

Whooping Crane Riverine Roost Site Selection Update

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First Increment Big Question Status

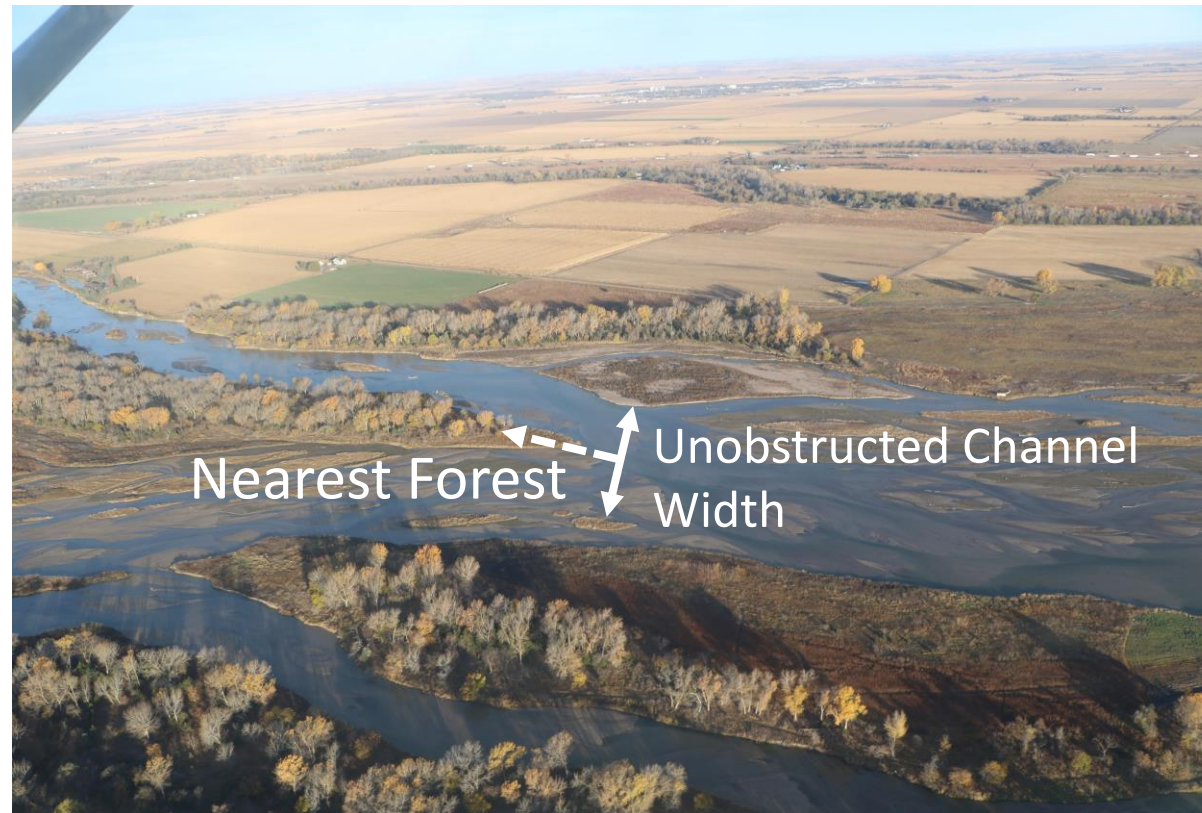
PRRIP Big Question	2019 Assessment	Check In Activities*
Implementation – Program Management Actions and Habitat		
1. Will implementation of SDHF produce suitable tern and plover riverine nesting habitat on an annual or near-annual basis?	👎👎	On-channel monitoring to detect nesting on natural sandbar habitat following peak flow event(s)
2. Will implementation of SDHF produce and/or maintain suitable whooping crane riverine roosting habitat on an annual or near-annual basis?	👎👎	Relationship between flow and whooping crane habitat is an Extension focus – will be addressed directly.
3. Is sediment augmentation necessary for the creation and/or maintenance of suitable riverine tern, plover, and whooping crane habitat?	👍	Big Question carried forward into Extension – will be addressed directly.
4. Are mechanical channel alterations (channel widening and flow consolidation) necessary for the creation and/or maintenance of suitable riverine tern, plover, and whooping crane habitat?	👍👍	Relationship between mechanical management actions and whooping crane habitat is an Extension focus – will be addressed directly.
Effectiveness – Habitat and Target Species Response		
5. Do whooping cranes select suitable riverine roosting habitat in proportions equal to its availability?	👎👎	System-scale whooping crane monitoring. Whooping crane habitat selection analysis will be rerun on a five-year interval to identify changes in selection.



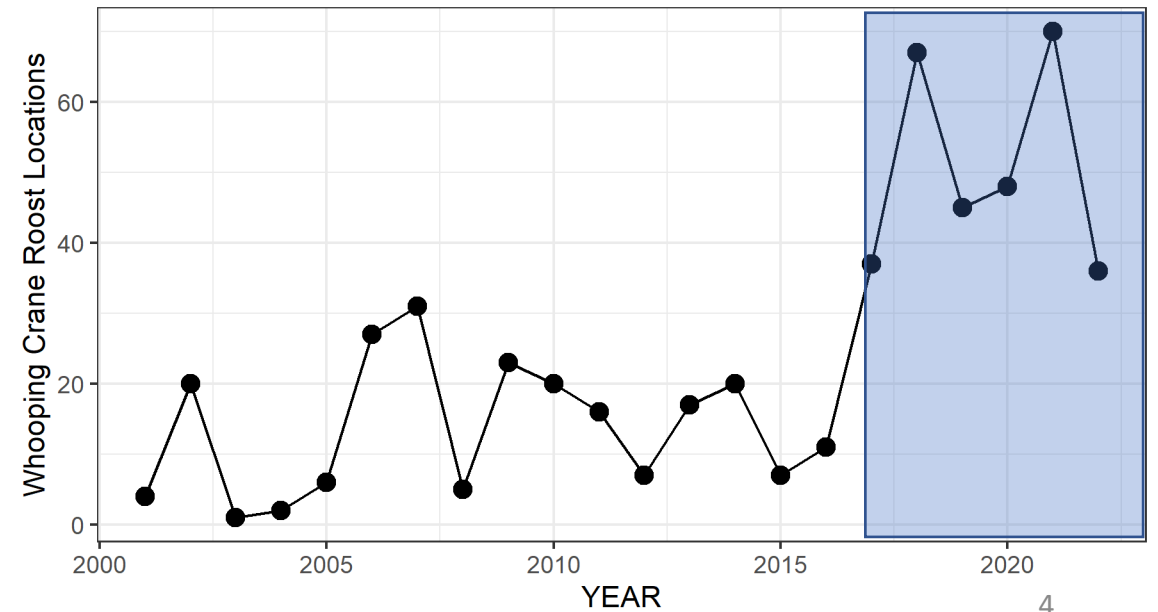
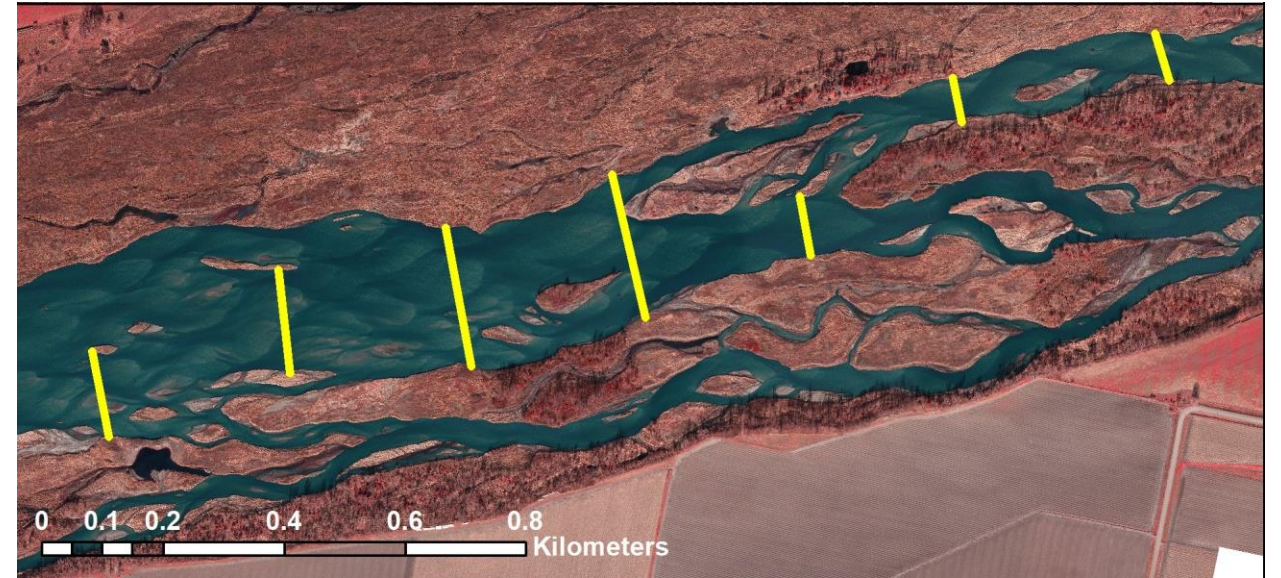
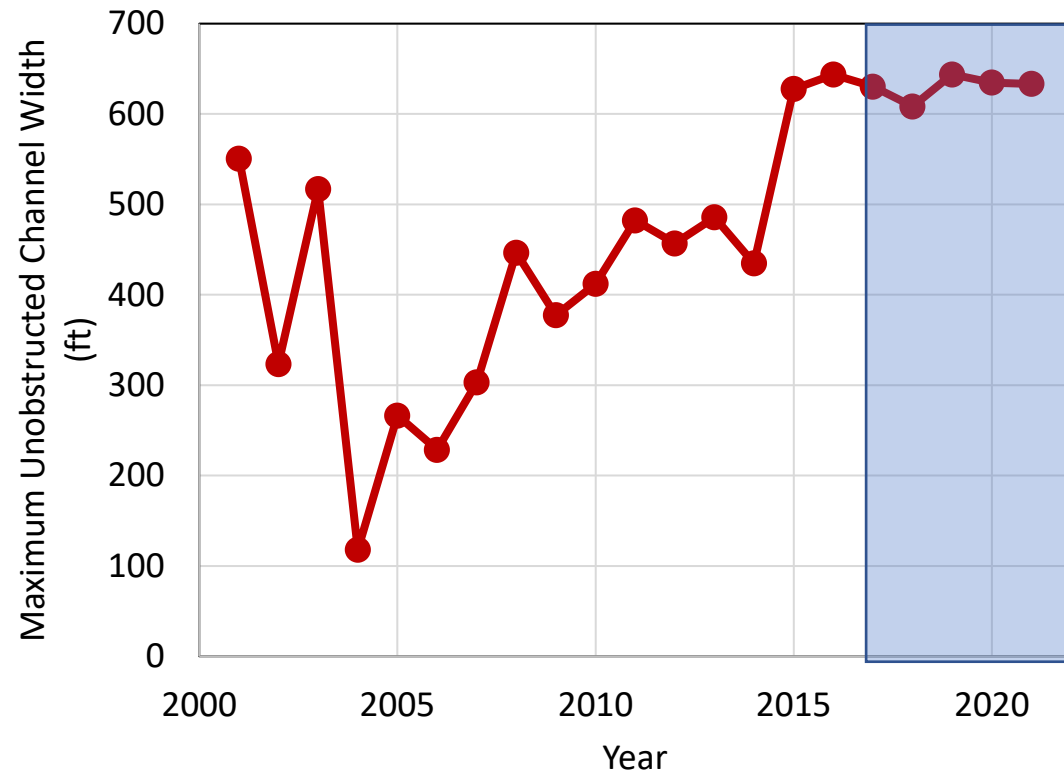
RESEARCH ARTICLE

Whooping crane use of riverine stopover sites

David M. Baasch¹*, Patrick D. Farrell¹, Shay Howlin², Aaron T. Pearce³, Jason M. Farnsworth¹, Chadwin B. Smith¹



WC Data



At five-year mark with 10 more migrations seasons,

- (1) Are unobstructed channel width and nearest forest still important in-channel variables to explain riverine selection?
- (2) Similar predicted relationships?
- (3) Does off-channel landcover influence roost site selection?

