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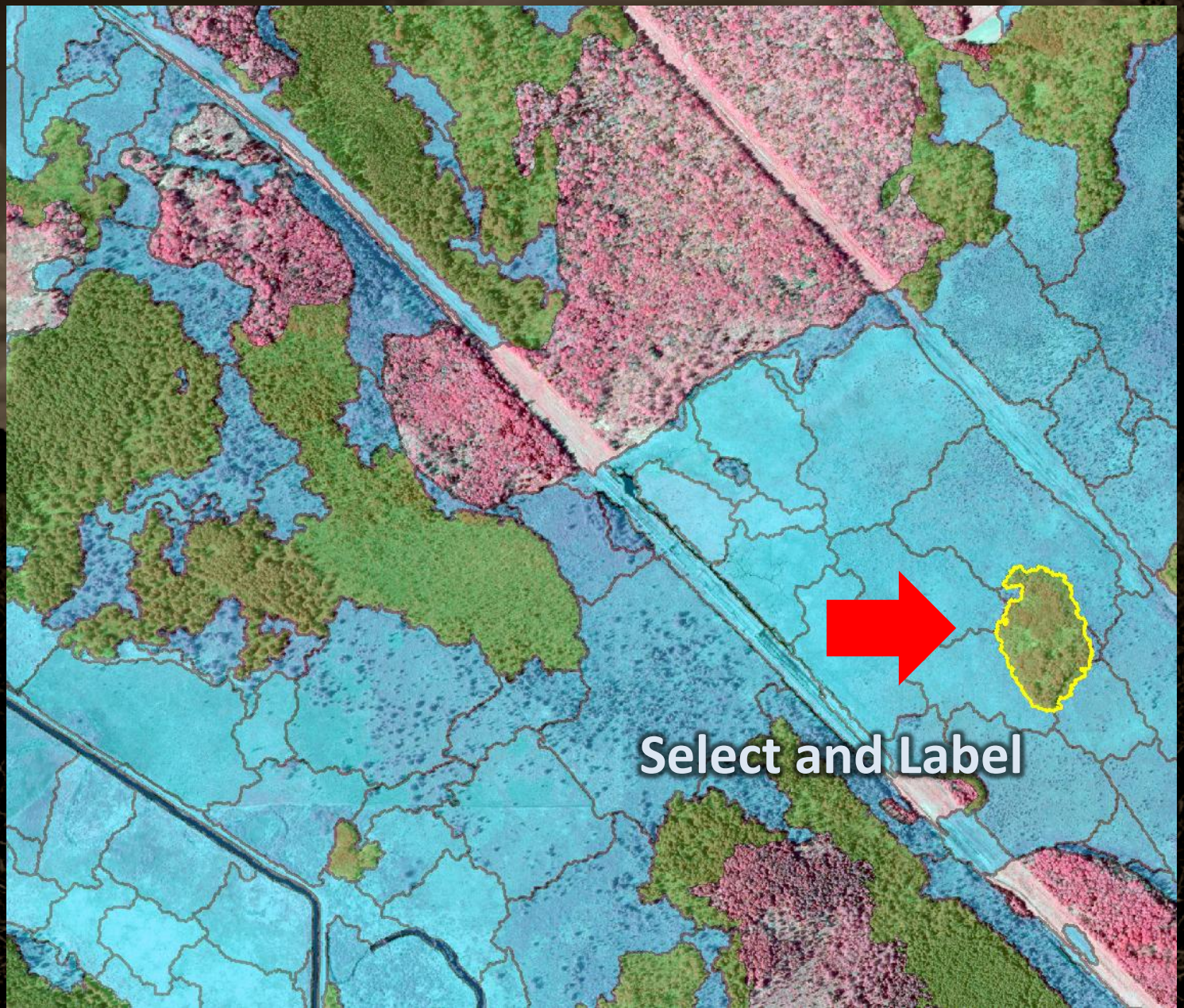

