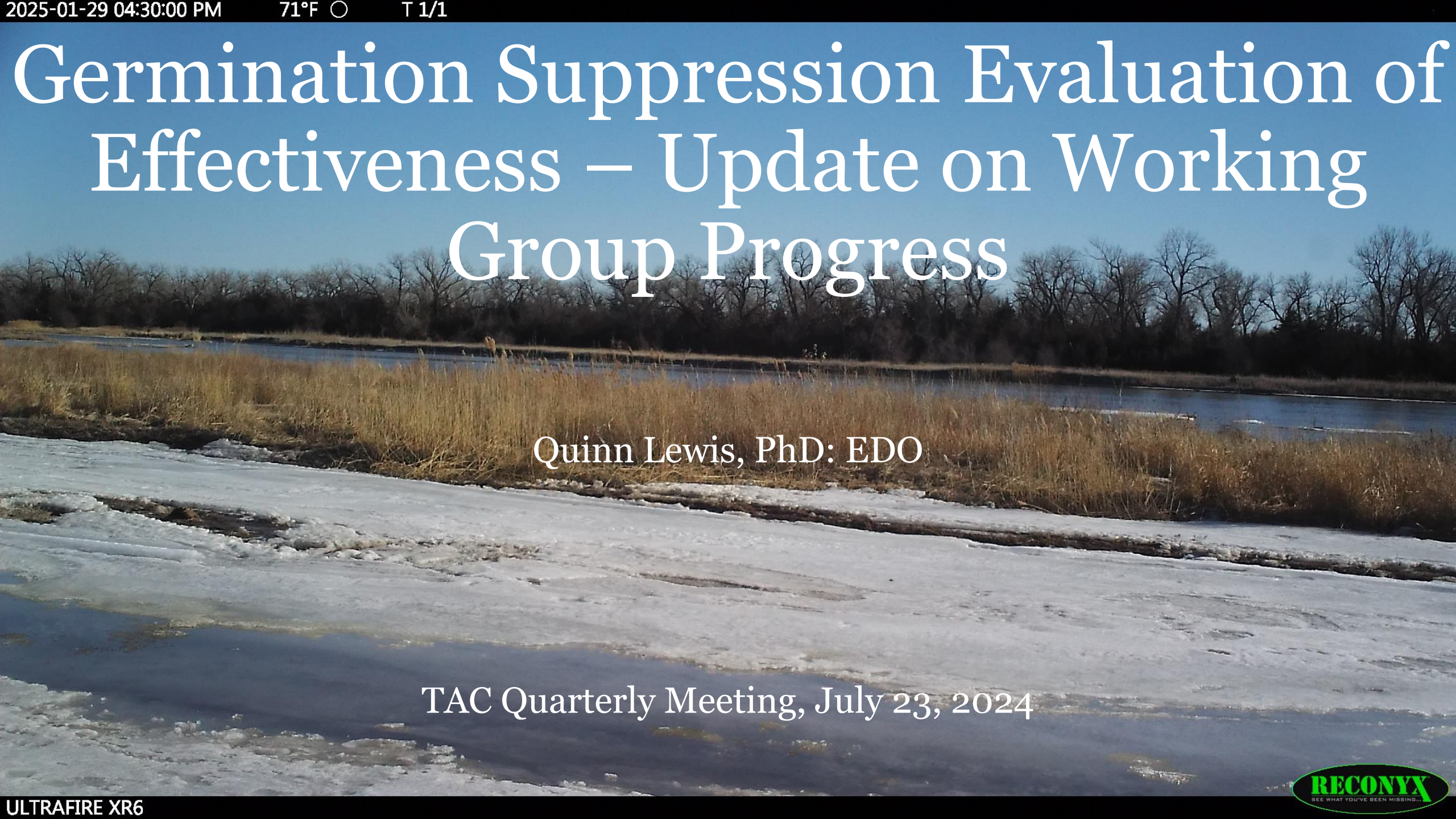
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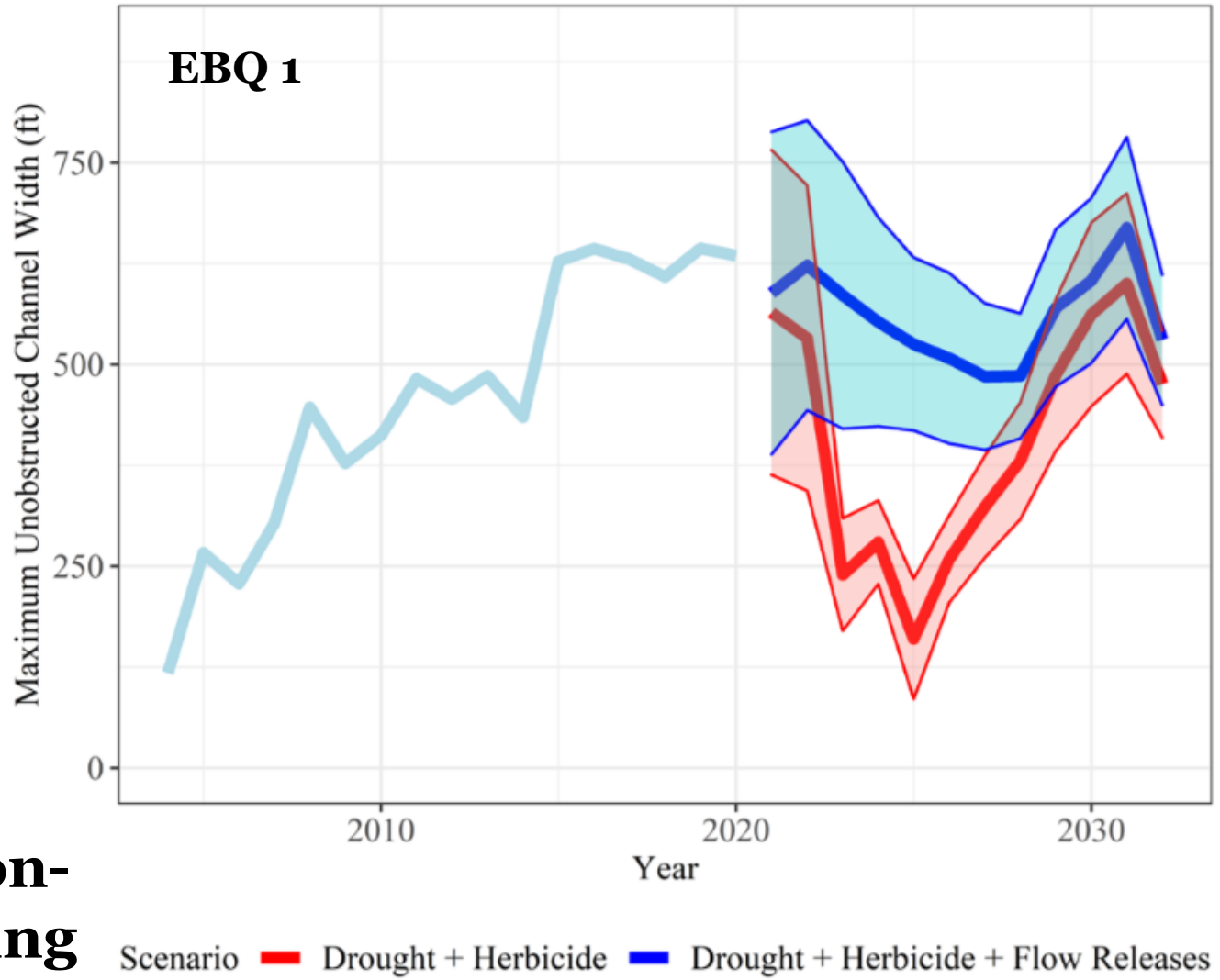
Germination Suppression Evaluation of Effectiveness – Update on Working Group Progress
Quinn Lewis, PhD: EDO
TAC Quarterly Meeting, July 23, 2024
ULTRAFIRE XR6
RECONYX
SEE WHAT YOU'VE BEEN MISSING...

Presentation Structure

- Big picture
- Brief summaries of working group (WG) 1 meetings

- Plan for moving forward
- Feedback and discussion

Goal: fill in TAC @ high-level, on-board with where we are heading



Germination Suppression Evaluation of Effectiveness (big picture)

Predictive Channel Width Model (generalized, statistical)

State Change – RS and GIS (connection between ↕)

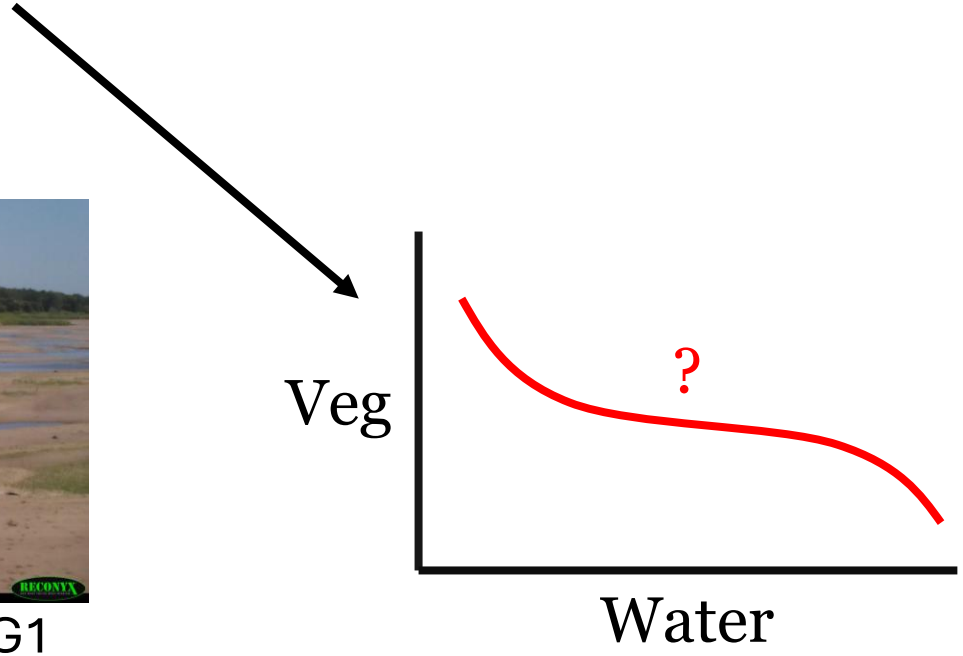
Timelapse Cameras/Imagery (direct, in-channel)

Today's focus

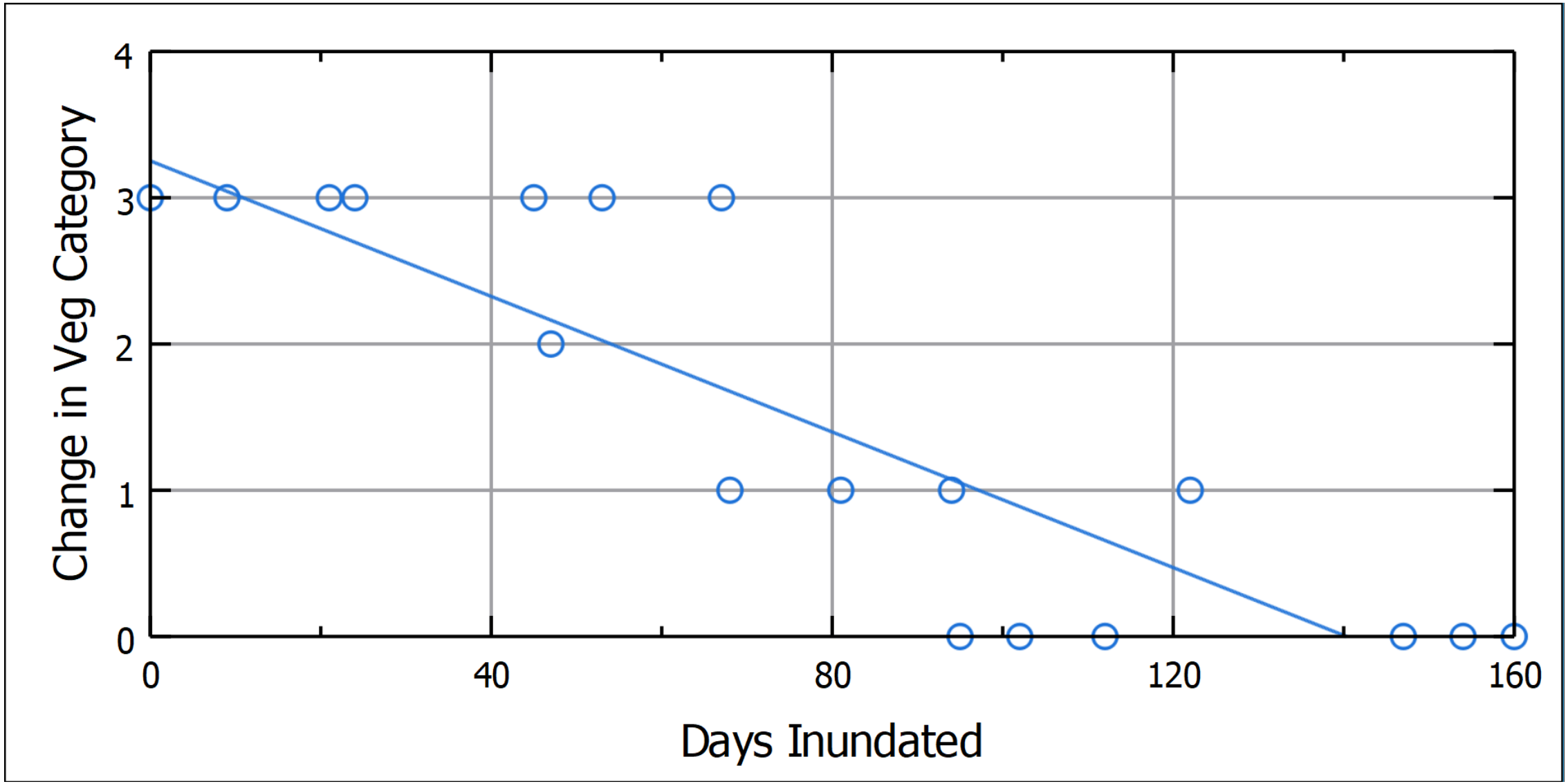
WG 1 - Objective

WG1

- Establish the reasoning, variables, and process/methods
- Provide initial examples