- Program Systematic Aerial Monitoring (2001 – Spring 2022)
- Whooping Crane Cellular Telemetry Partnership (2018 - 2021)



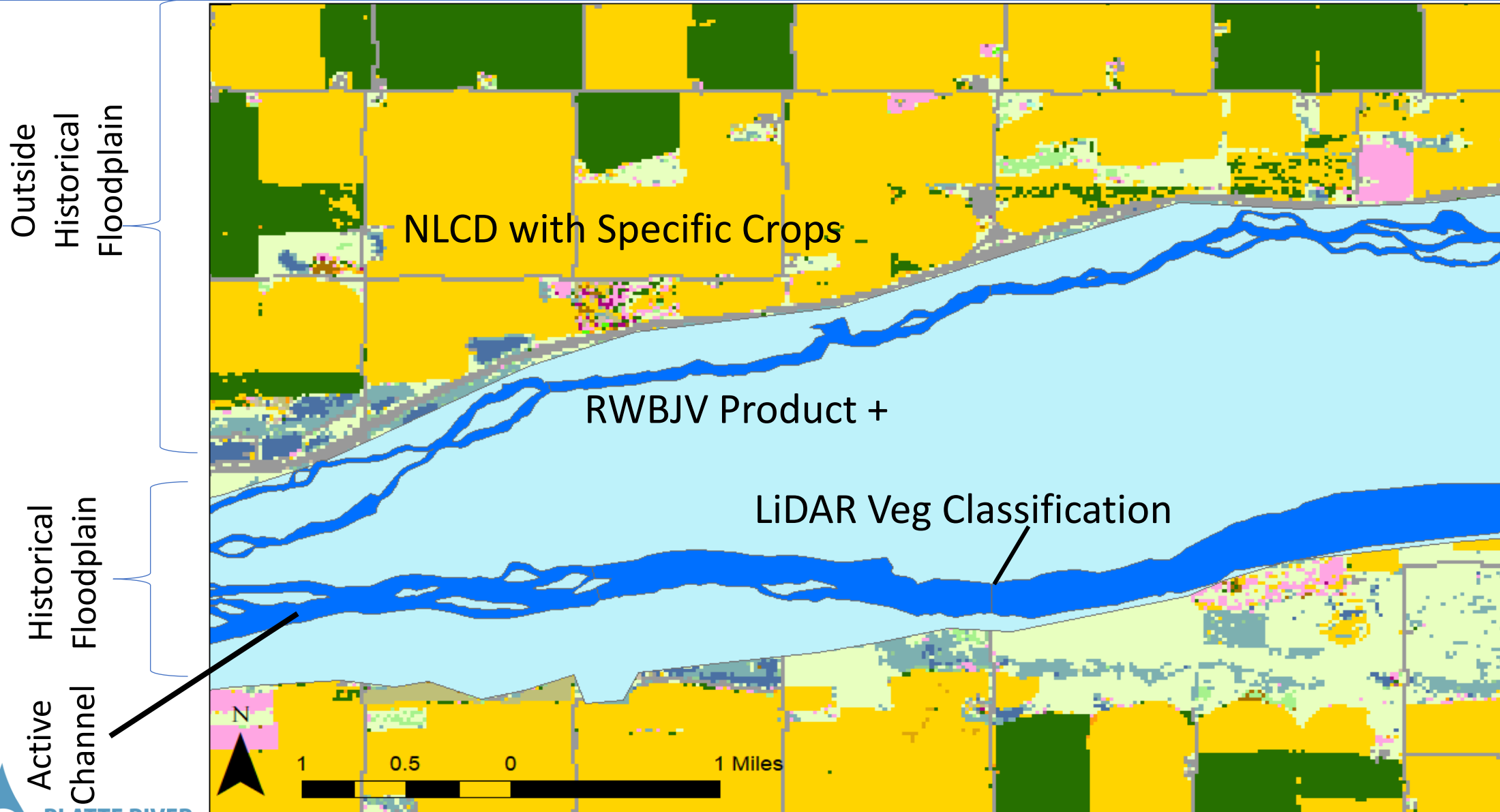
Explanatory Variables: On-Channel Metrics

- Channel Openness
- Forest Obstructions
- Flow Metric
 - Unit Discharge

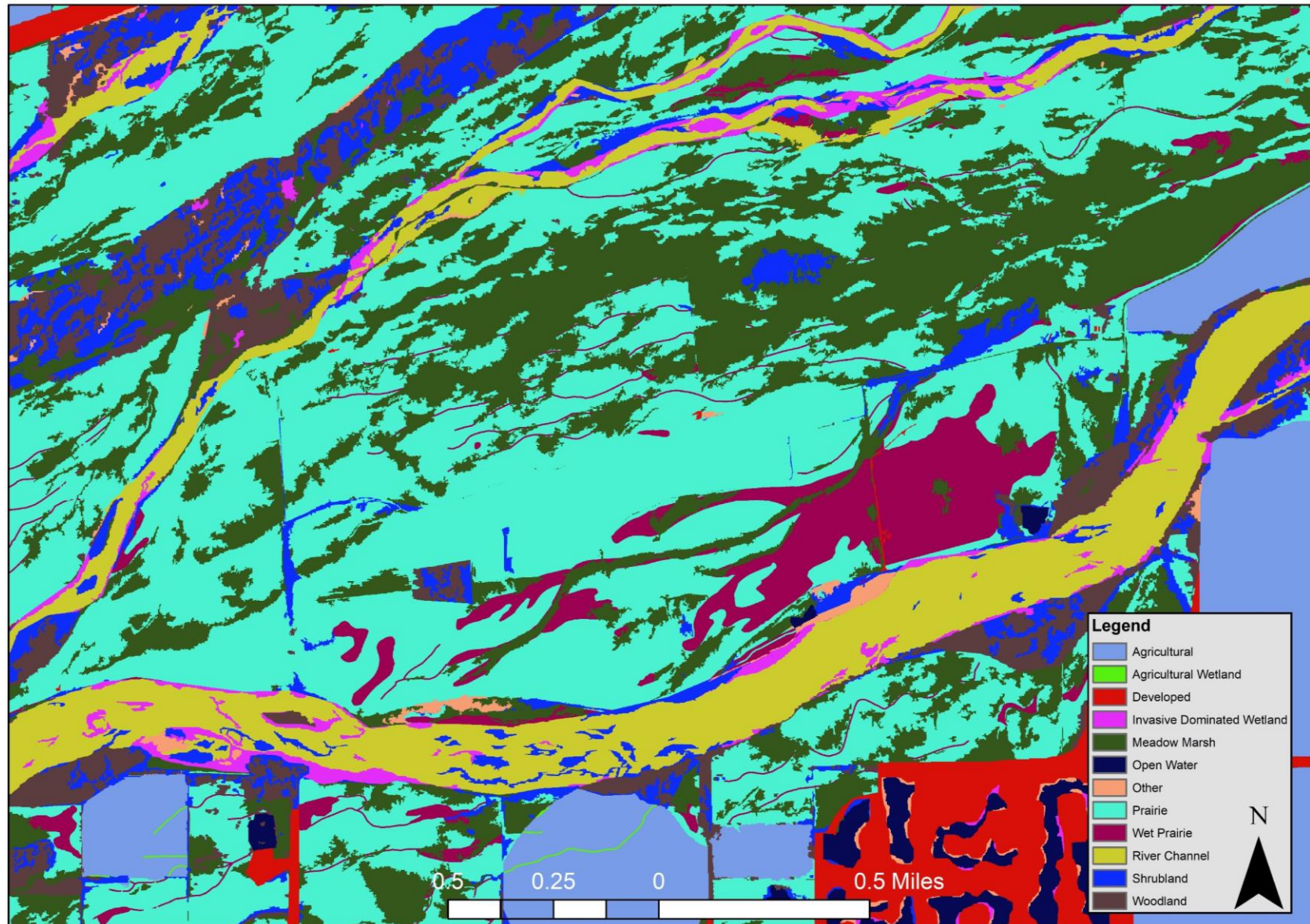
Explanatory Variables: Off-Channel Metrics