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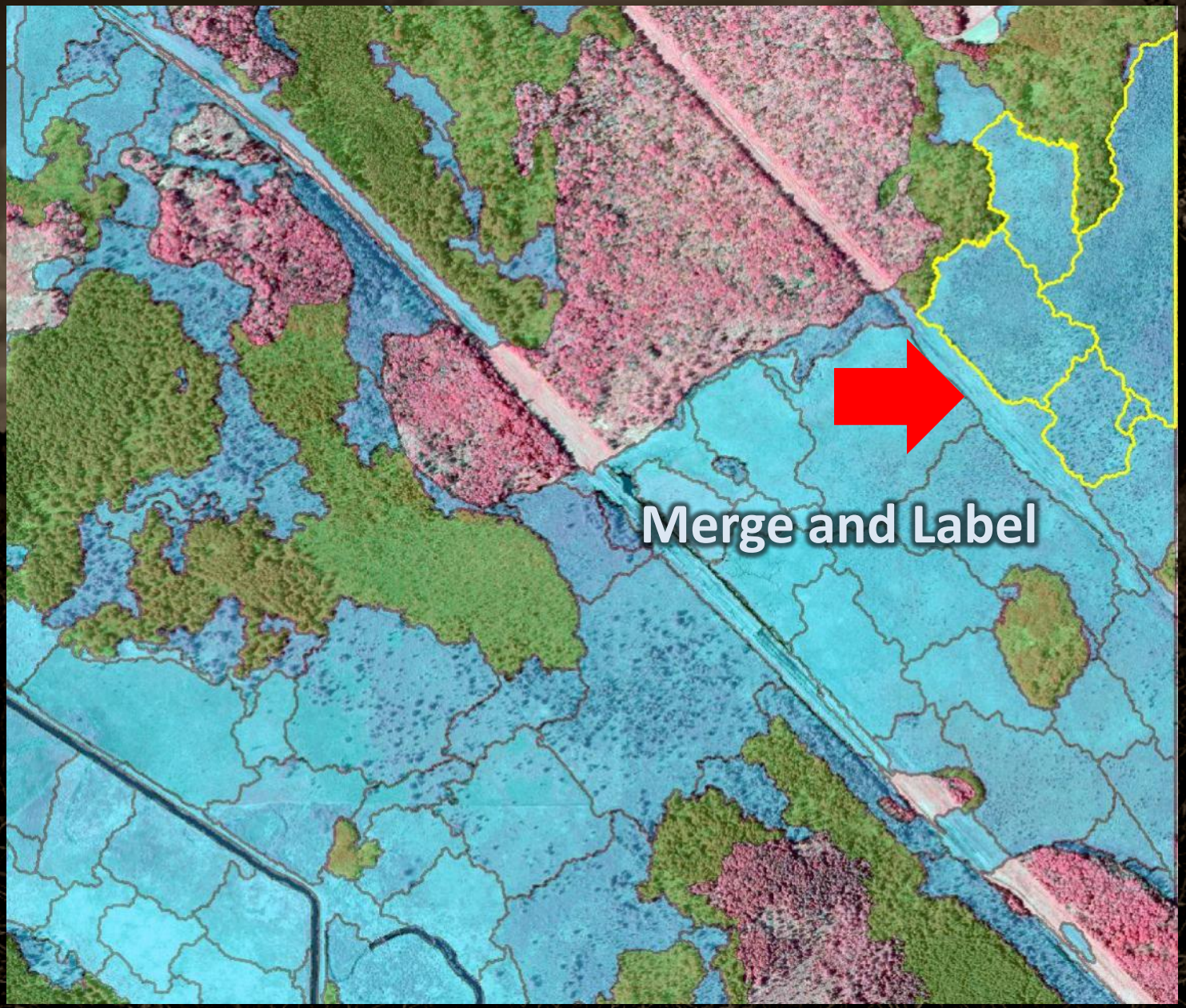