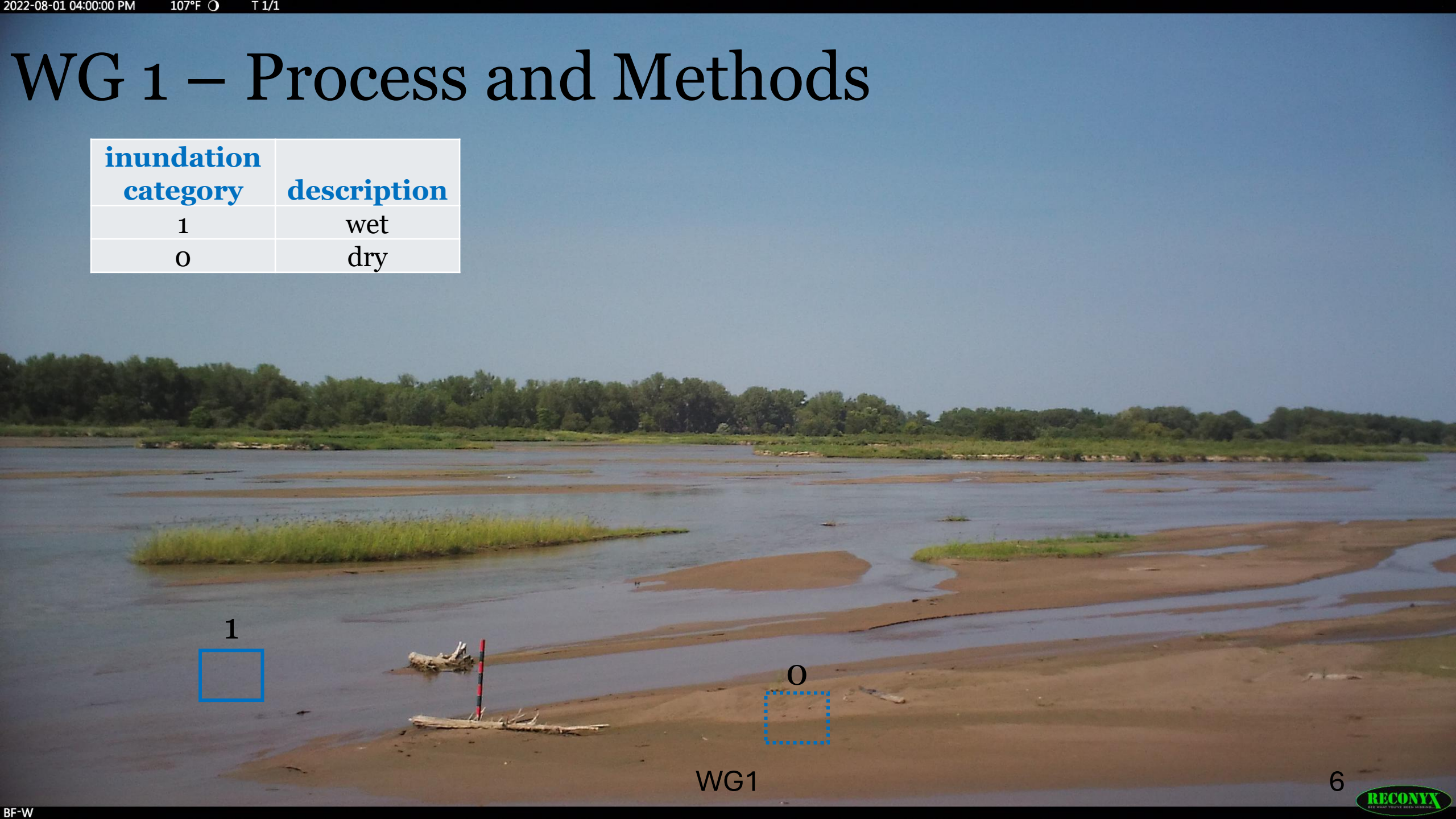


WG 1 – Reasoning and Variables



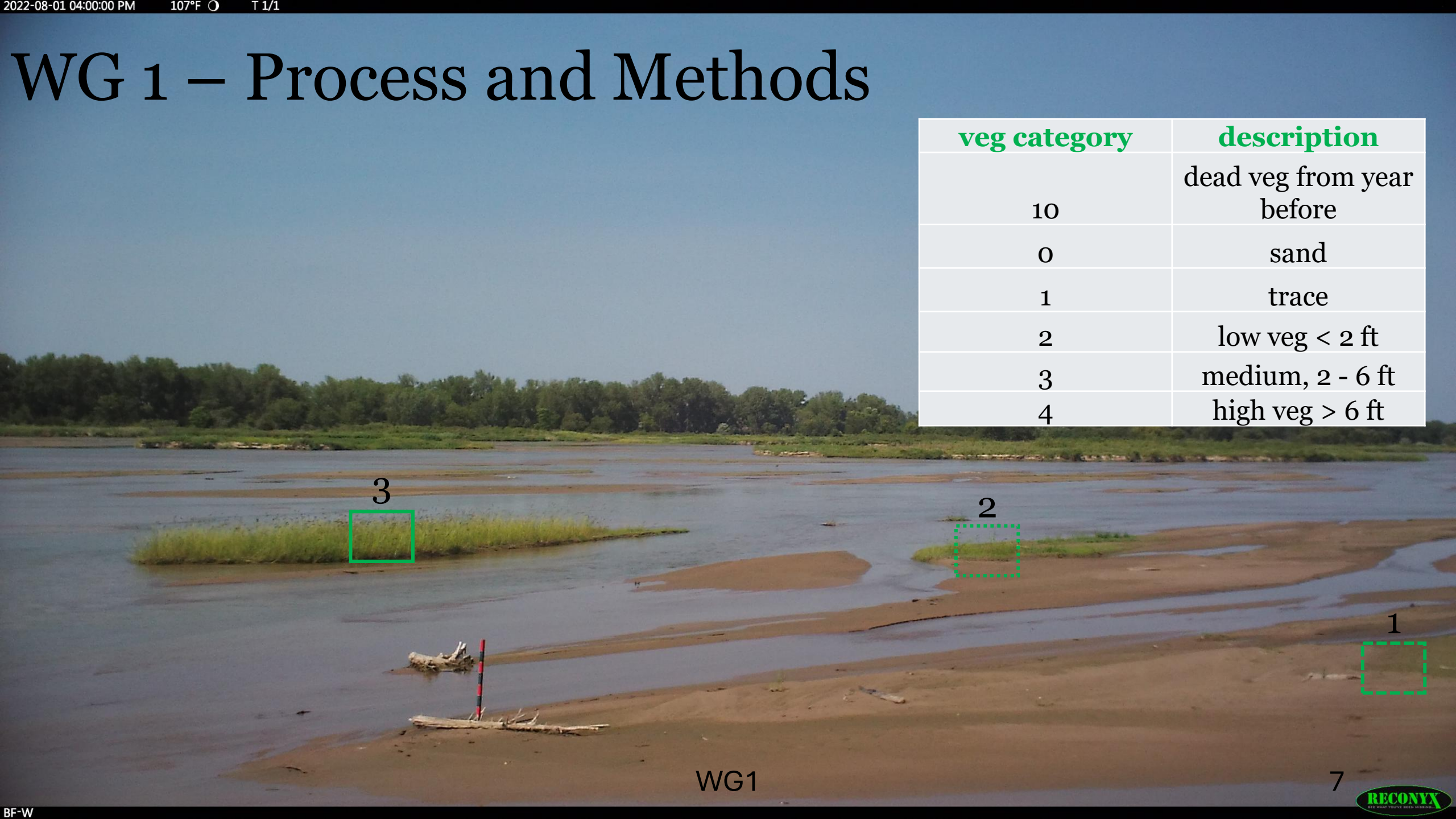
WG 1 – Process and Methods

inundation category	description
1	wet
0	dry



WG 1 – Process and Methods

veg category	description
10	dead veg from year before
0	sand
1	trace
2	low veg < 2 ft
3	medium, 2 - 6 ft
4	high veg > 6 ft



WG1

WG 1 – Process and Methods

day	hour	inun	veg cat
2022/09/06	09	0	2
	10	0	2
	11	0	2? 3?
	12	0	3
	13	0	3
	14	0	3

Automatic? Not super helpful

$$GCC = \frac{G_{DN}}{R_{DN} + G_{DN} + B_{DN}}$$

WG 1 - Takeaways

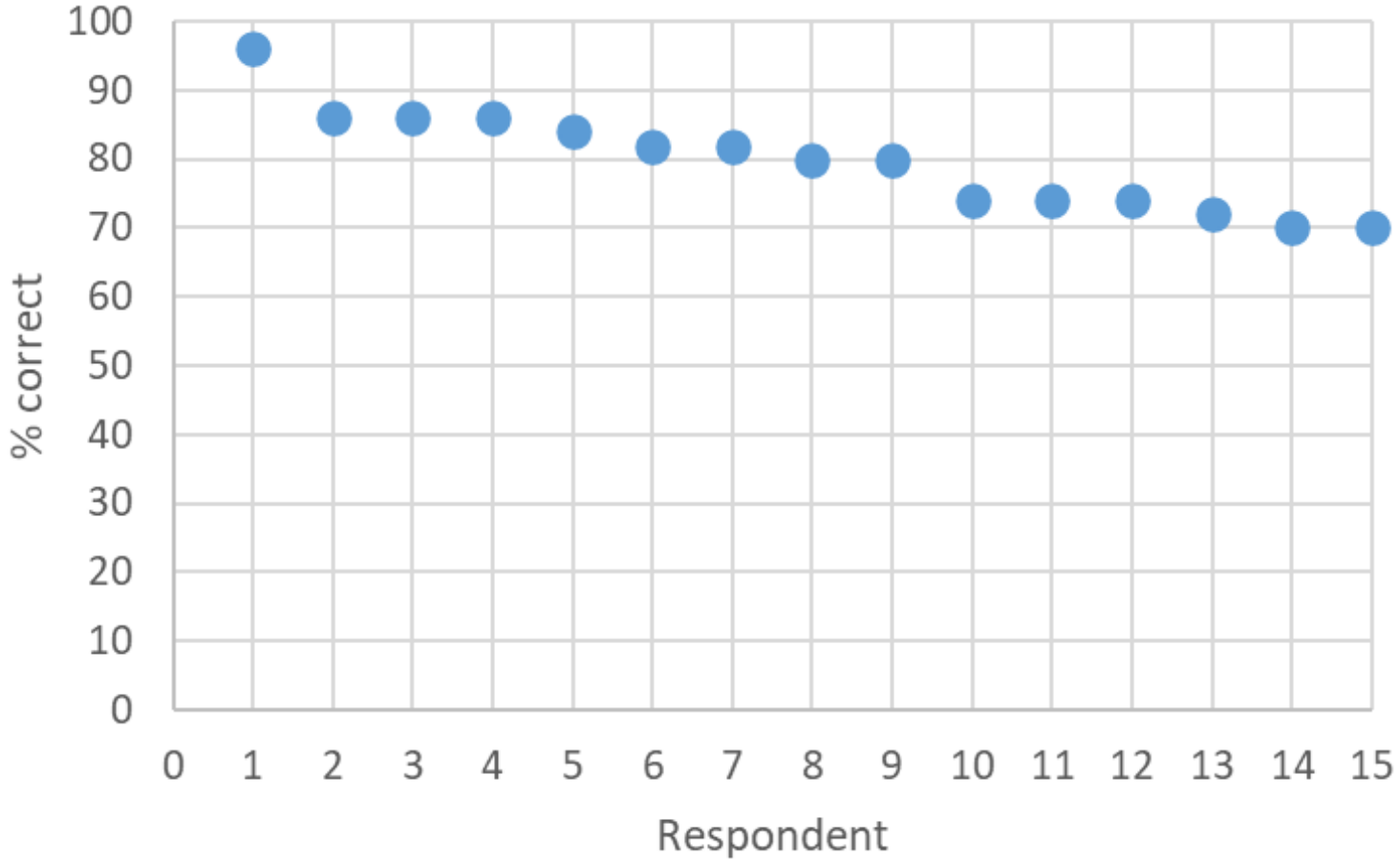
- Cameras connect inundation with vegetation state in a quantifiable way
- Reliability of manual classification? Assign “homework” to test – sets theme for **WG2**

image	class/category	notes
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

WG 2 - Objective

- Discuss results of vegetation classification test experiment

- Refine categories, improve classification system



WG 2 – Vegetation Classification

veg category	description
10	dead veg from year before
0	sand
1	trace
2	low veg < 2 ft
3	medium, 2 - 6 ft
4	high veg > 6 ft
NEW: 99	flag