- Grassland landcovers
- Agriculture
- Forest
- Disturbances

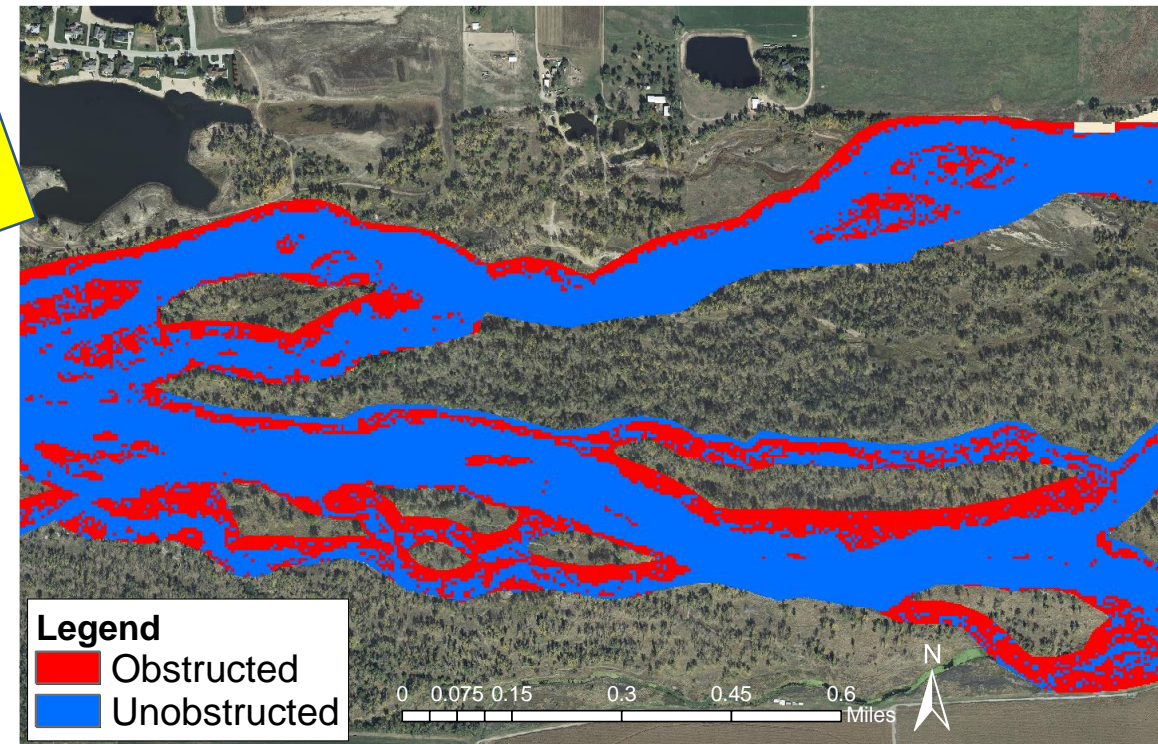
Spatial Data Sources



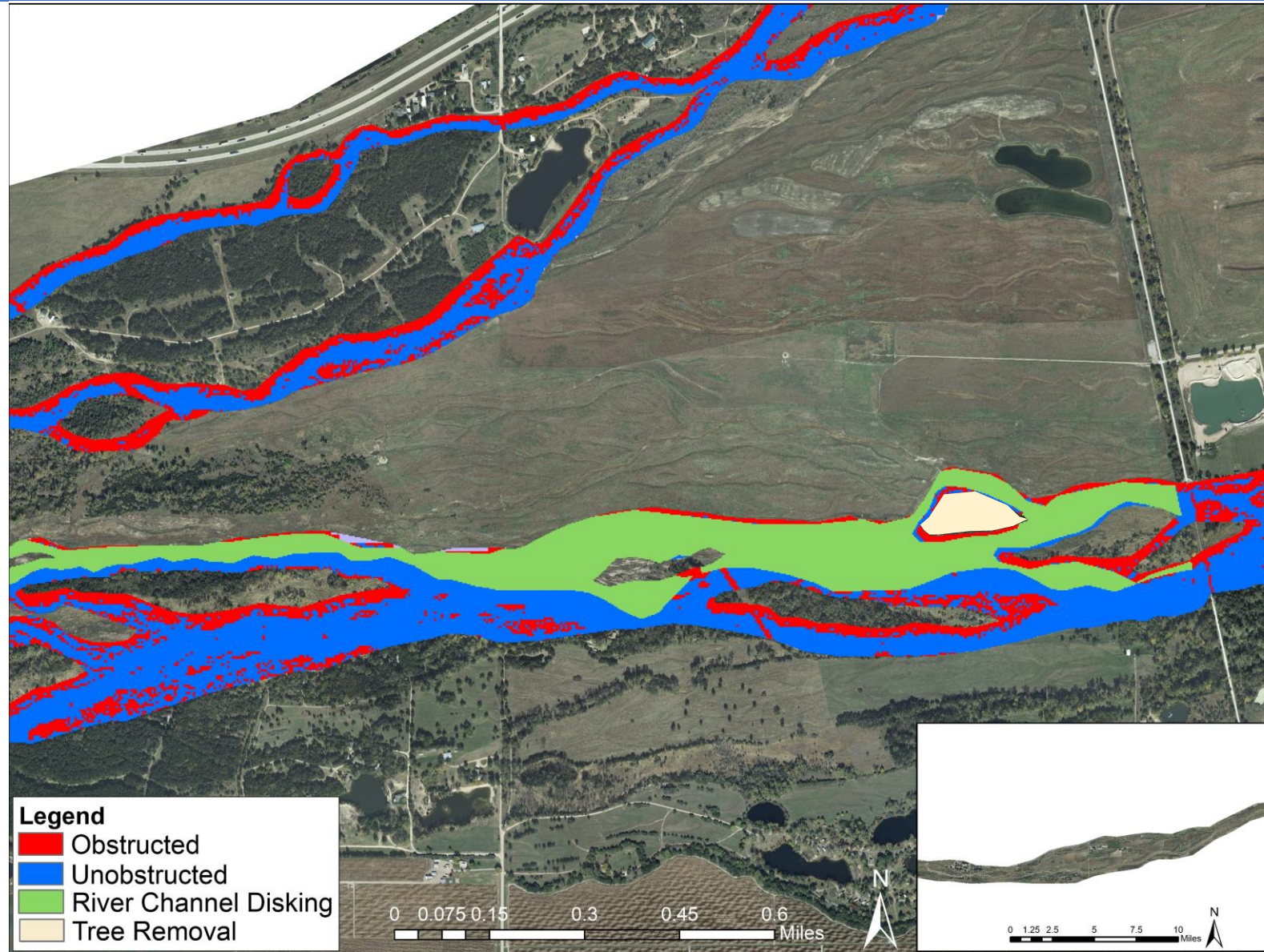
Rainwater Basin Joint Venture Product +



LiDAR Vegetation Classification

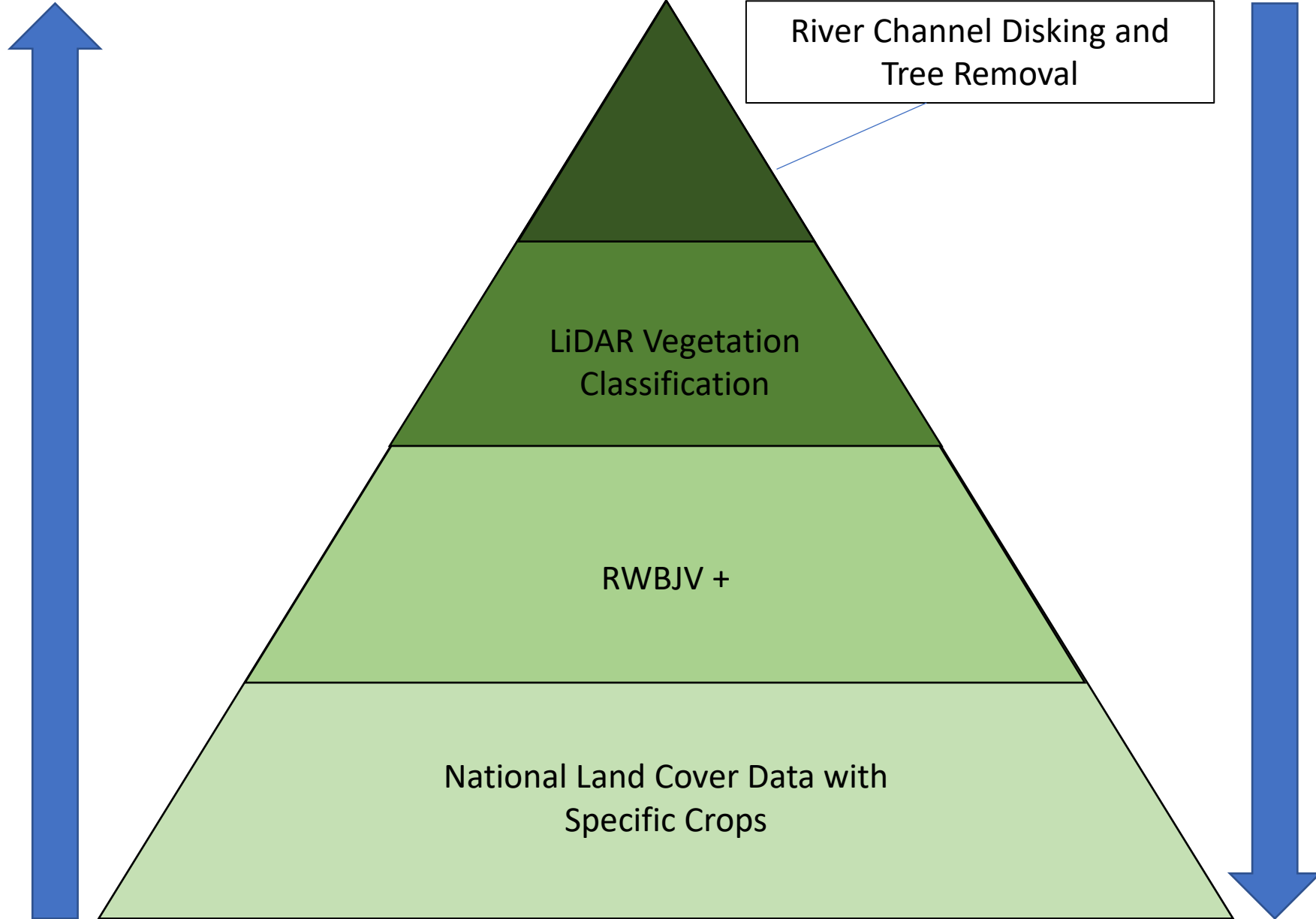


River Channel Disking and Tree Removal



Priority

Spatial Coverage