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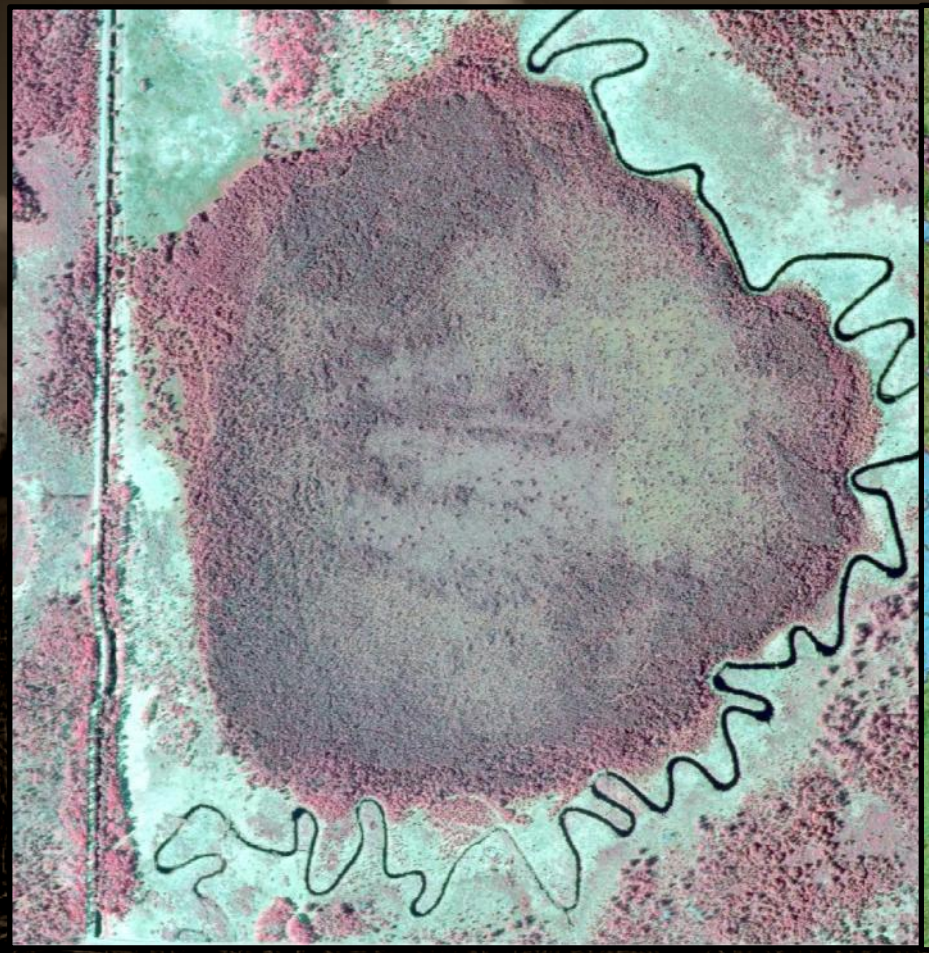