3

2

99

0

1

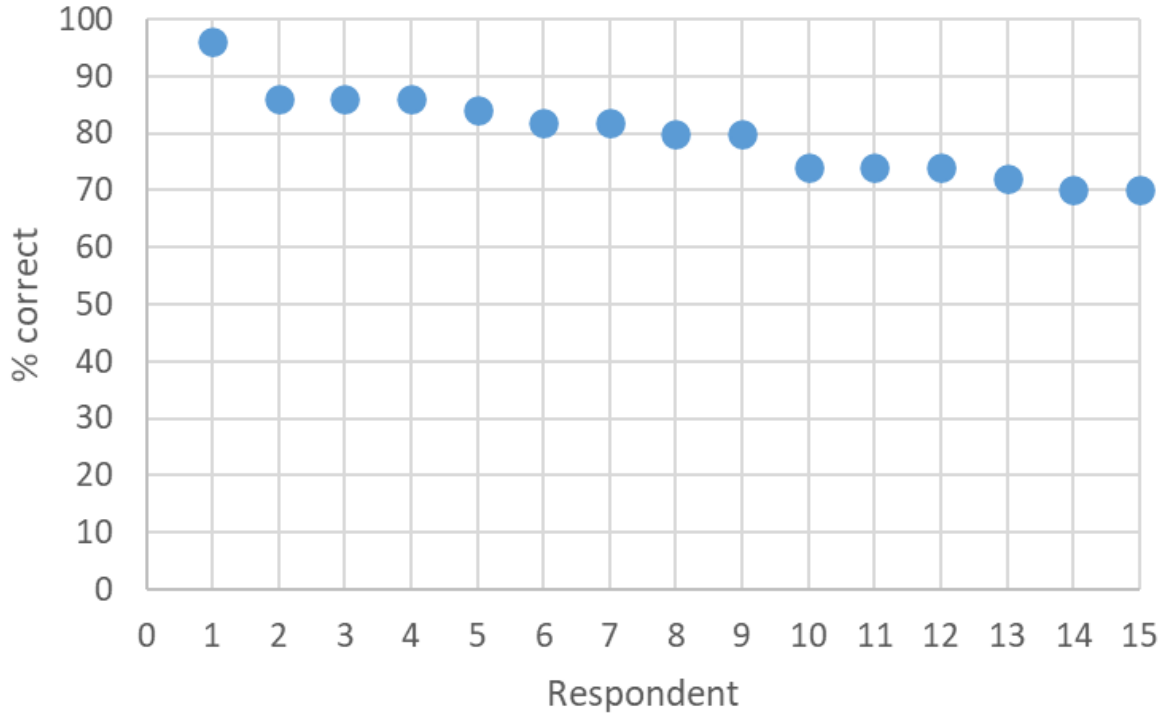
WG2

WG 2 – Vegetation Classification

Summary stats – overall accuracy good

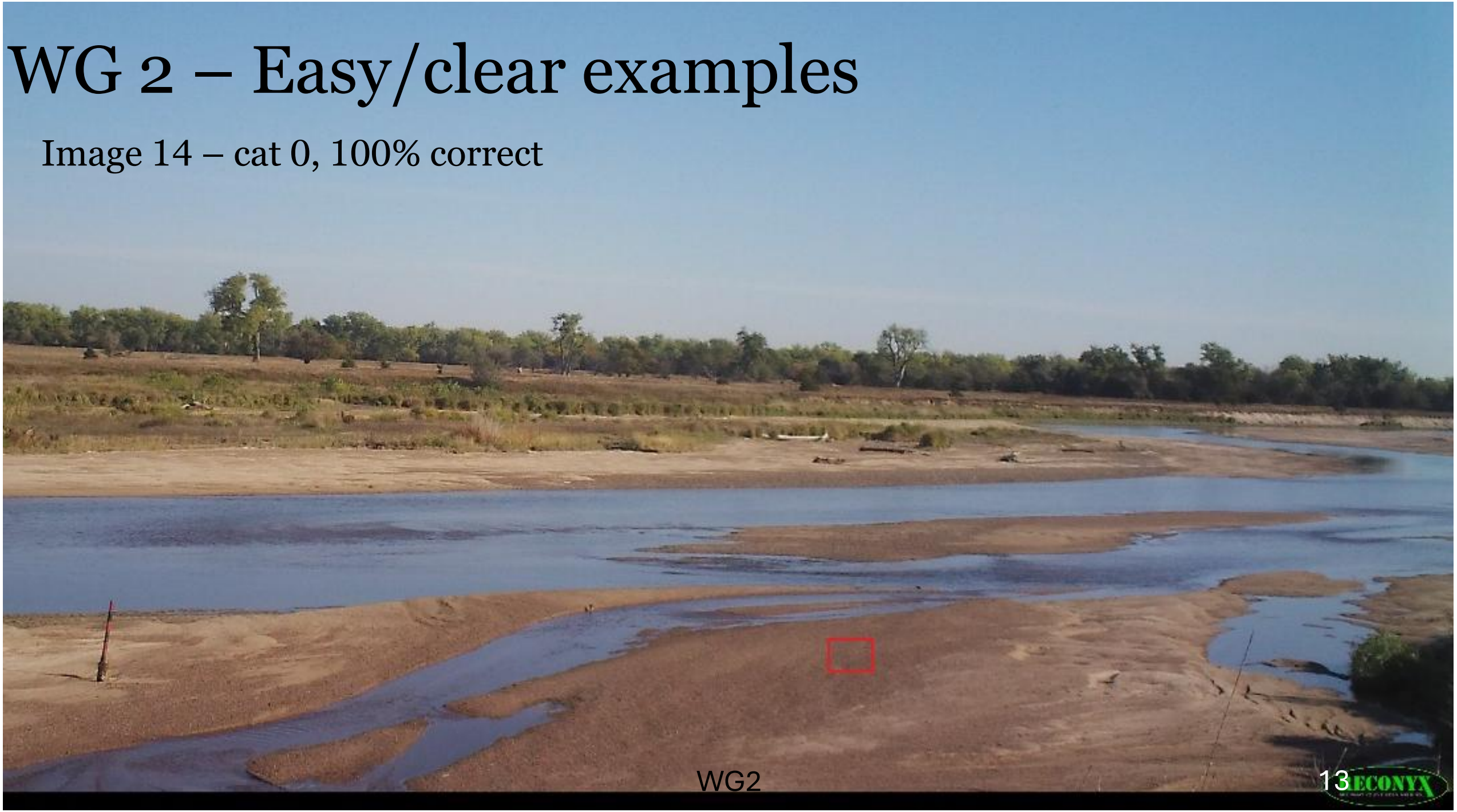
cat	correct	incorrect	correct %	# of images
0	142	8	94.7	10
1	146	19	88.5	11
2	105	30	77.8	9
3	111	39	74.0	10
4				
10	96	39	71.1	9
99	6	9	40.0	1
SUM	606	144	80.8	50