River Channel Disking and
Tree Removal

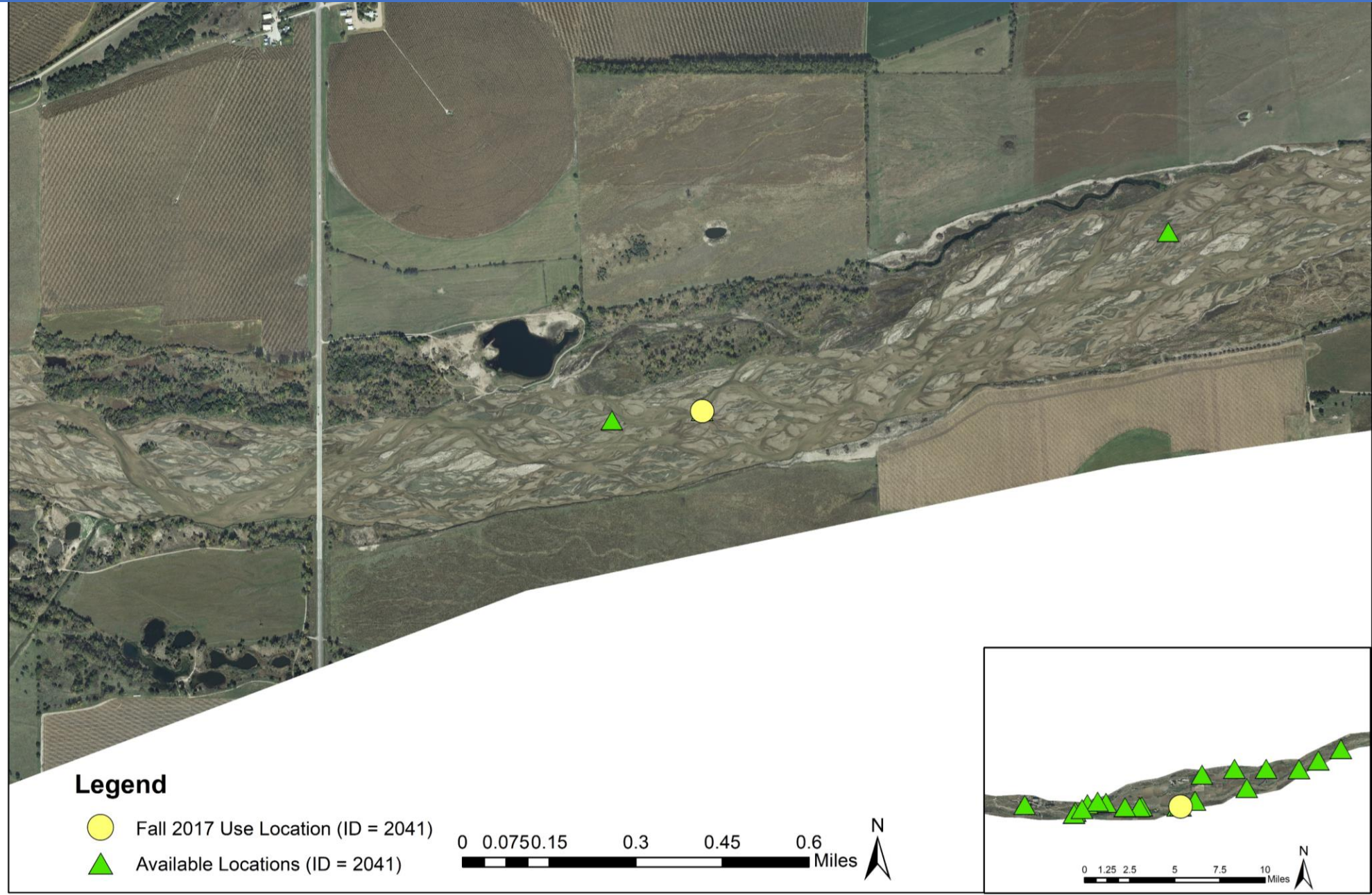
LiDAR Vegetation
Classification

RWBJV +

National Land Cover Data with
Specific Crops



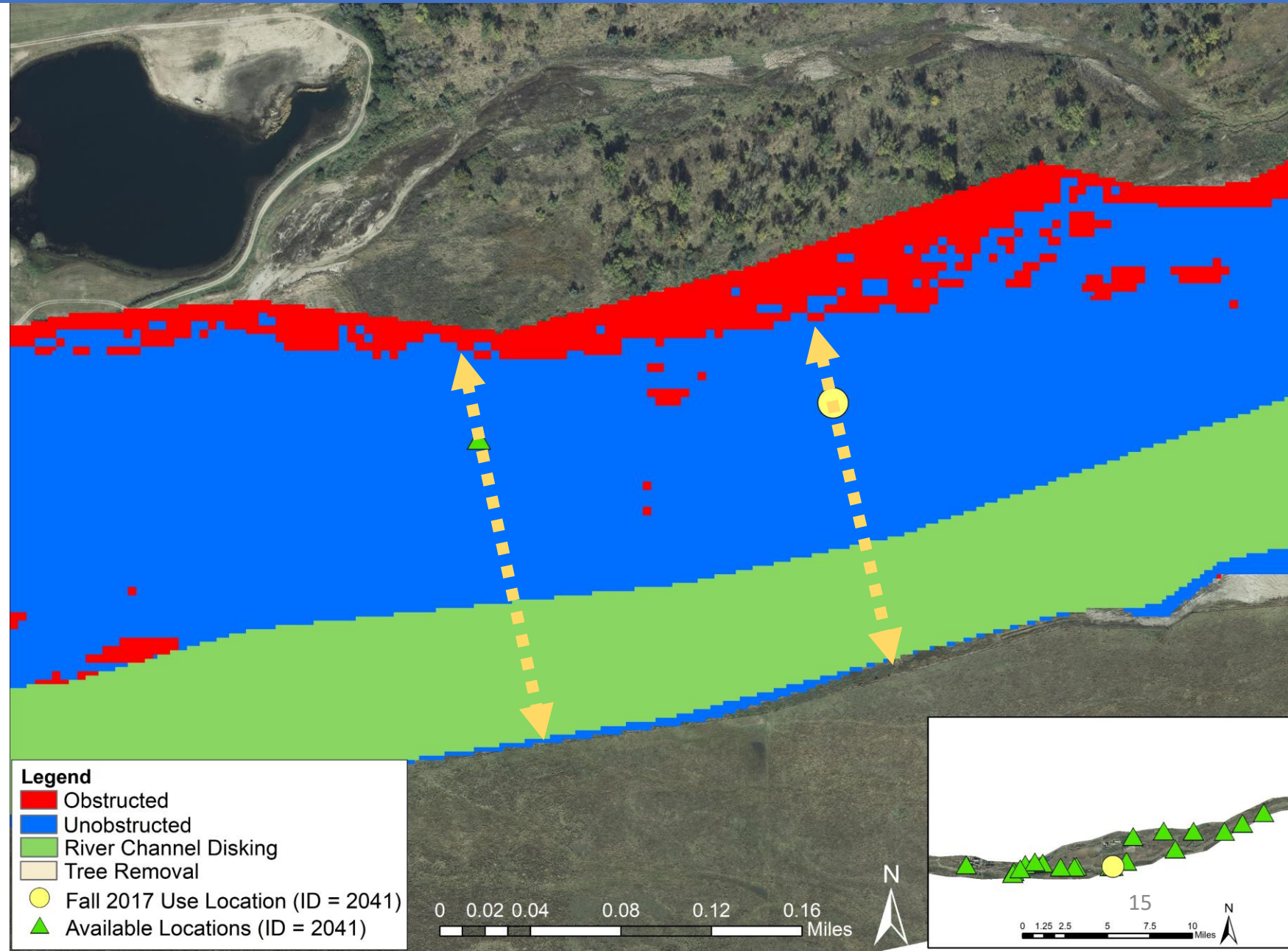
Measuring Explanatory Variables



Channel Openness

Unobstructed Channel Width (UOCW)

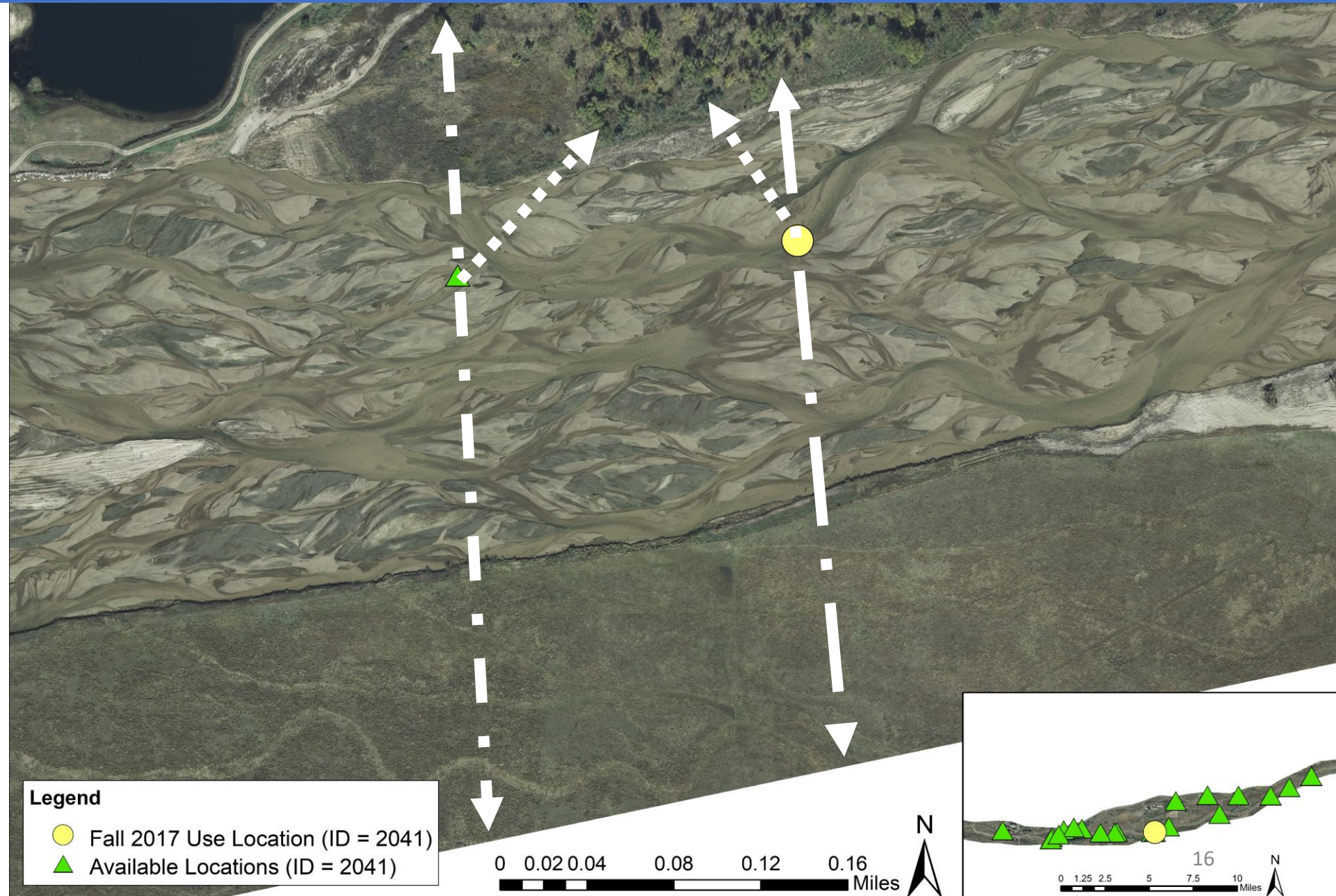
Total Channel Width (TCW)