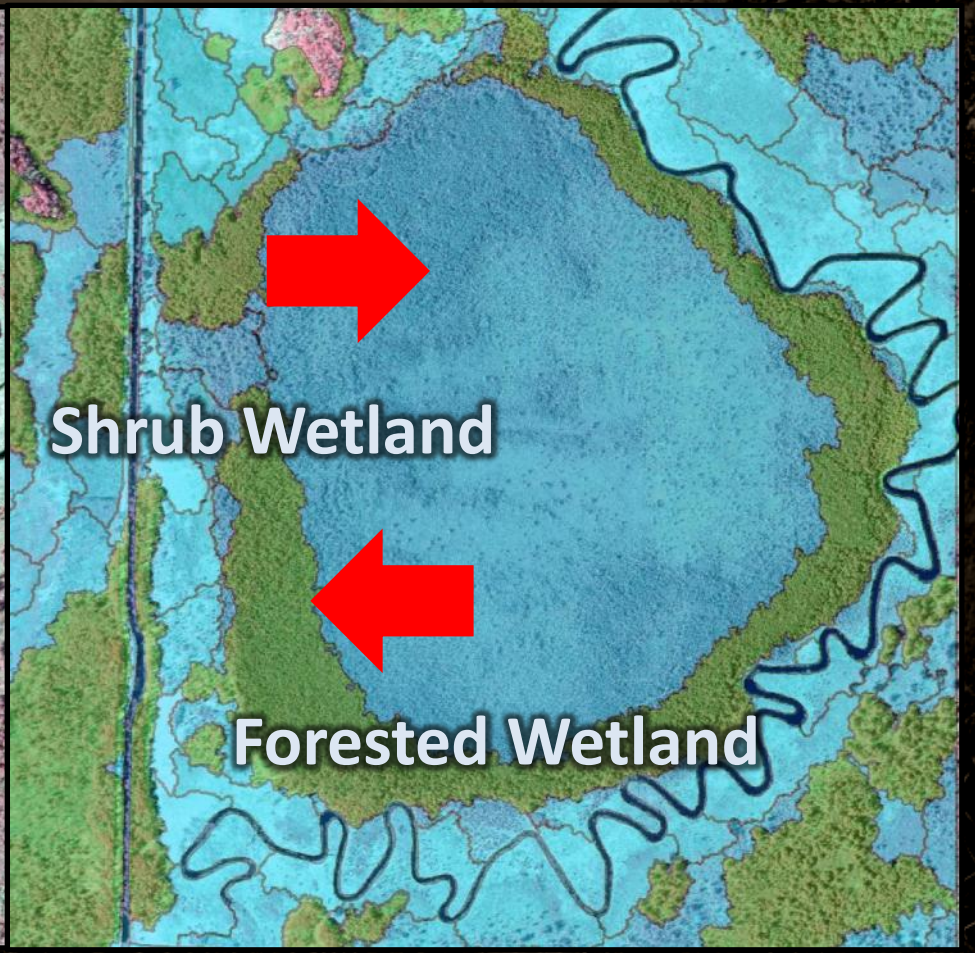

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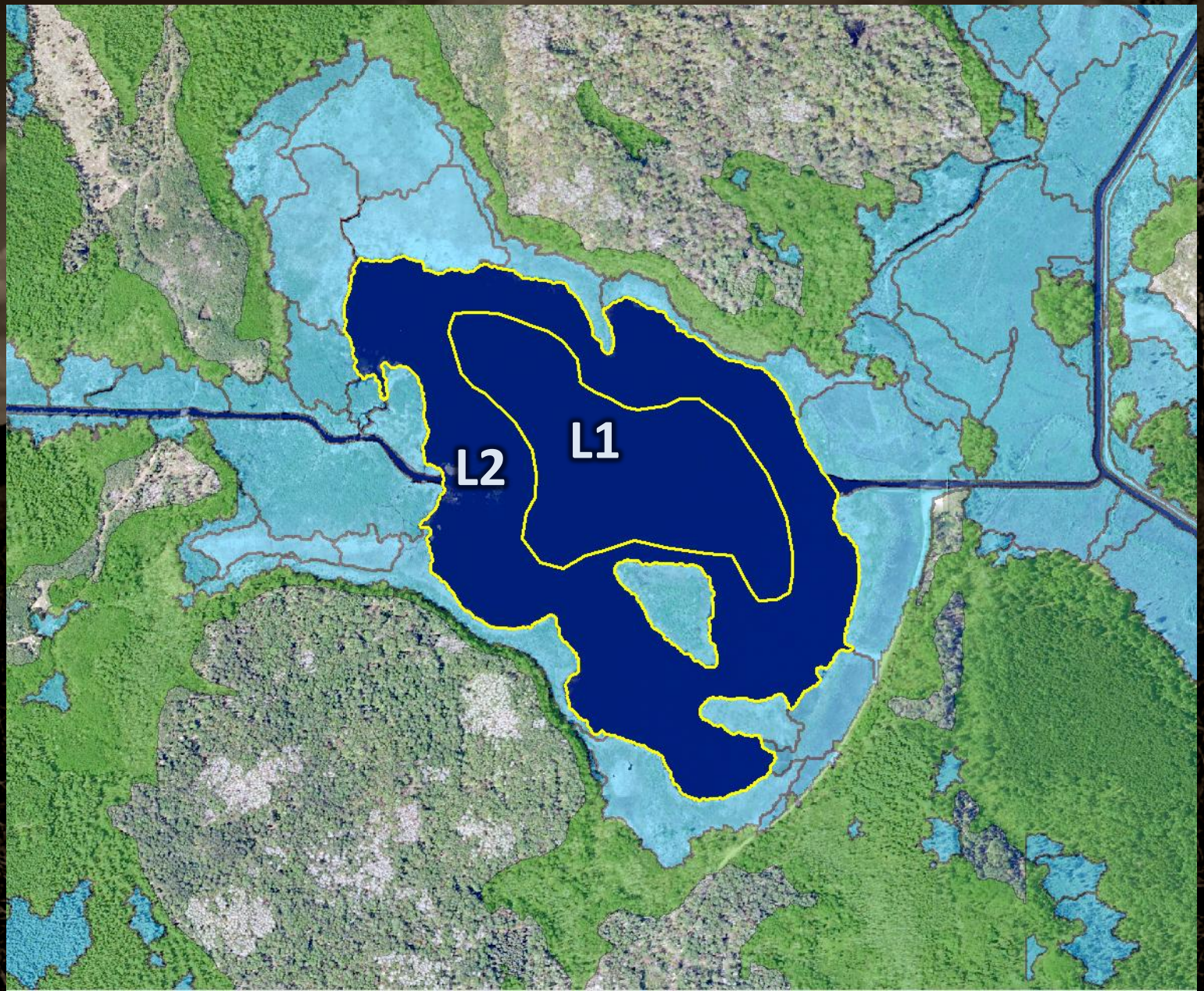