Mean = 80% (79%); median = 80%



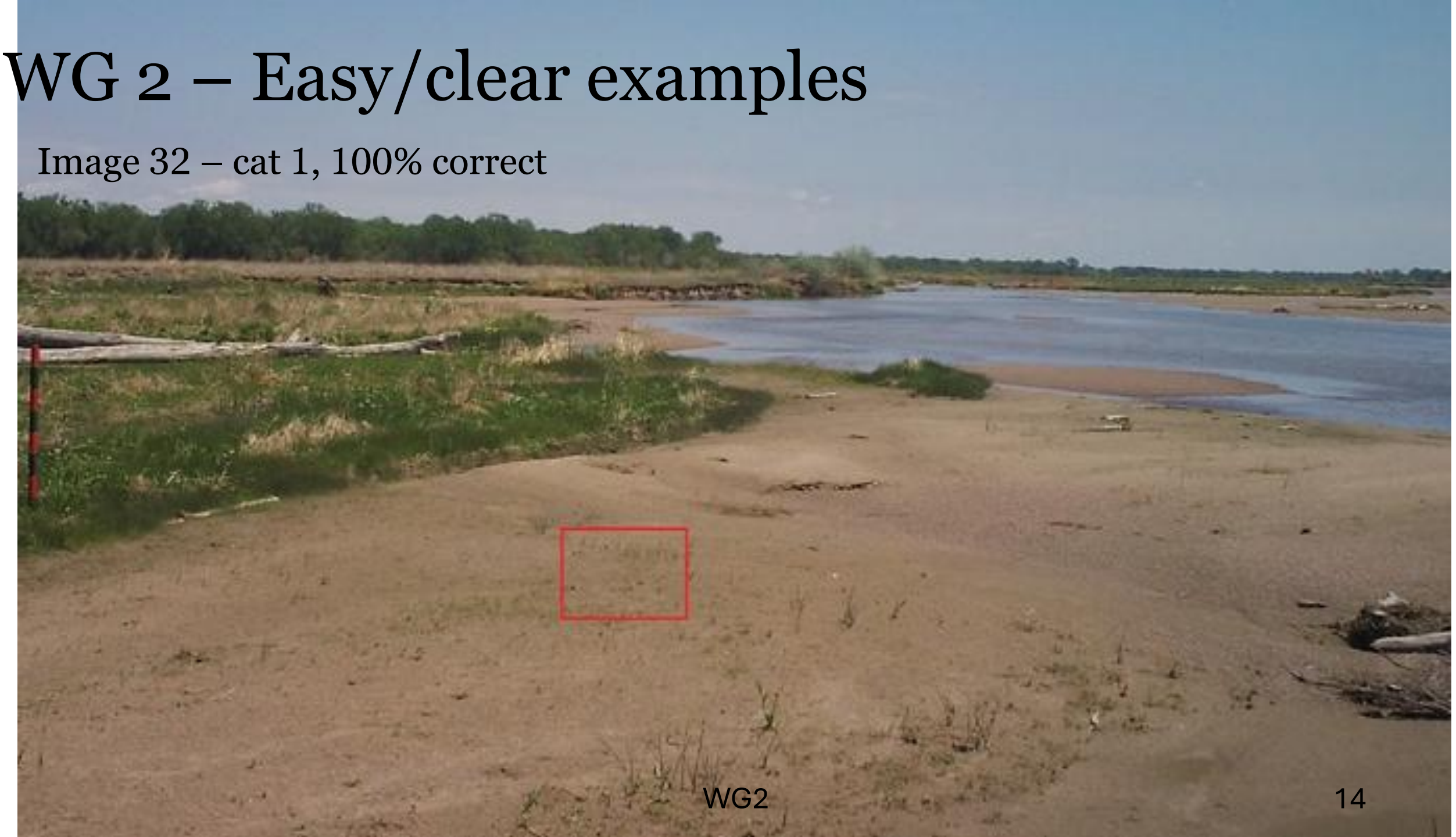
WG 2 – Easy/clear examples

Image 14 – cat 0, 100% correct



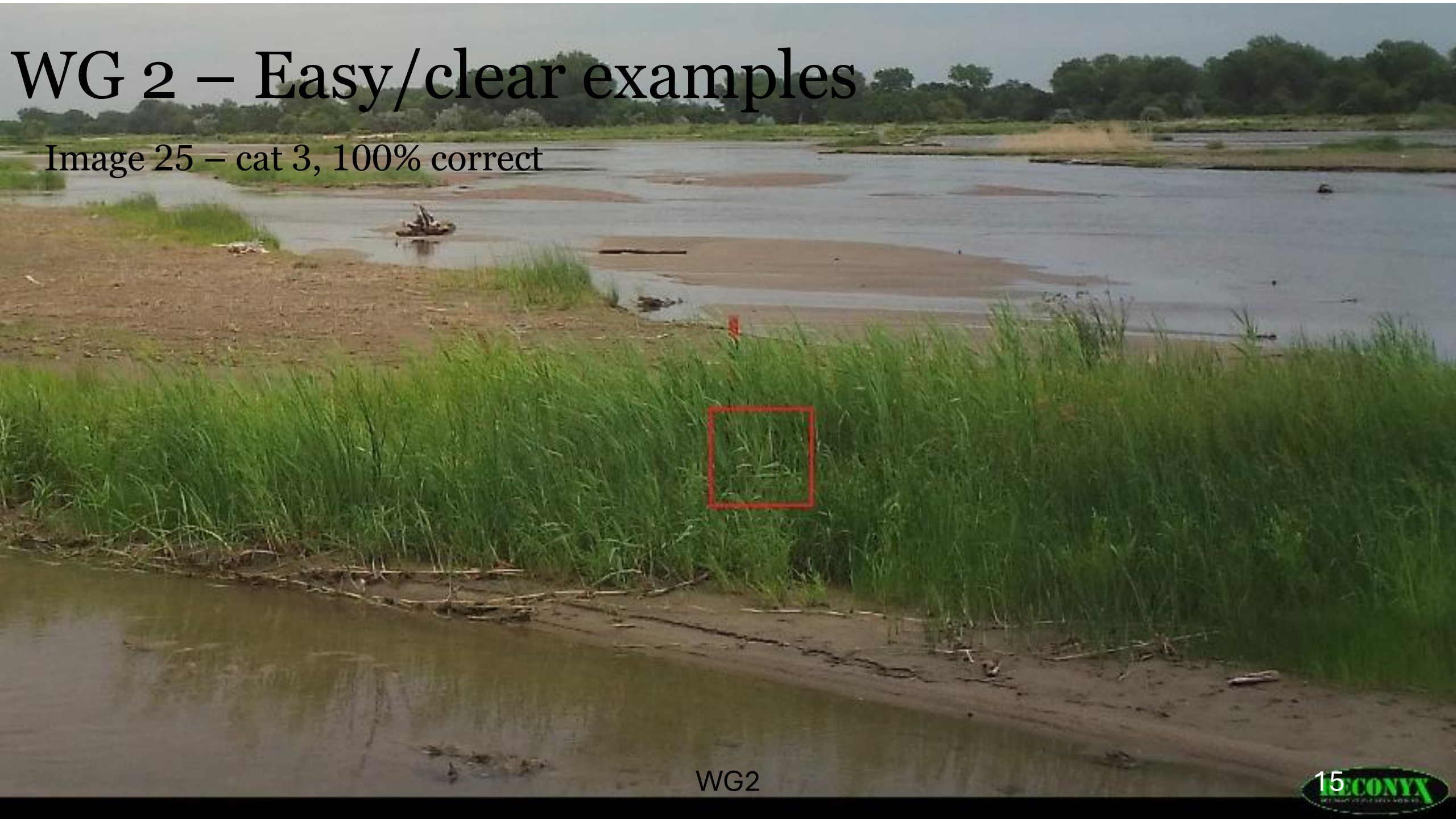
WG 2 – Easy/clear examples

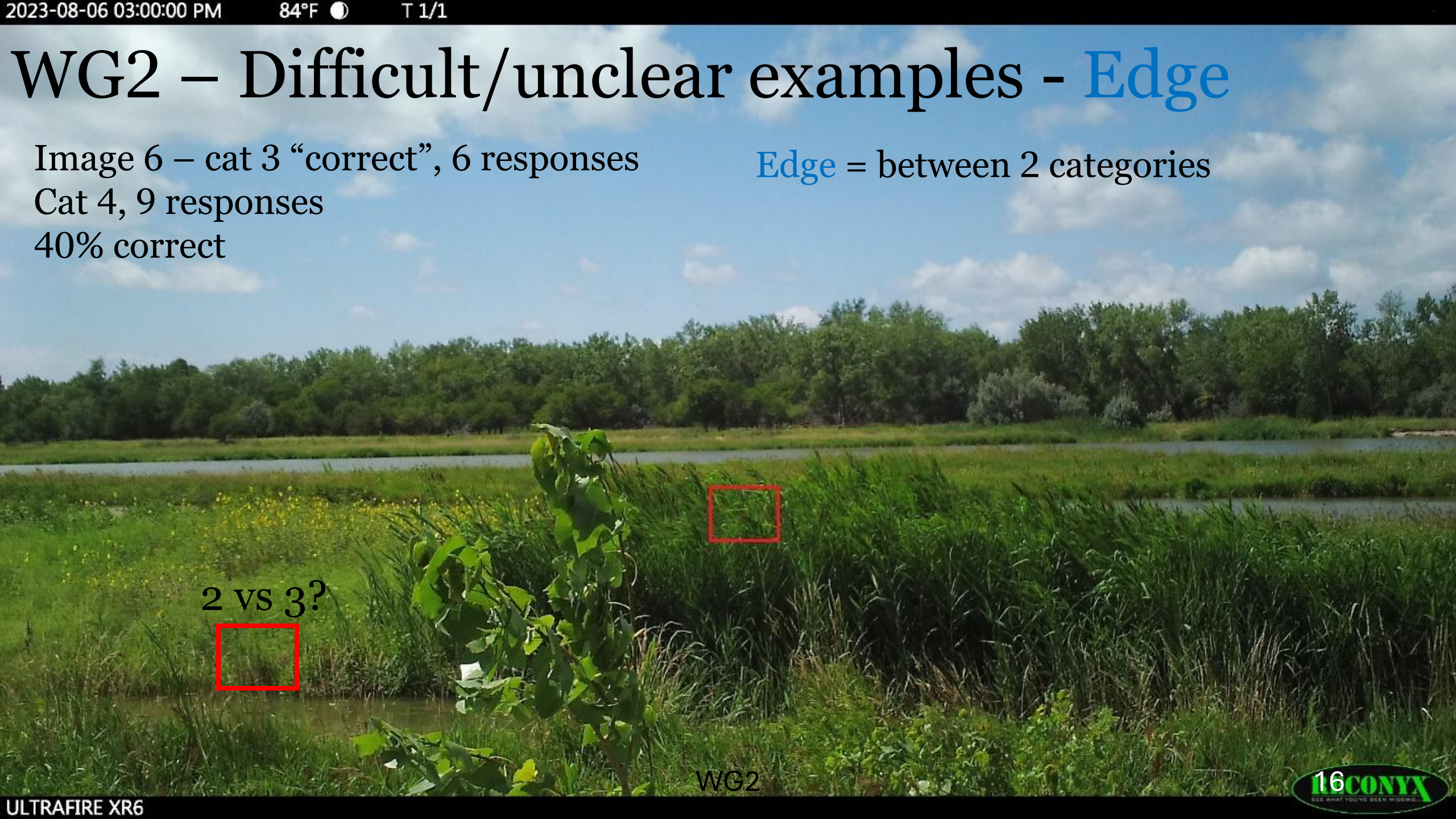
Image 32 – cat 1, 100% correct



WG 2 – Easy/clear examples

Image 25 – cat 3, 100% correct

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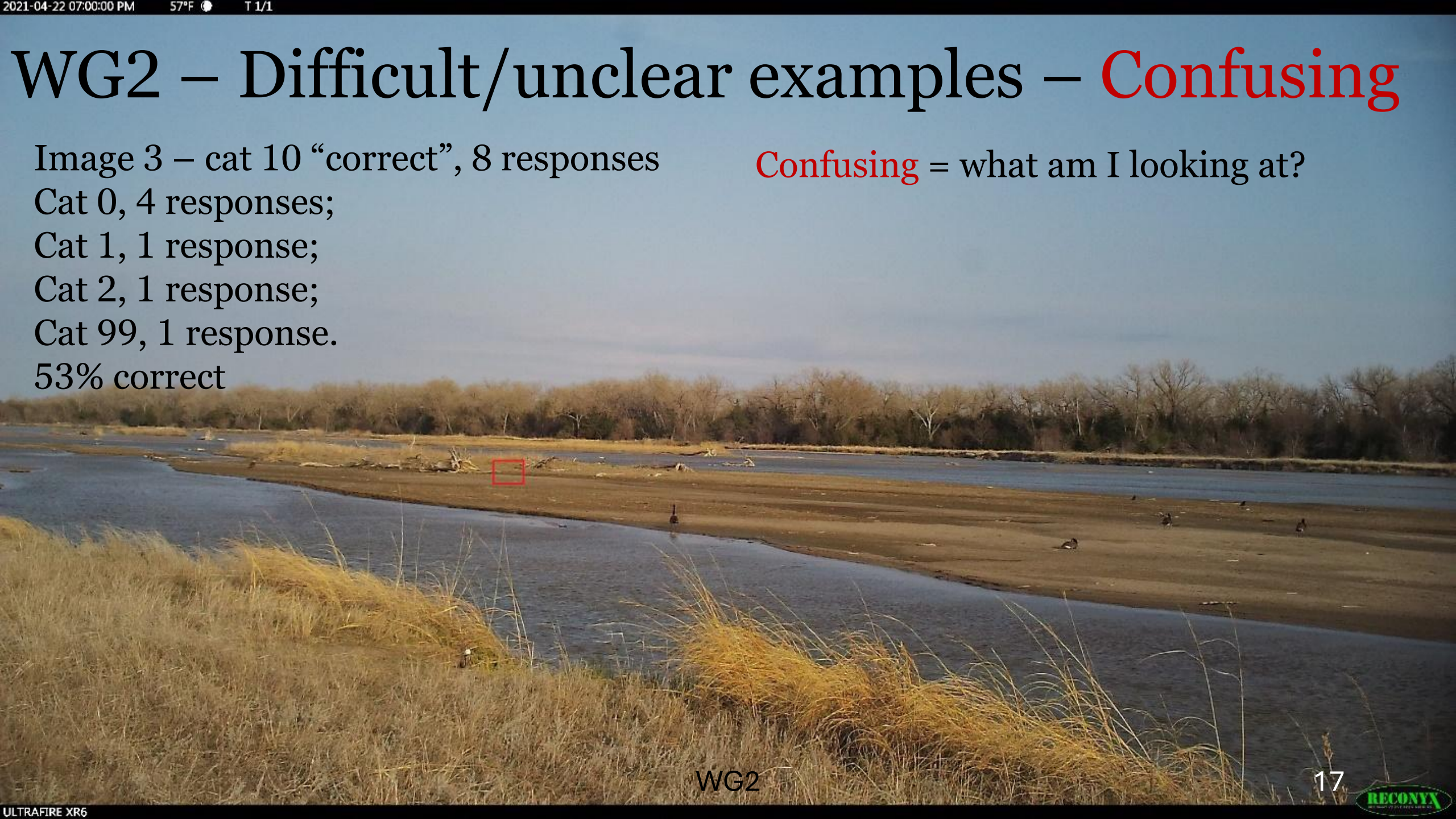
WG2 – Difficult/unclear examples - Edge
Image 6 – cat 3 “correct”, 6 responses
Cat 4, 9 responses
40% correct
Edge = between 2 categories
2 vs 3?
WG2
16
ULTRAFIRE XR6