Forest Obstructions

Nearest Forest

Unforested
Corridor Width



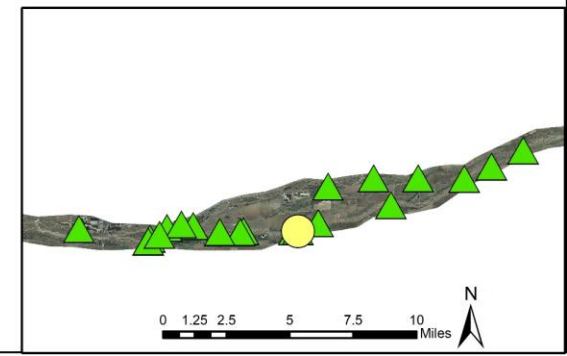
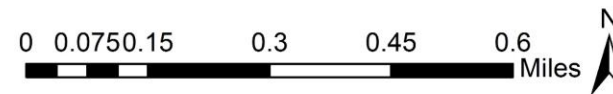
Flow Metric

Unit Discharge
(flow/wetted width)

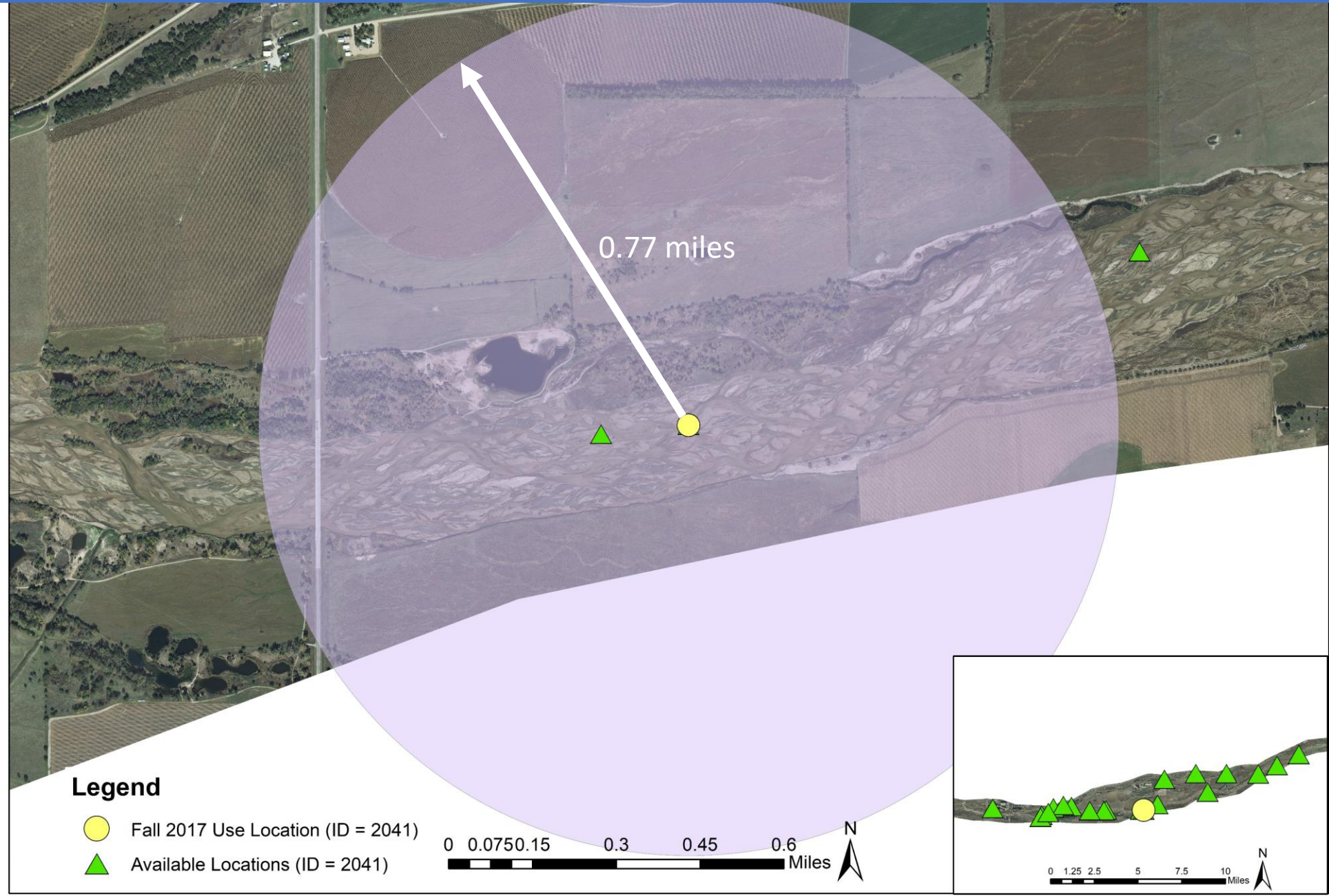


Legend

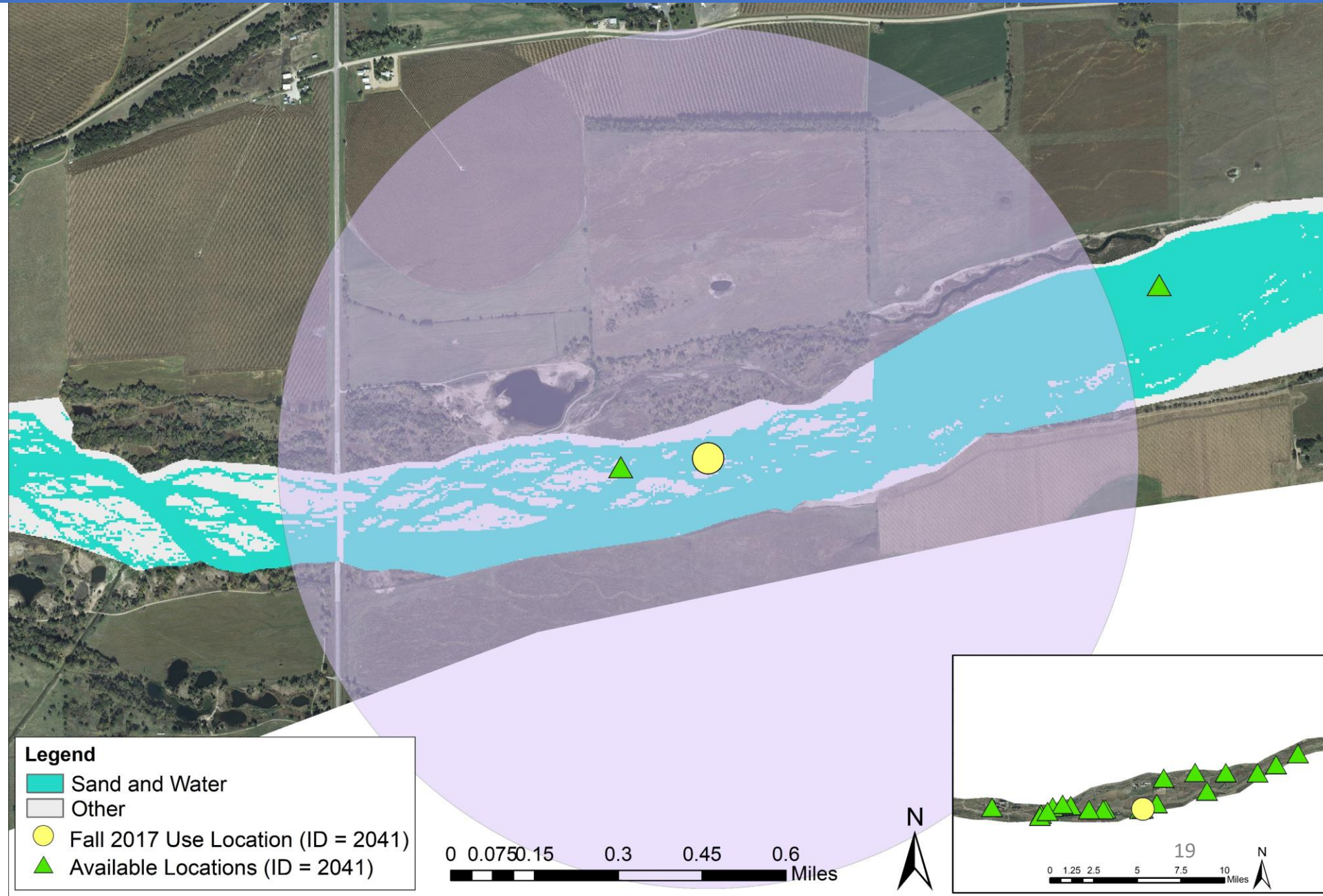
-  Fall 2017 Use Location (ID = 2041)
-  Available Locations (ID = 2041)