DISCUSSION TOPICS

- Cost/Benefit of Segmentation vs. Traditional PI

  Input data preparation

  Segmentation Routine

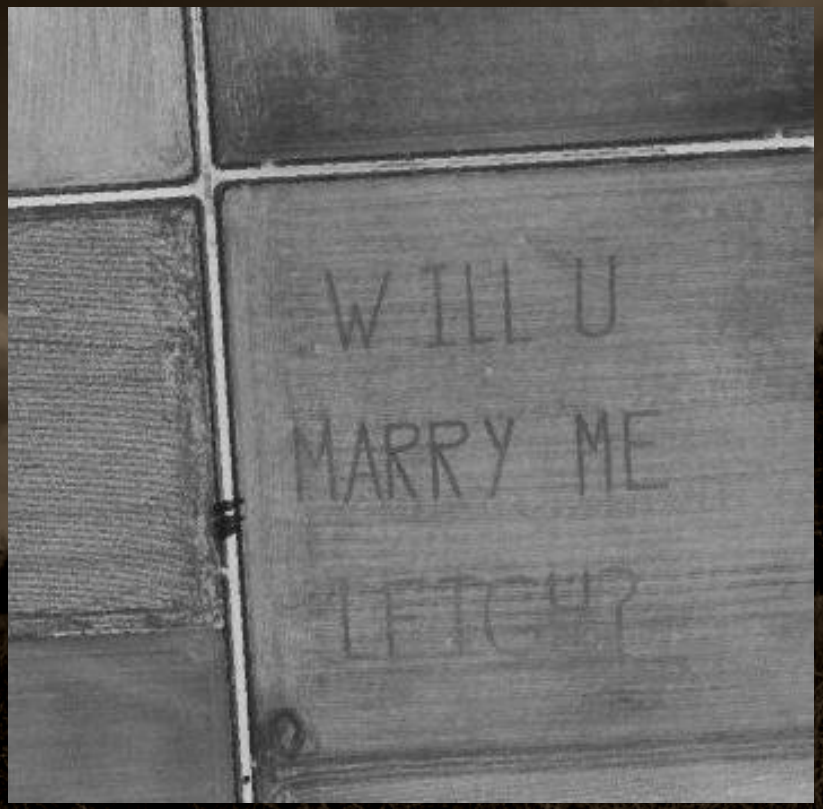
  Faster Photo Interpretation

  Better Accuracy/Precision?

DISCUSSION TOPICS

- Photo Interpretation Mindset
- Handling Large datasets
- Wetlands are challenging!
- Different “look” to segments
- Future enhancements

THANK YOU AND CONTACT INFO



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