WG2 – Difficult/unclear examples – Confusing

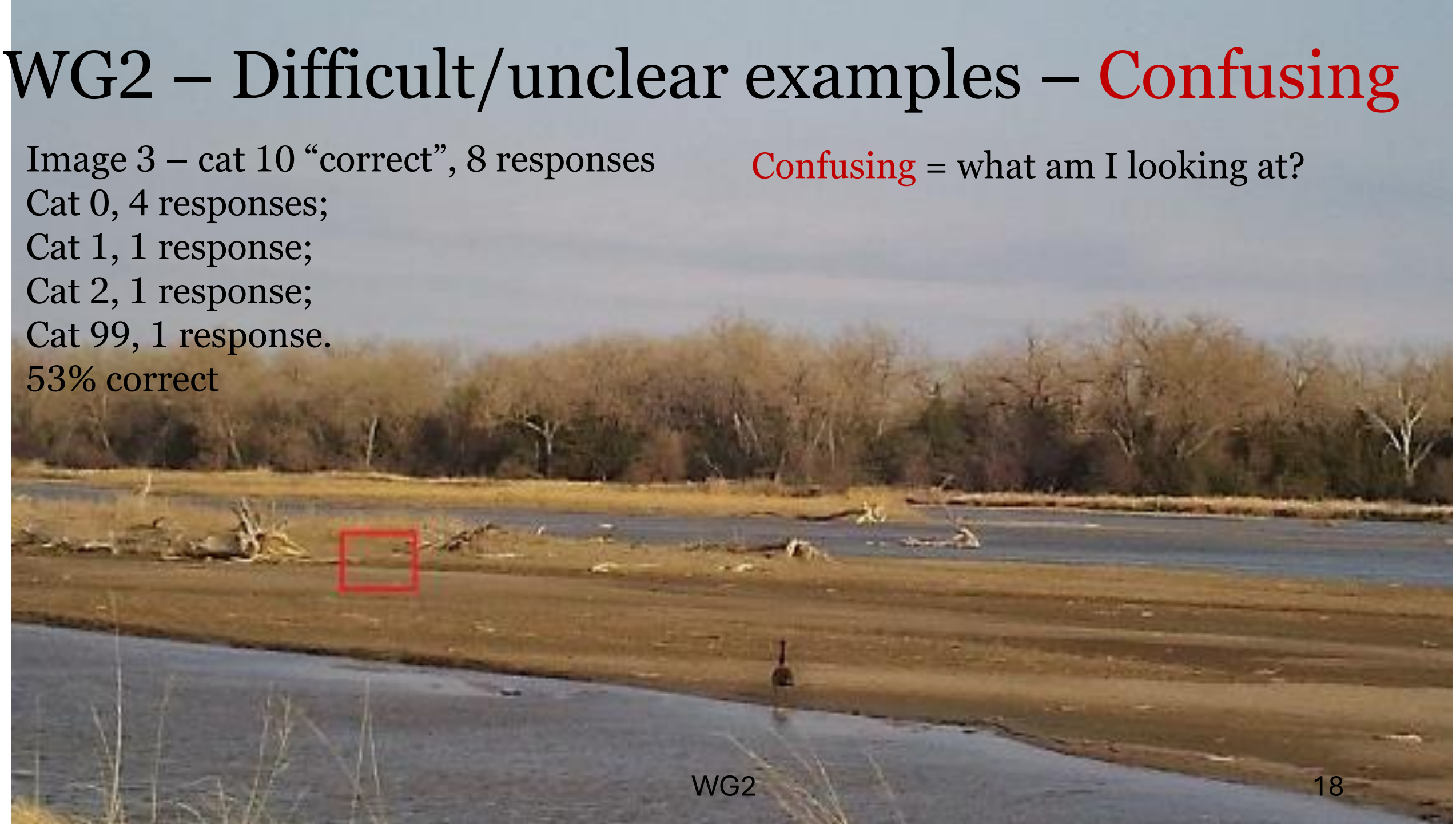
Image 3 – cat 10 “correct”, 8 responses
Cat 0, 4 responses;
Cat 1, 1 response;
Cat 2, 1 response;
Cat 99, 1 response.
53% correct

Confusing = what am I looking at?

WG2 – Difficult/unclear examples – Confusing

Image 3 – cat 10 “correct”, 8 responses
Cat 0, 4 responses;
Cat 1, 1 response;
Cat 2, 1 response;
Cat 99, 1 response.
53% correct

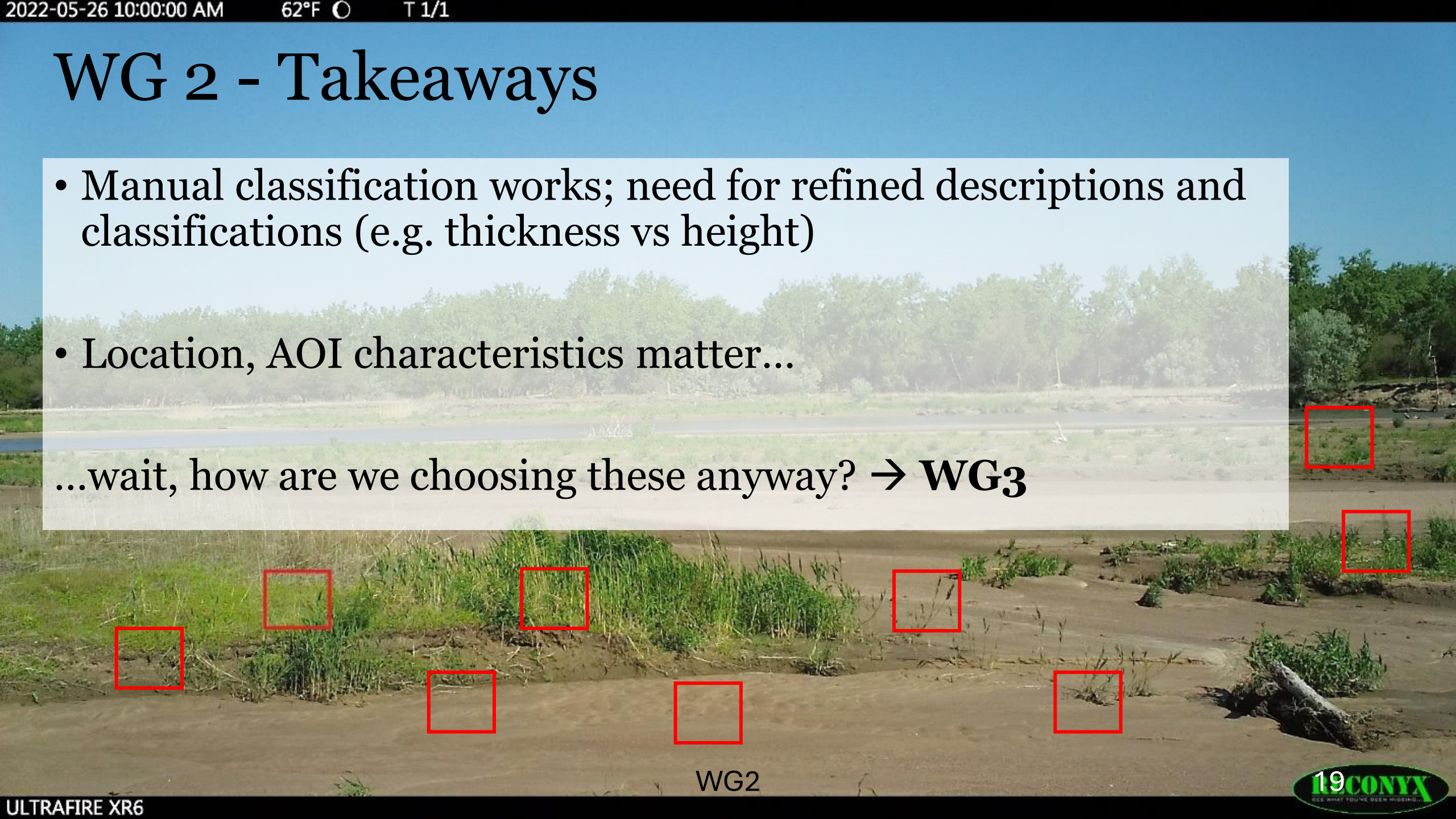
Confusing = what am I looking at?



WG 2 - Takeaways

- Manual classification works; need for refined descriptions and classifications (e.g. thickness vs height)
- Location, AOI characteristics matter…

…wait, how are we choosing these anyway? → **WG3**

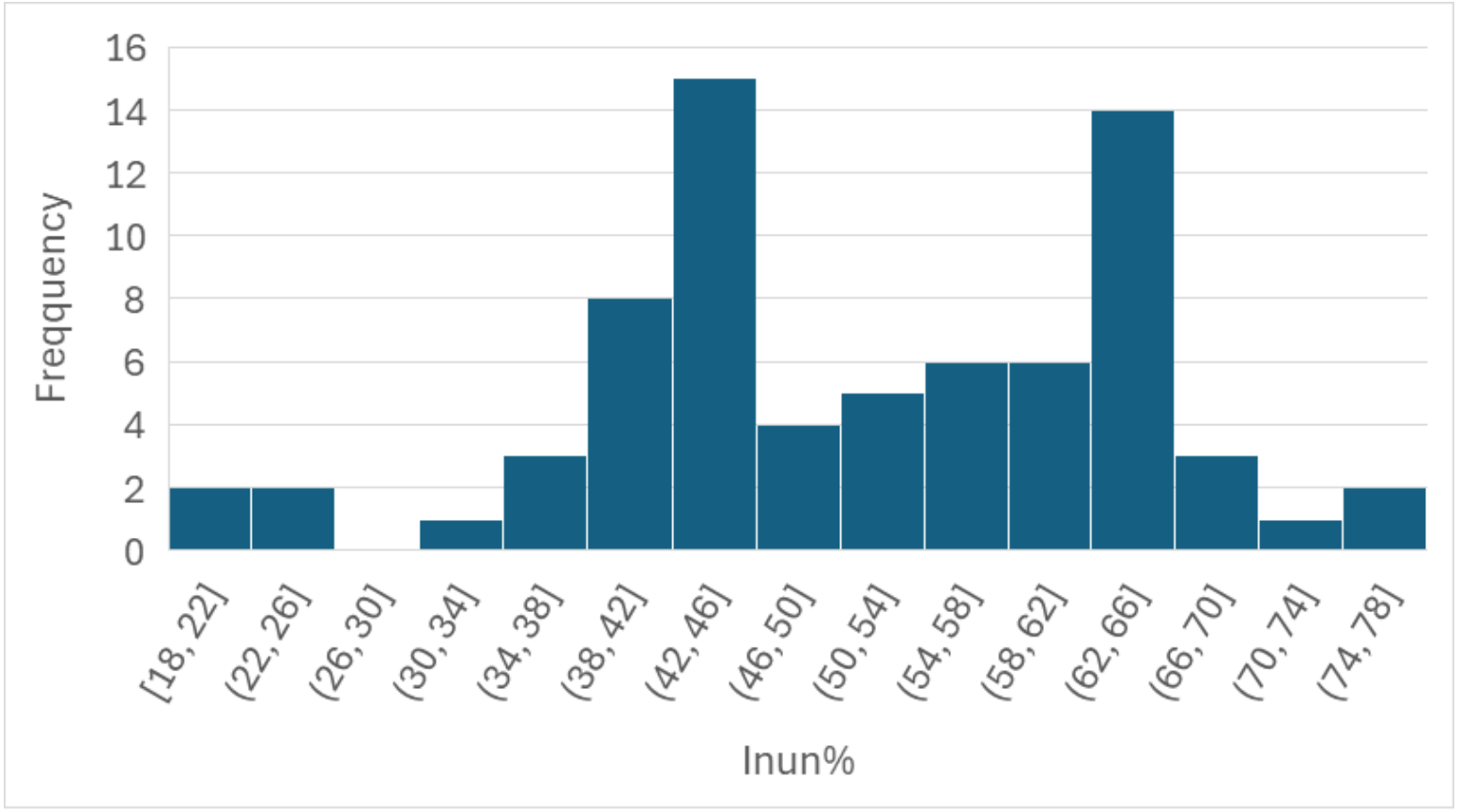


WG2

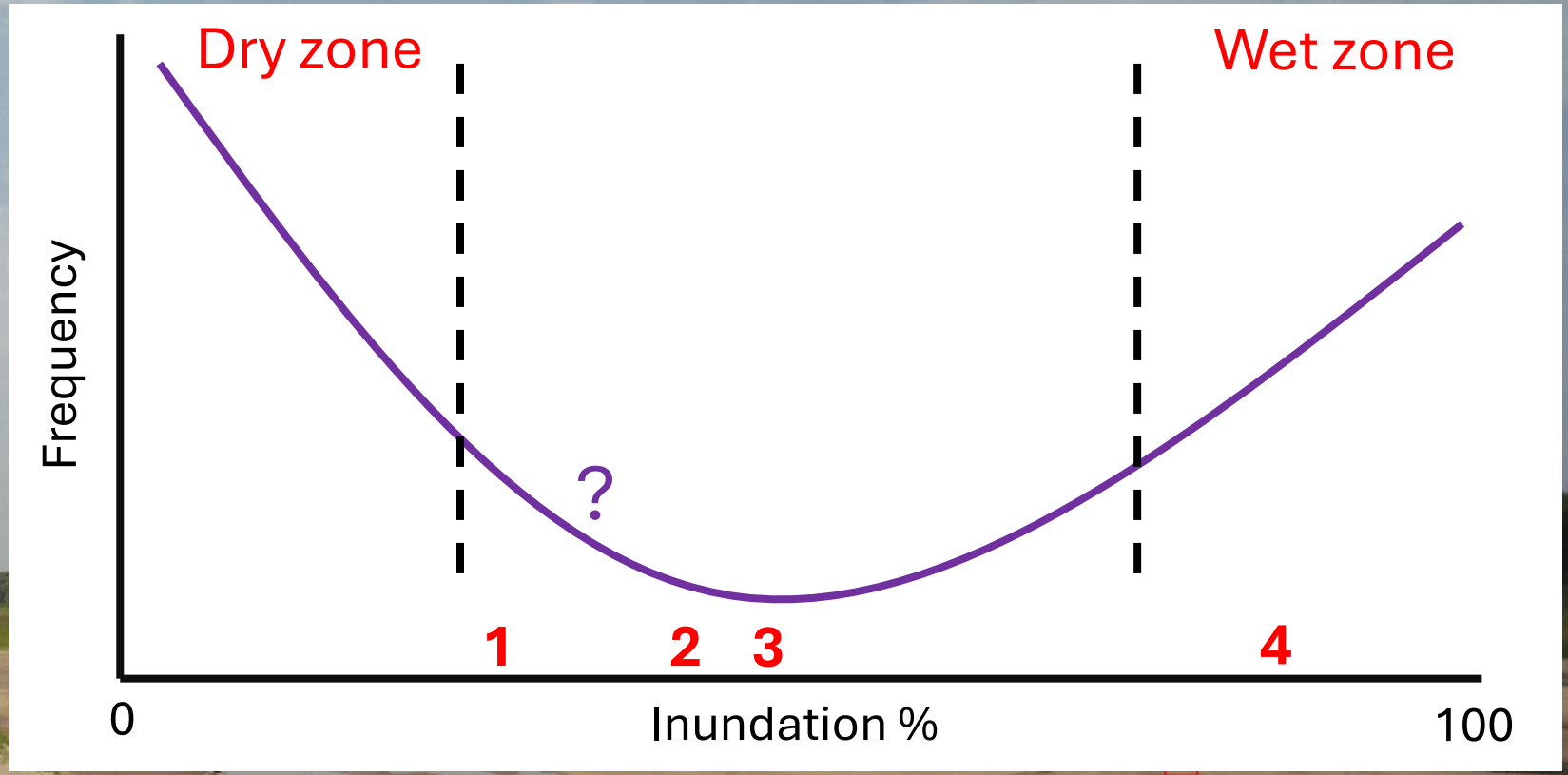
WG 3 - Objective

- Discuss process to arrive at robust sampling scheme – establish **representative blocks** from which to sample from