Landscape Scale



Sand and Water



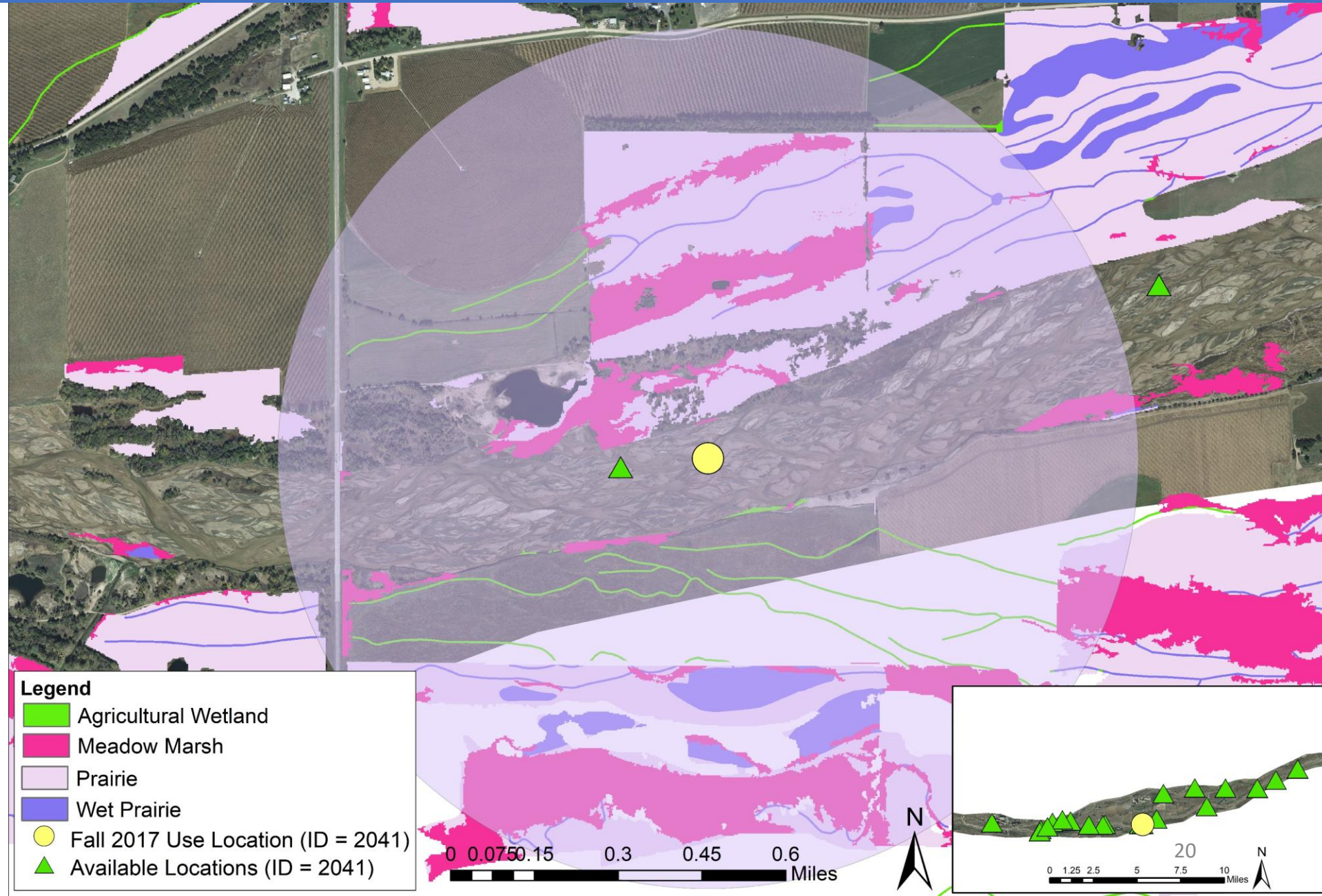
Grasslands

Meadow Marsh

Prairie

Wet Prairie

Agricultural
Wetlands



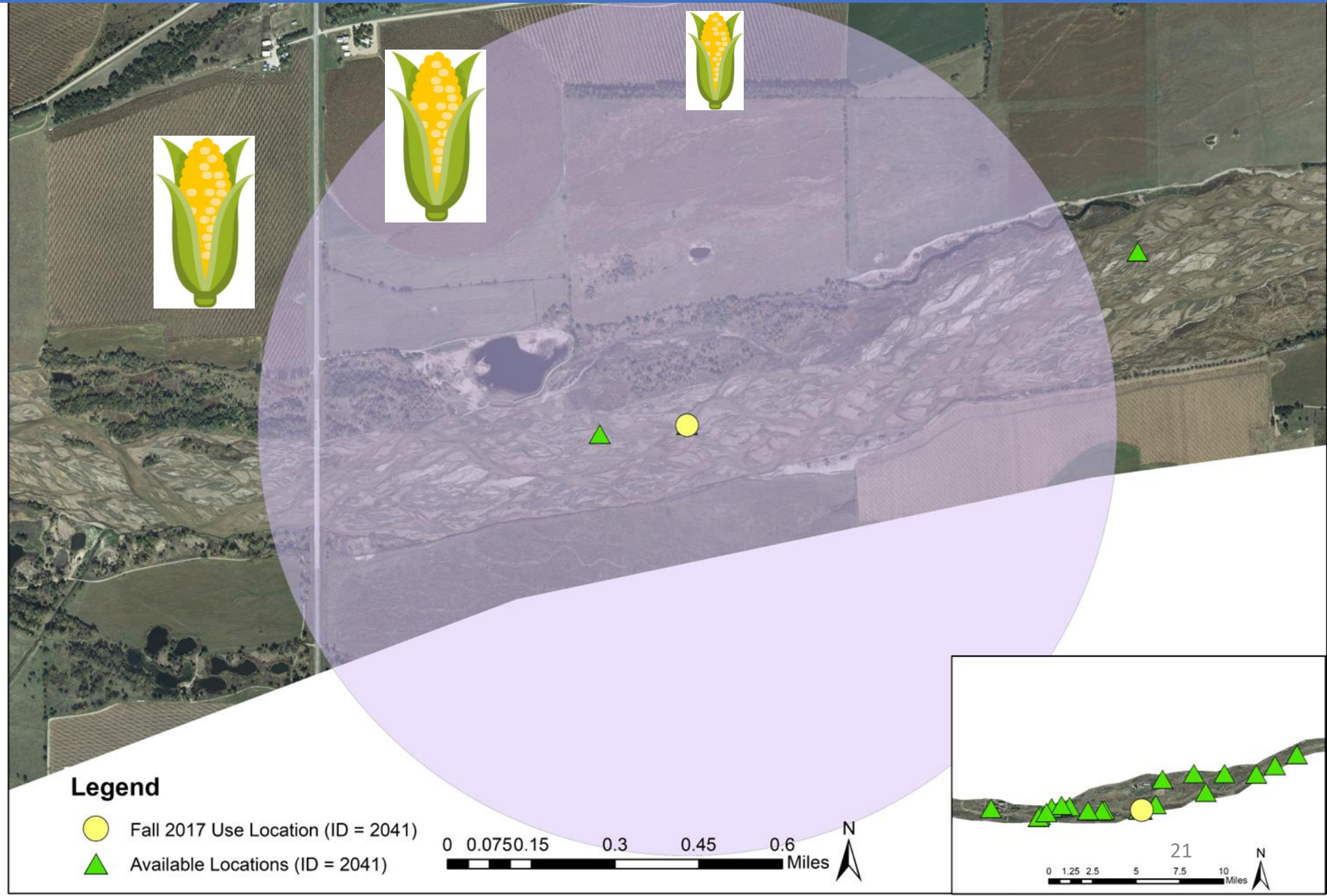
Agriculture

Corn

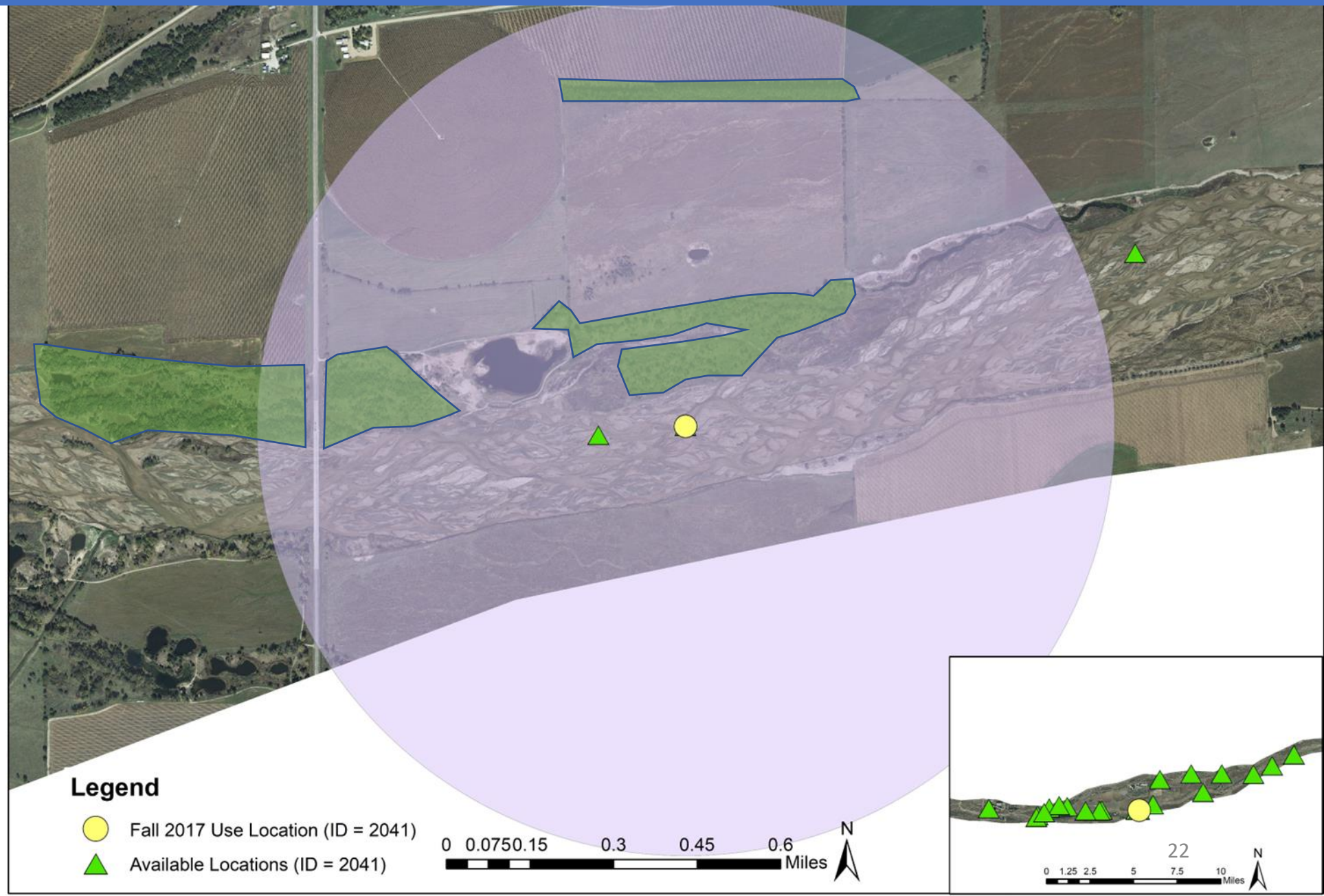
Soybeans

Alfalfa

Other



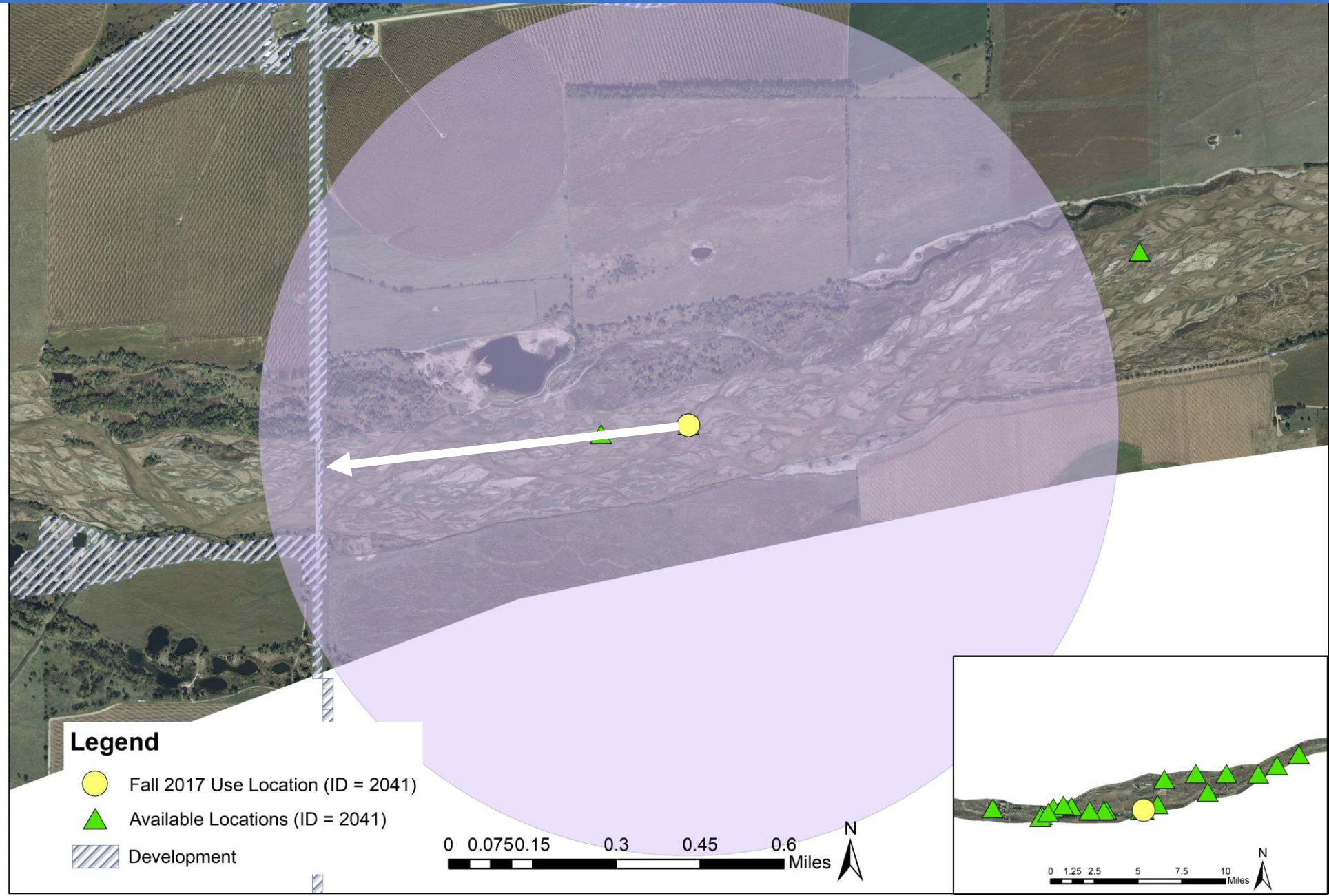
Forest



Developed

Proportion
Developed

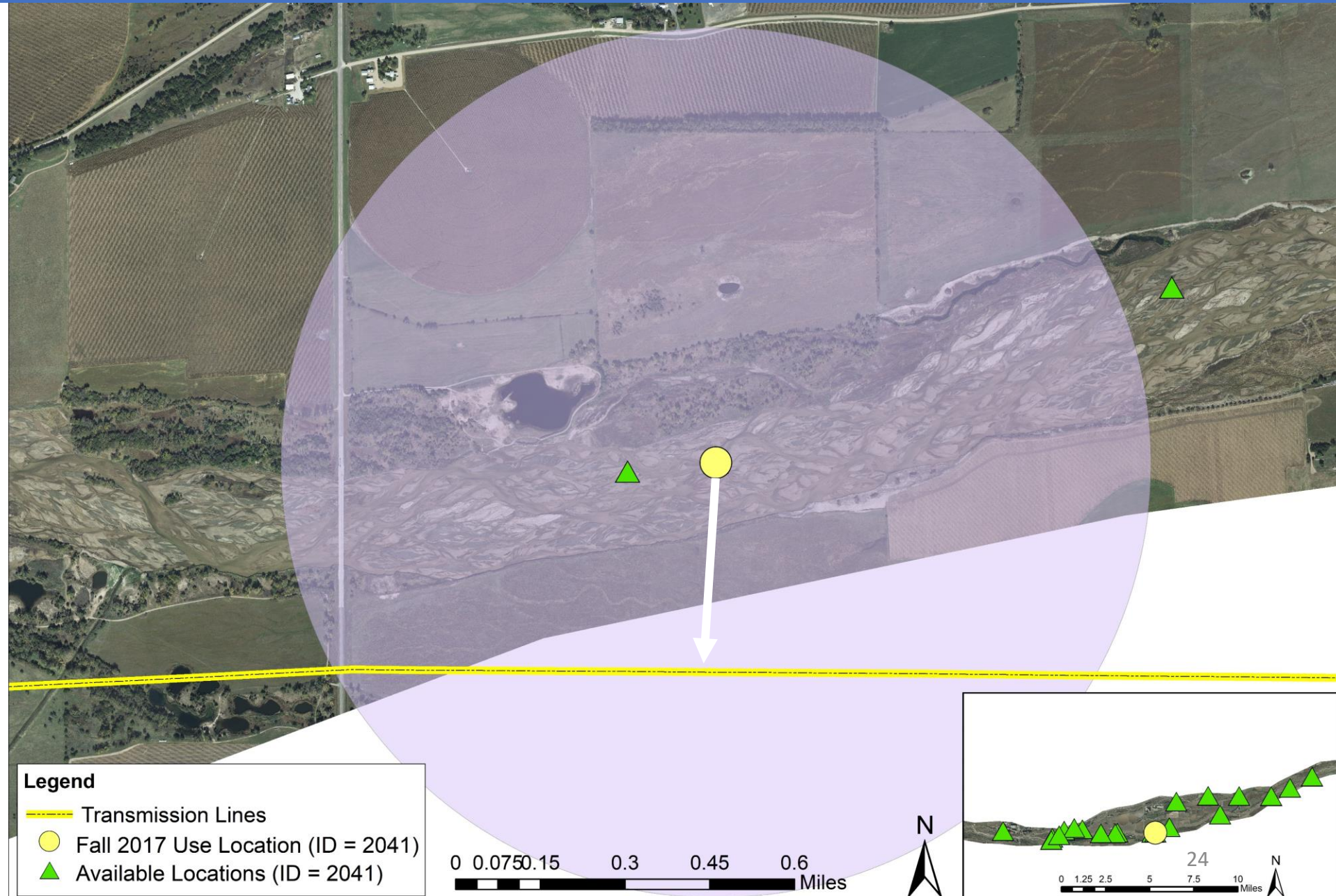
Distance to
Developed



Transmission Lines

Transmission Line
Length

Distance to
Transmission lines



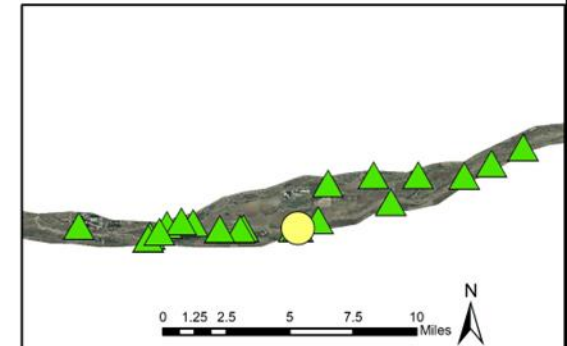
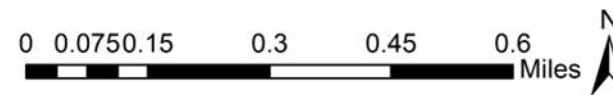
Statistical Analysis

- Use-Available
 - Discrete choice
- General Additive Models (GAMs)



Legend

- Fall 2017 Use Location (ID = 2041)
- ▲ Available Locations (ID = 2041)



Model Selection Process

- Step 1: Reproduce previous investigation results
- Step 2: On-channel metrics only
- Step 3: Off-channel metrics only
- Step 4: Combined important on/off-channel metrics

Model Selection Process

- On-Channel Metrics Only
 - Time periods
 - 2001 – Spring 2022
 - 2001 – Spring 2015
 - Fall 2015 – Spring 2022
 - Akaike Information Criterion
 - Unique locations ONLY
 - Top model(s) = most parsimonious model(s) with $\Delta AIC \leq 2.0$
- Off-Channel Metrics Only
- Combined On/Off-channel Metrics
 - All combinations of top model variables
 - Utilized all locations for final results.

Results: Riverine Roost Data

- Use = 520 locations
 - Program aerial monitoring
 - unique locations = 164
 - total locations = 461
 - Telemetry
 - unique locations = 16
 - total locations = 59