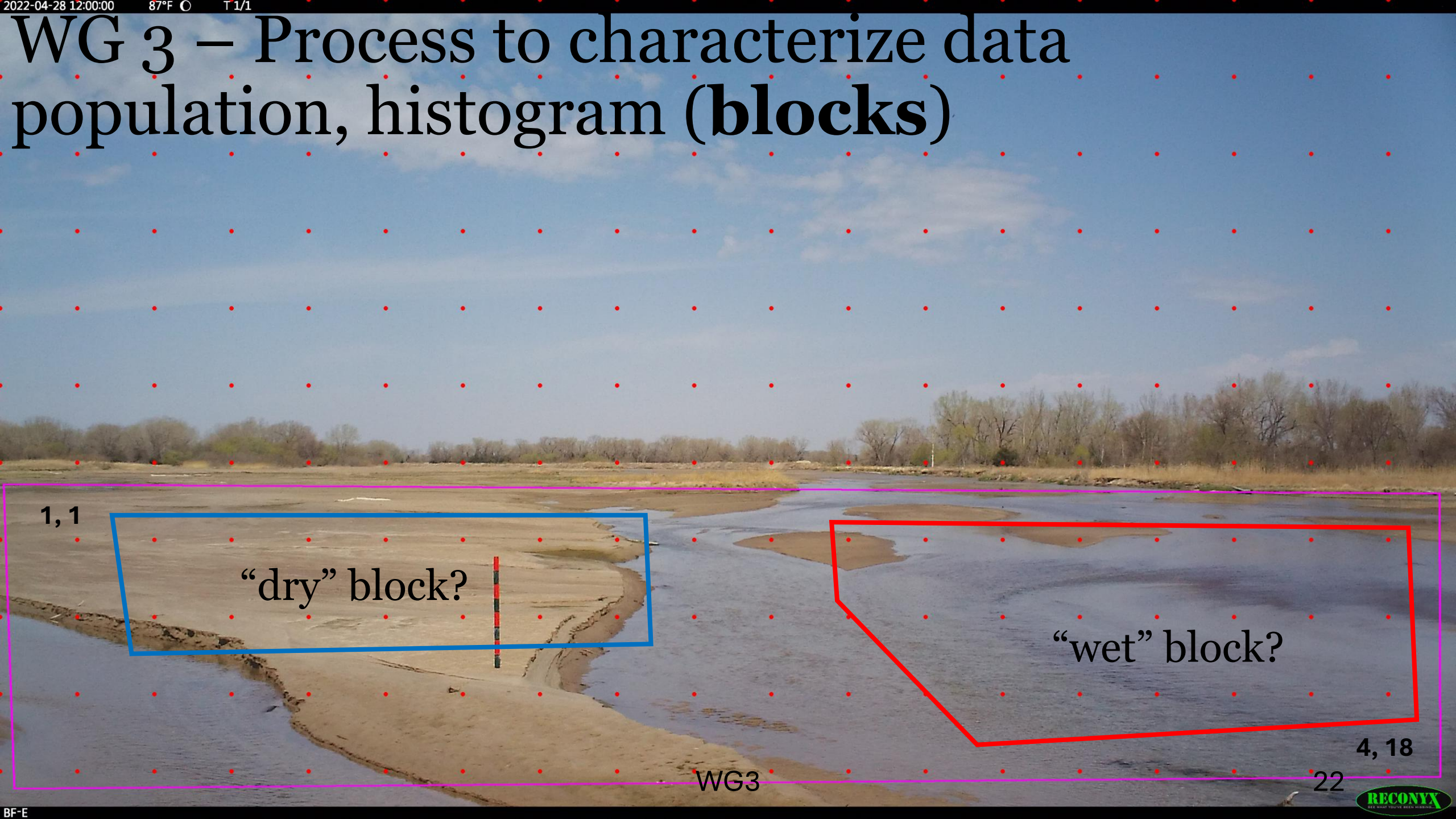
- Discuss and present how to overcome limiting factors



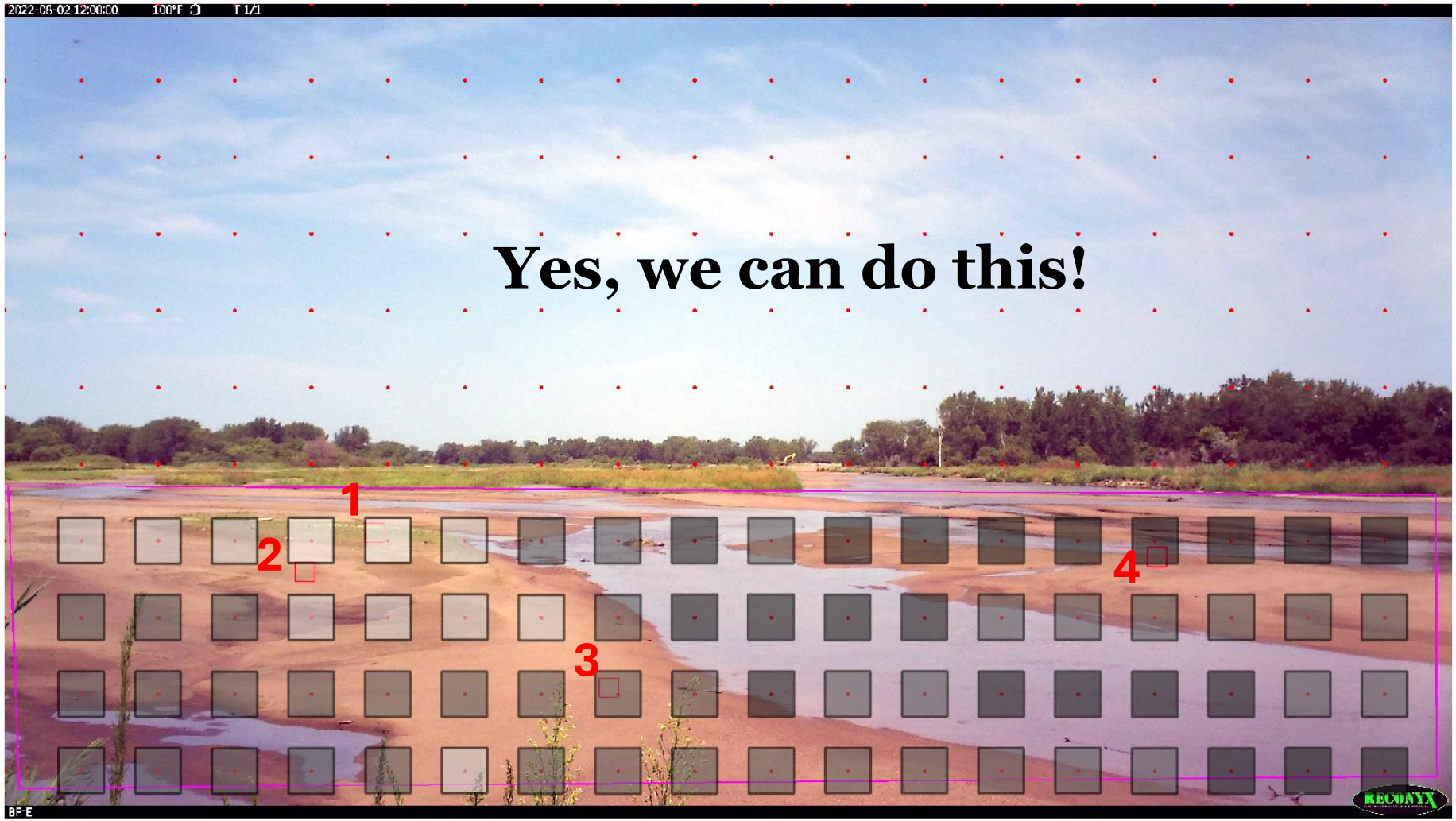
WG 3 - Need for robust sampling scheme



WG 3 – Process to characterize data population, histogram (**blocks**)



WG3 – Goal: histogram/map of inundation % for all points in each scene?



Inundation (%)

- 17.8 - 20.0
- 20.1 - 40.0
- 40.1 - 60.0
- 60.1 - 80.0

1 = 18%, 2 = 25%
3 = 48%, 4 = 72%

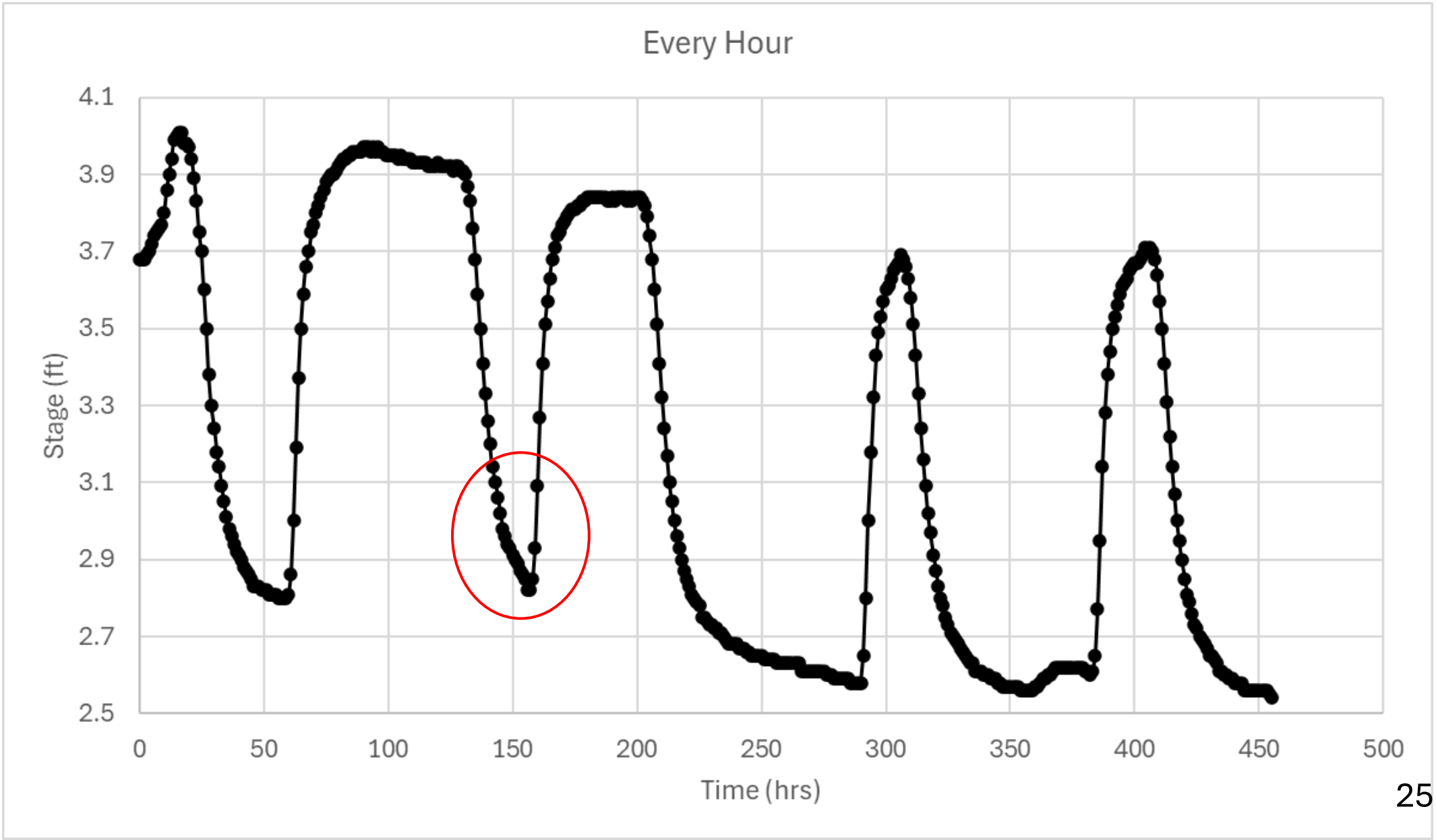
WG3 – Major issue?

- **Time-consuming**
- 15 images per day
- 180 days
- 50 “scenes”
- 50 points in each location/year combo
- 2 seconds per observation

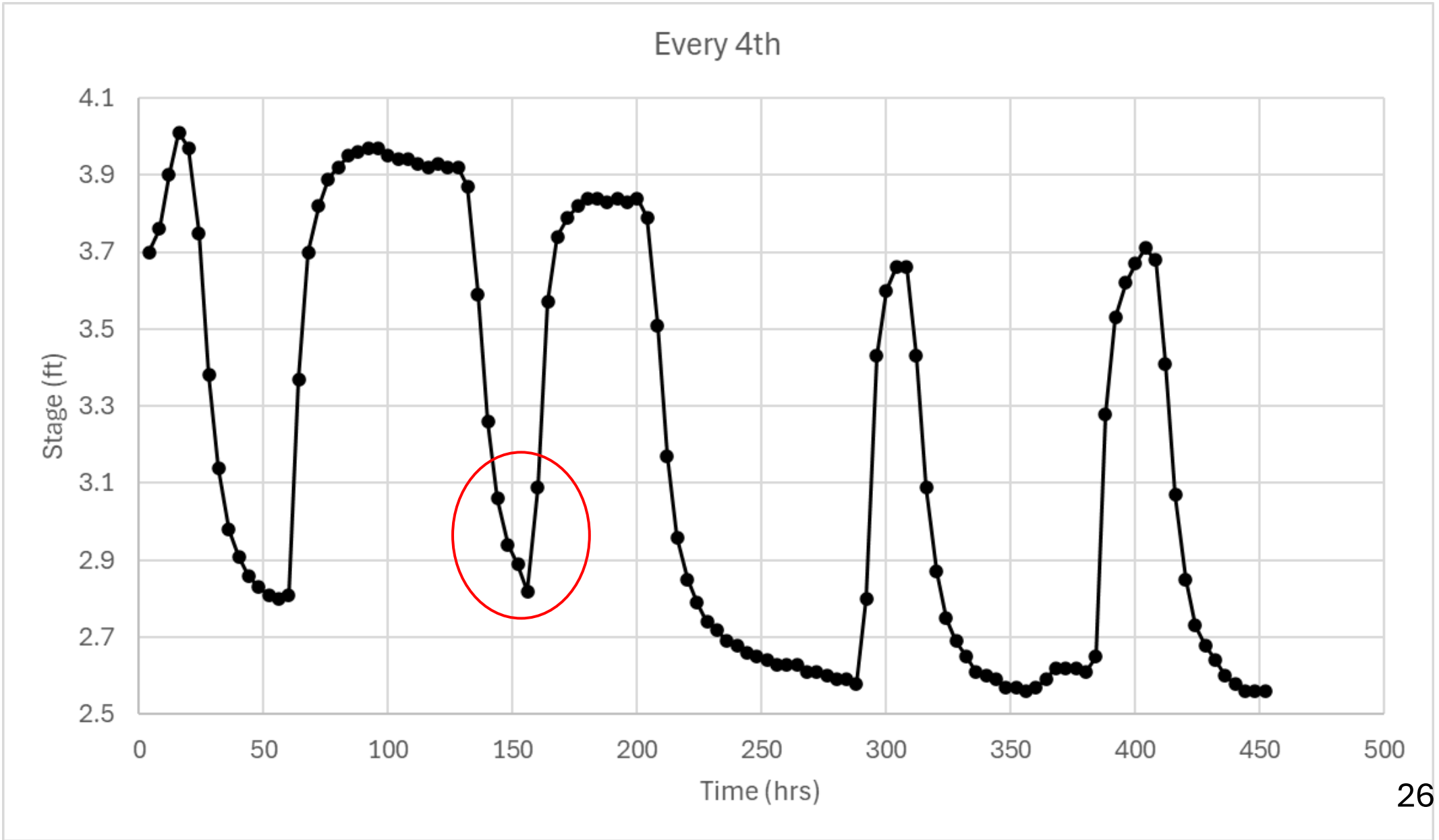
=

3750 hours or **469 8-hour workdays**

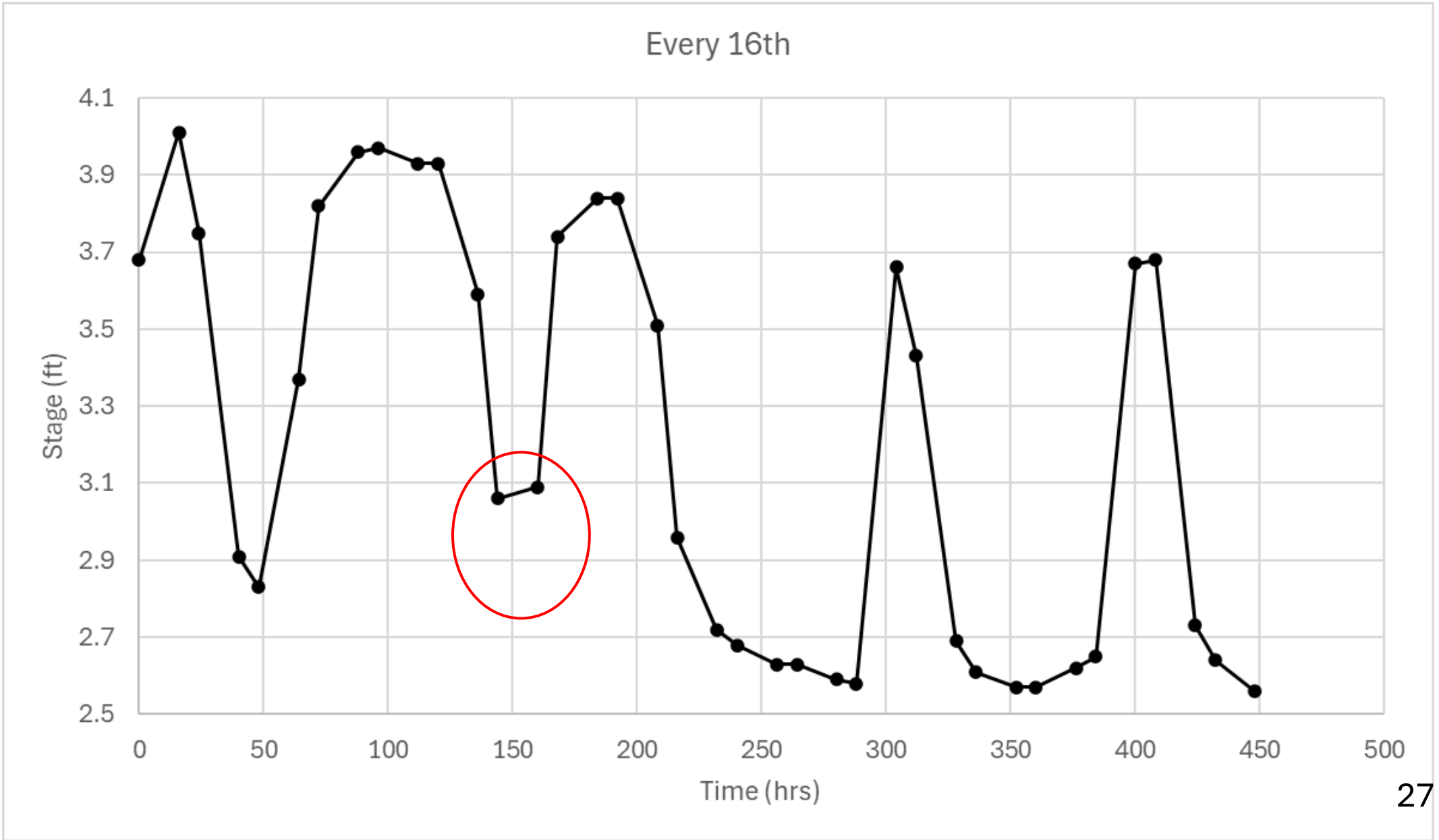
WG3 – Major issue



WG3 – Major issue



WG3 – Major issue



WG3 – Theoretical, actual frequency reduction

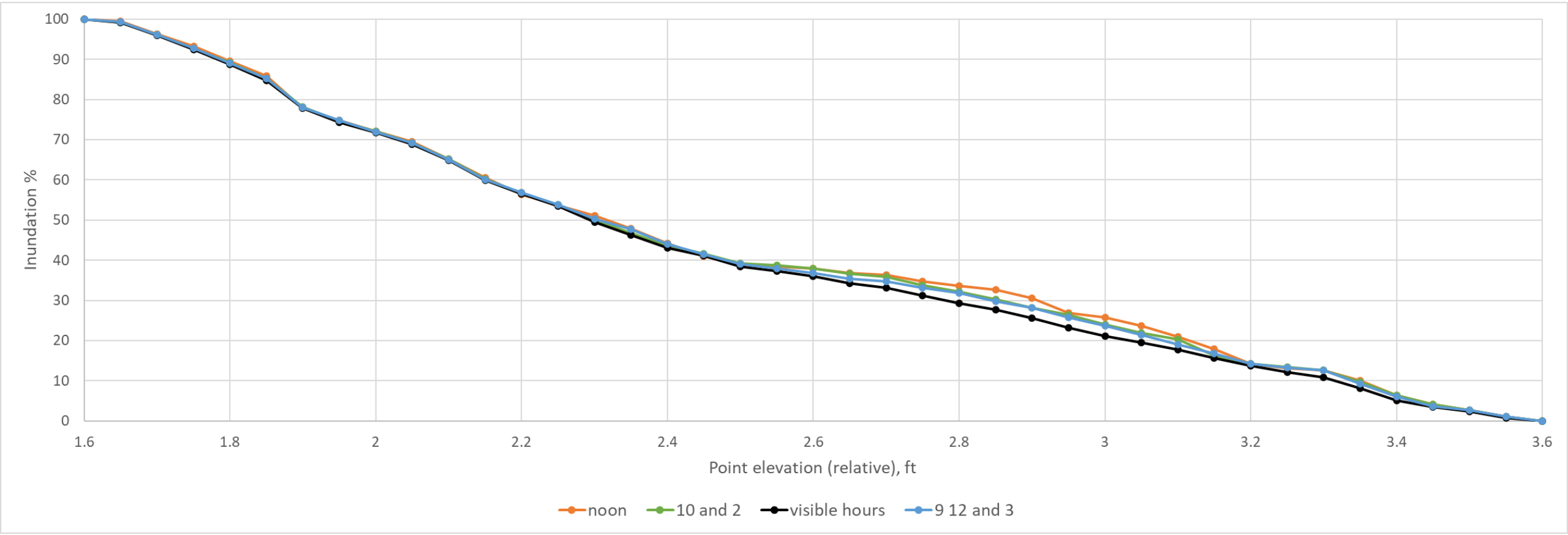
Theoretically – real stage data, do the math. **Not based on image observation**

Real observations. **Do the time-consuming work to test it out**

points named as rowID, columnID							
see GUIDE image							
			3.1	3.2	3.3	3.4	
day	image?	hour	inun_ob	inun_ob	inun_ob	inun_ob	inu
26-Apr	1	12					
27-Apr	1	12	1	1	1	0	
28-Apr	1	12	1	1	1	0	
29-Apr	1	12	1	1	1	0	
30-Apr	1	12	1	1	1	1	
1-May	1	12	1	1	1	1	
2-May	1	12	1	1	1	1	
3-May	1	12	1	1	1	1	