- Available = 10,400 locations

Model Selection Process: On-channel metrics

		Top On-Channel Metrics		
Analysis Period	Analysis Step	Unobstructed Channel Width	Nearest Forest	Unit Discharge
2001 - Spring 2022	On-channel	X	X	X
2001 - Spring 2015	On-channel	X	X	
Fall 2015 - Spring 2022	On-channel	X	X	X

Fall 2015 - Spring 2022 Results

Model	AIC	ΔAIC	weight
Unobstructed Channel Width + Nearest Forest + Unit Discharge	1812	0	1.0
Total Channel Width + Nearest Forest + Unobstructed Channel Width	1824	12	0.0
Unobstructed Channel Width + Nearest Forest	1829	17	0.0
Nearest Forest	1830	18	0.0
Unobstructed Channel Width + Unforested Corridor Width + Unit Discharge	1863	51	0.0

Model Selection Process: Off-channel metrics

		Top Off-Channel Metrics
Analysis Period	Analysis Step	Proportion Developed
2001 - Spring 2022	Off-channel	To be completed
2001 - Spring 2015	Off-channel	
Fall 2015 - Spring 2022	Off-channel	X

Fall 2015 - Spring 2022 Results

Model	AIC	Δ AIC	weight
Developed	1908	0	0.9
Distance to Developed	1912	4	0.1
Forest	1922	15	0.0
Meadow Marsh	1930	23	0.0
Ag Wetland	1939	31	0.0

Model Selection Process: On and Off-channel metrics

		On-Channel Metrics			Off-Channel Metrics
Analysis Period	Analysis Step	Unobstructed Channel Width	Nearest Forest	Unit Discharge	Proportion Developed
2001 - Spring 2022	On-channel	X	X	X	
	Off-channel	To be completed			
	On/Off-channel				
2001 - Spring 2015	On-channel	X	X		
	Off-channel	To be completed			
	On/Off-channel				
Fall 2015 - Spring 2022	On-channel	X	X	X	
	Off-channel				X
	On/Off-channel	X	X	X	X

Fall 2015 - Spring 2022 Results

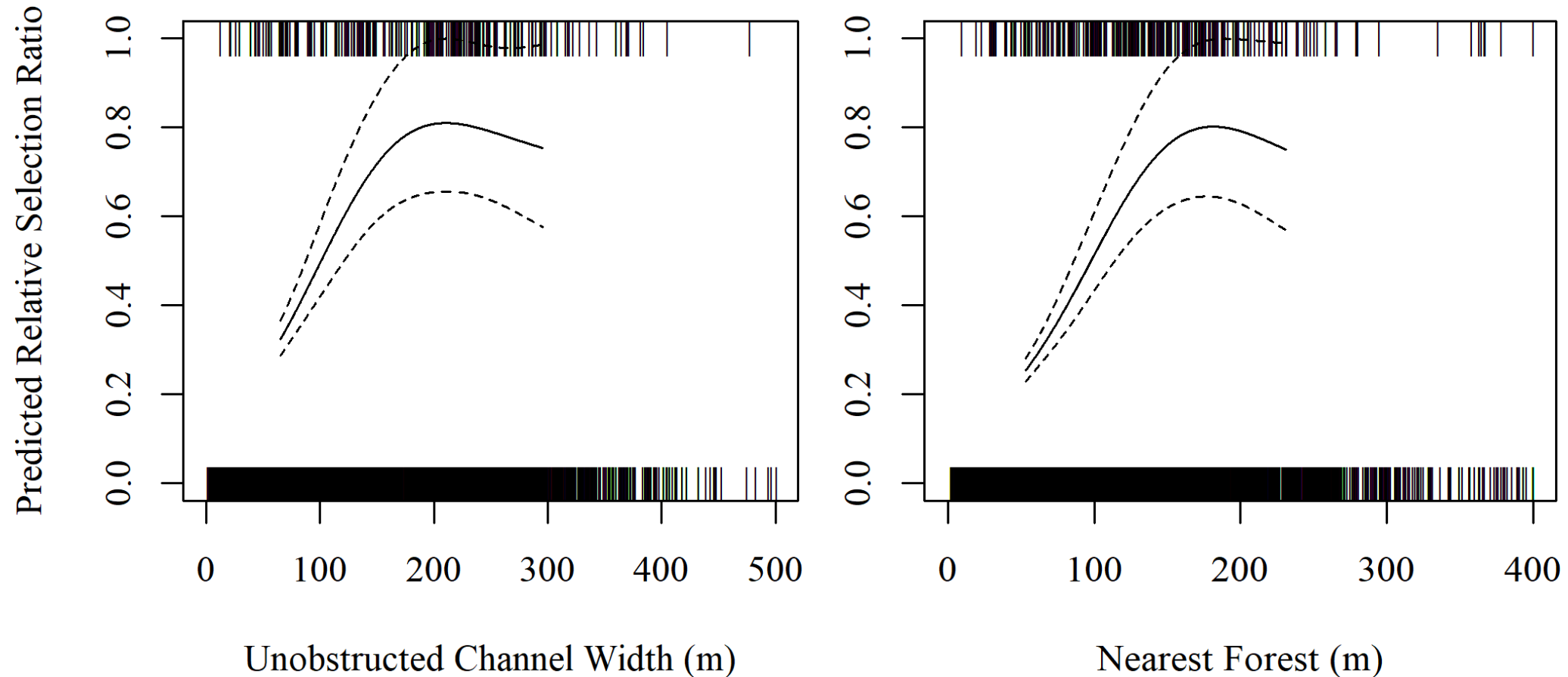
Model	AIC	ΔAIC	weight
Unobstructed Channel Width + Nearest Forest + Unit Discharge + Developed	1803	0	1
Unobstructed Channel Width + Nearest Forest + Unit Discharge	1812	9	0
Unobstructed Channel Width + Nearest Forest + Developed	1817	14	0
Nearest Forest + Developed	1819	16	0
Unobstructed Channel Width + Nearest Forest	1829	26	0

Previous Investigation Results

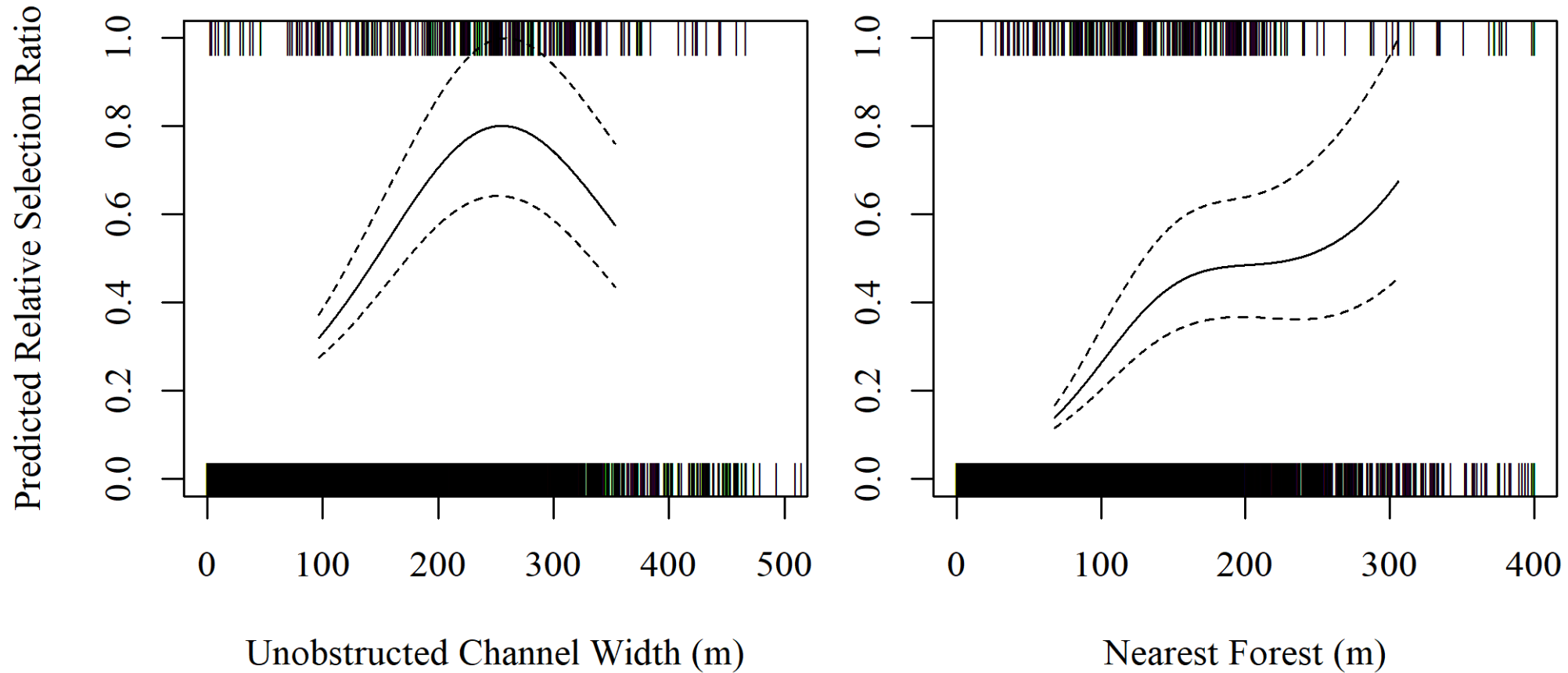
RESEARCH ARTICLE

Whooping crane use of riverine stopover sites (2001 – Spring 2017)

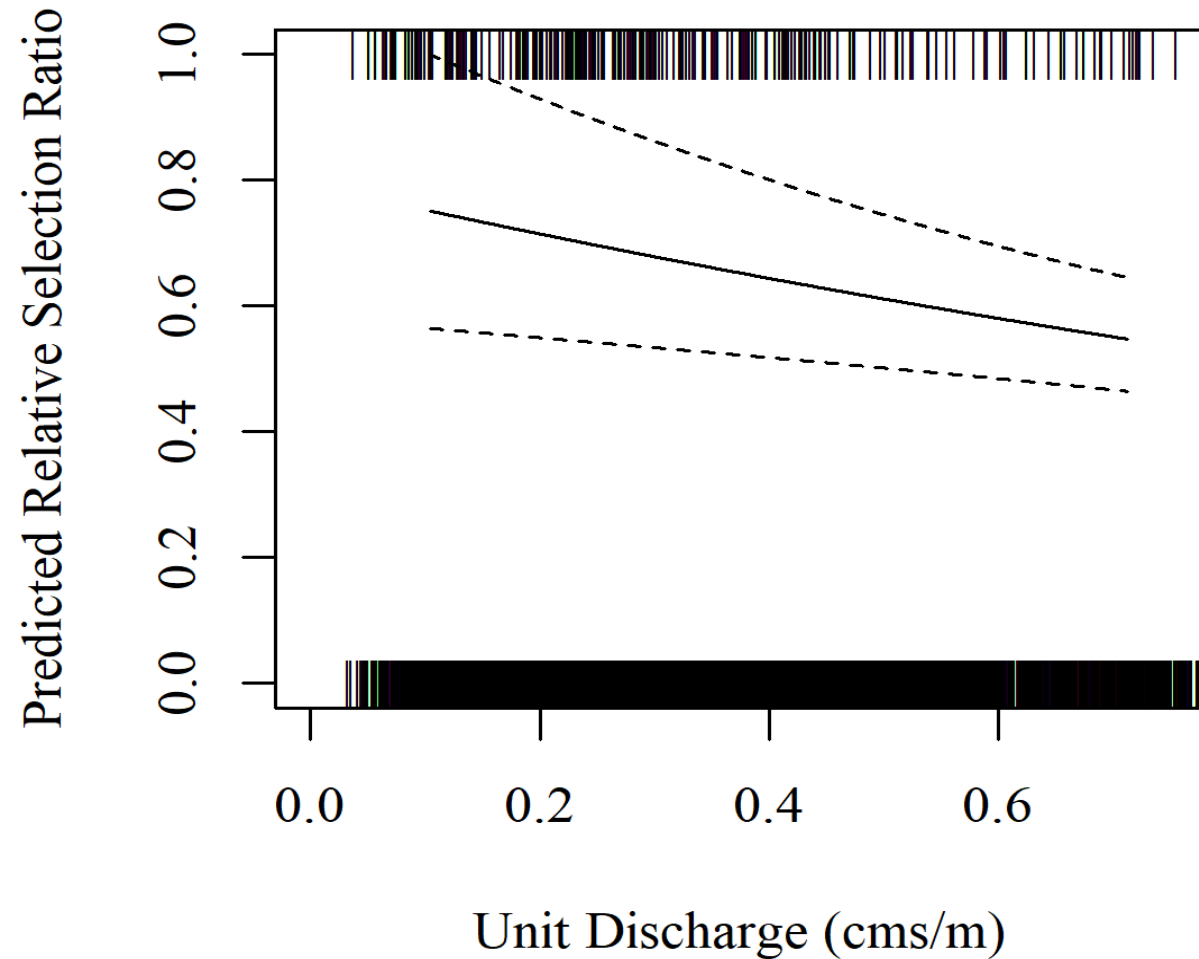
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Preliminary Results: Fall 2015 – Spring 2022



Preliminary Results: Fall 2015 – Spring 2022



Use Flow \approx Available Flow

Use Wetted Width > Available Wetted Width



Preliminary Results: Fall 2015 – Spring 2022