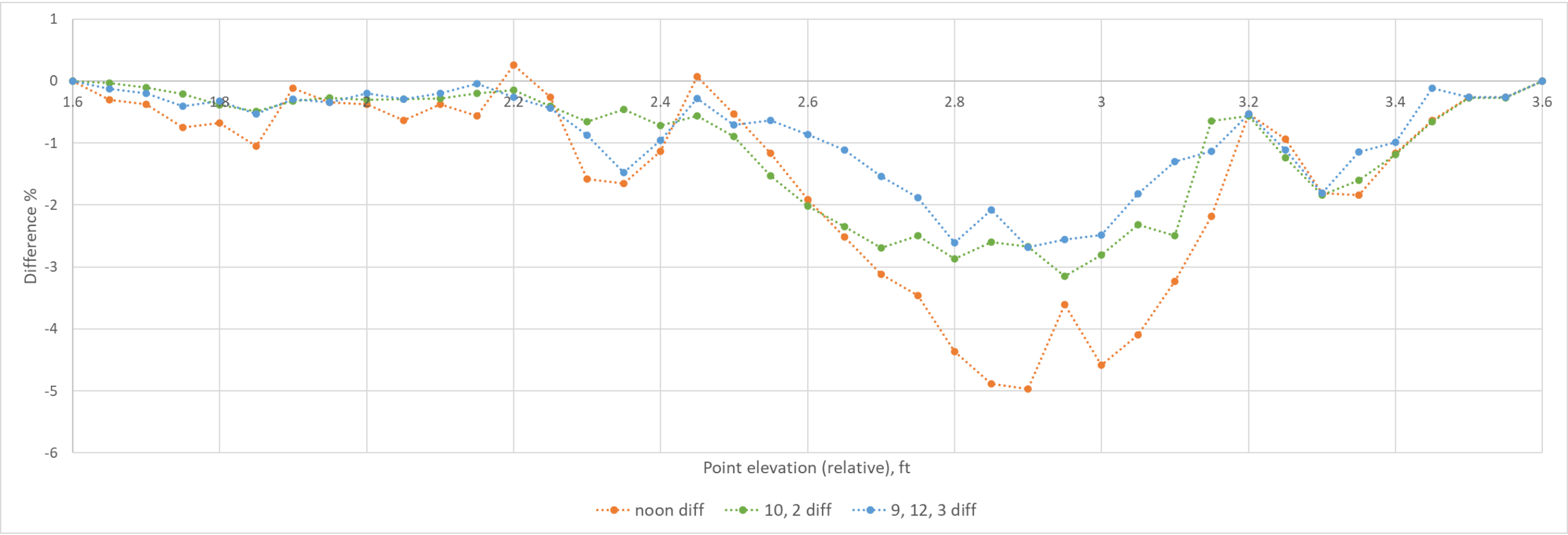
WG3 – Theoretical frequency reduction

Shows in theory reducing sampling frequency = small difference in inundation %

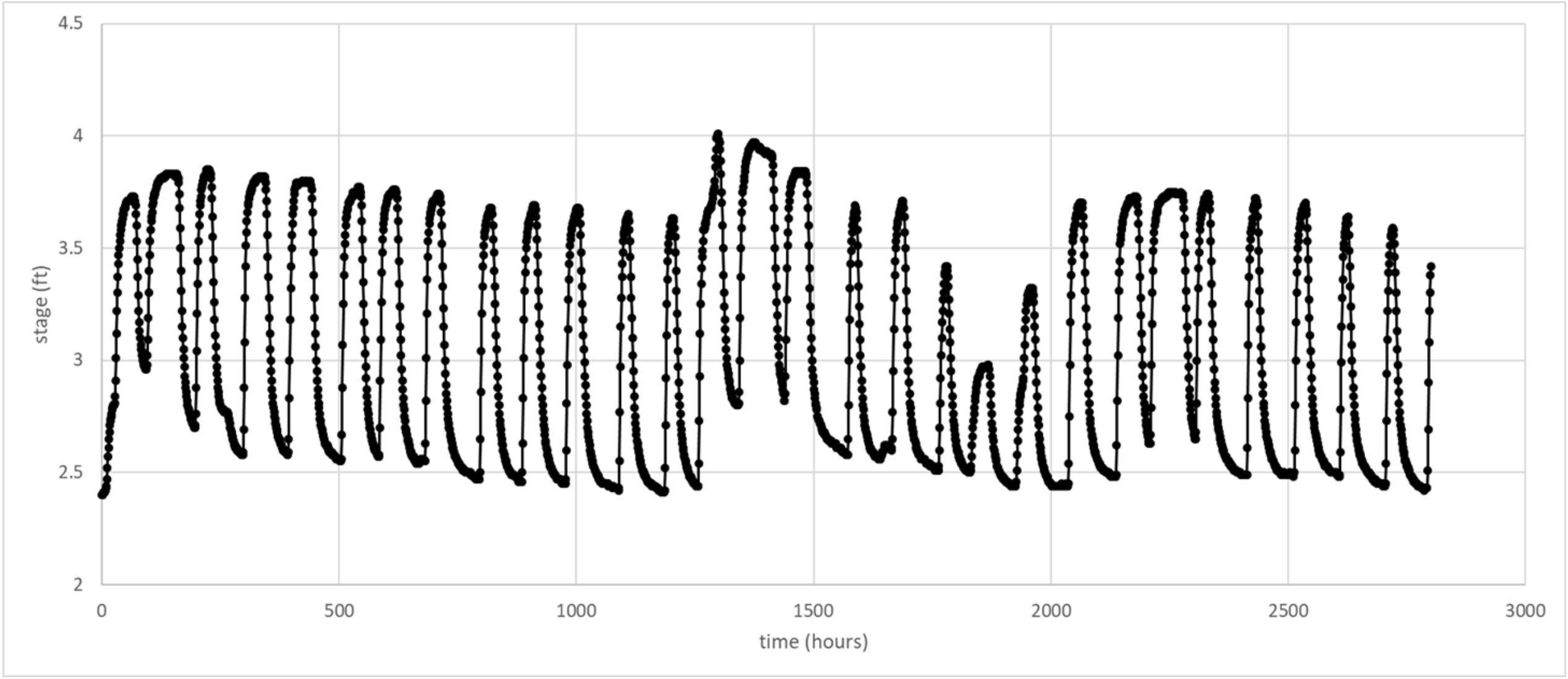


WG3 – Theoretical frequency reduction

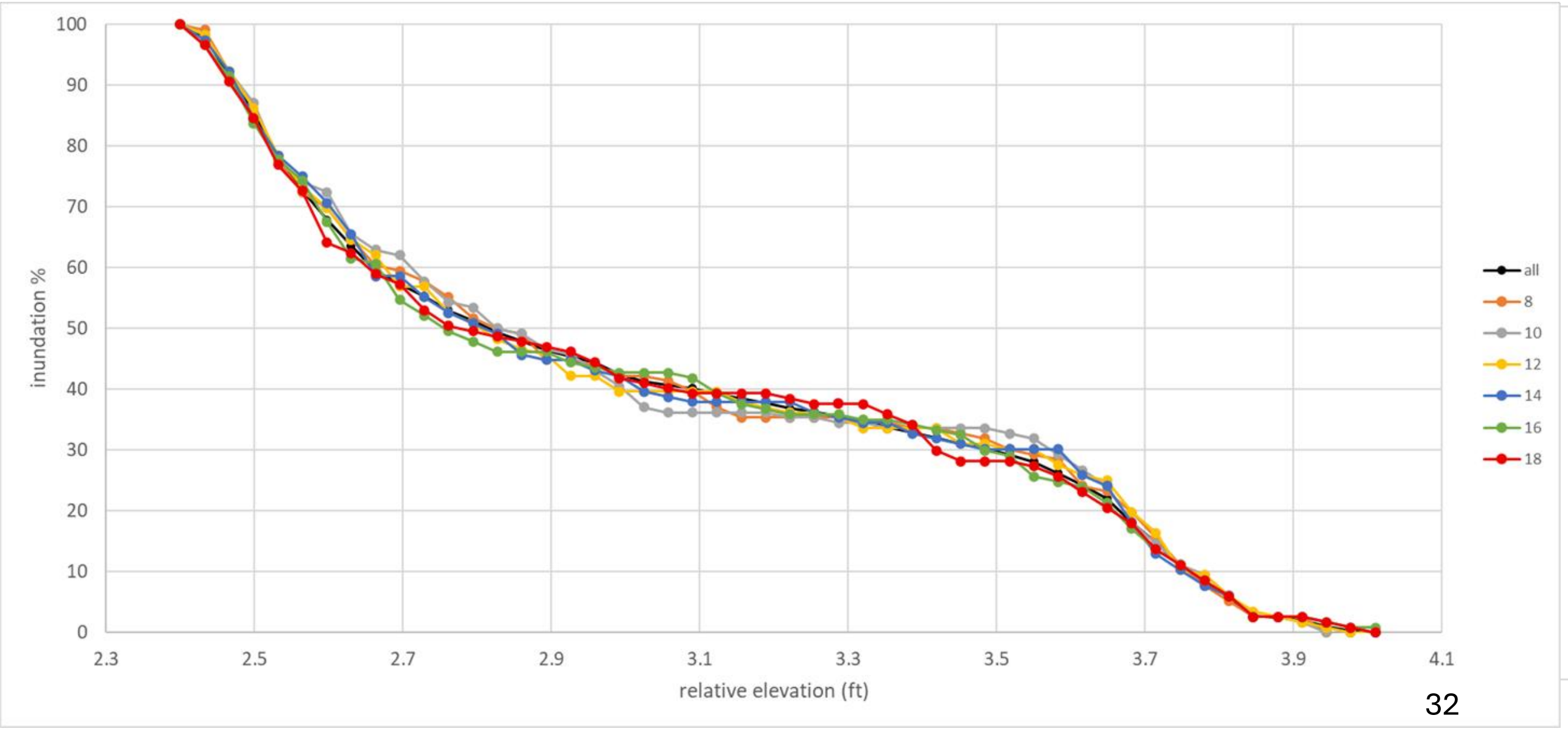
Shows in theory reducing sampling frequency = small difference in inundation %



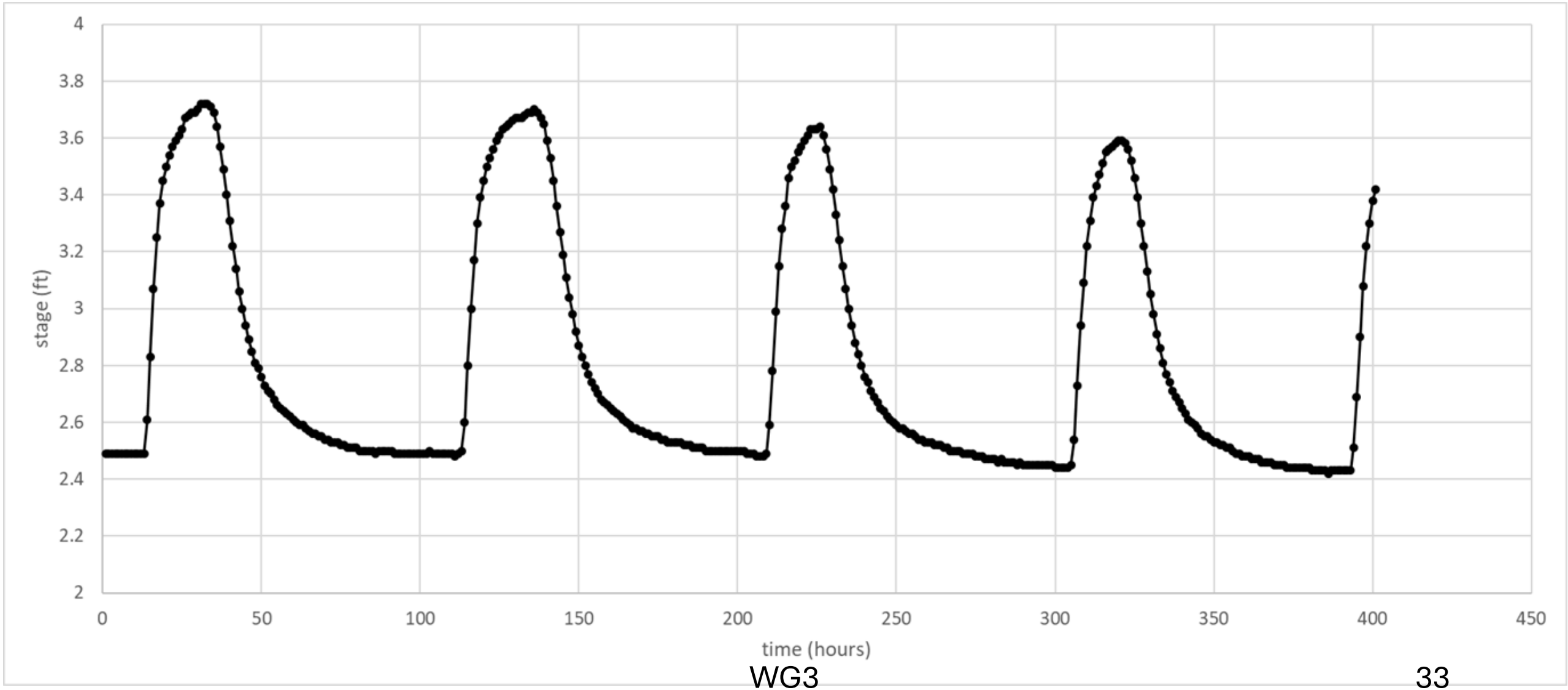
WG3 – Theoretical frequency reduction



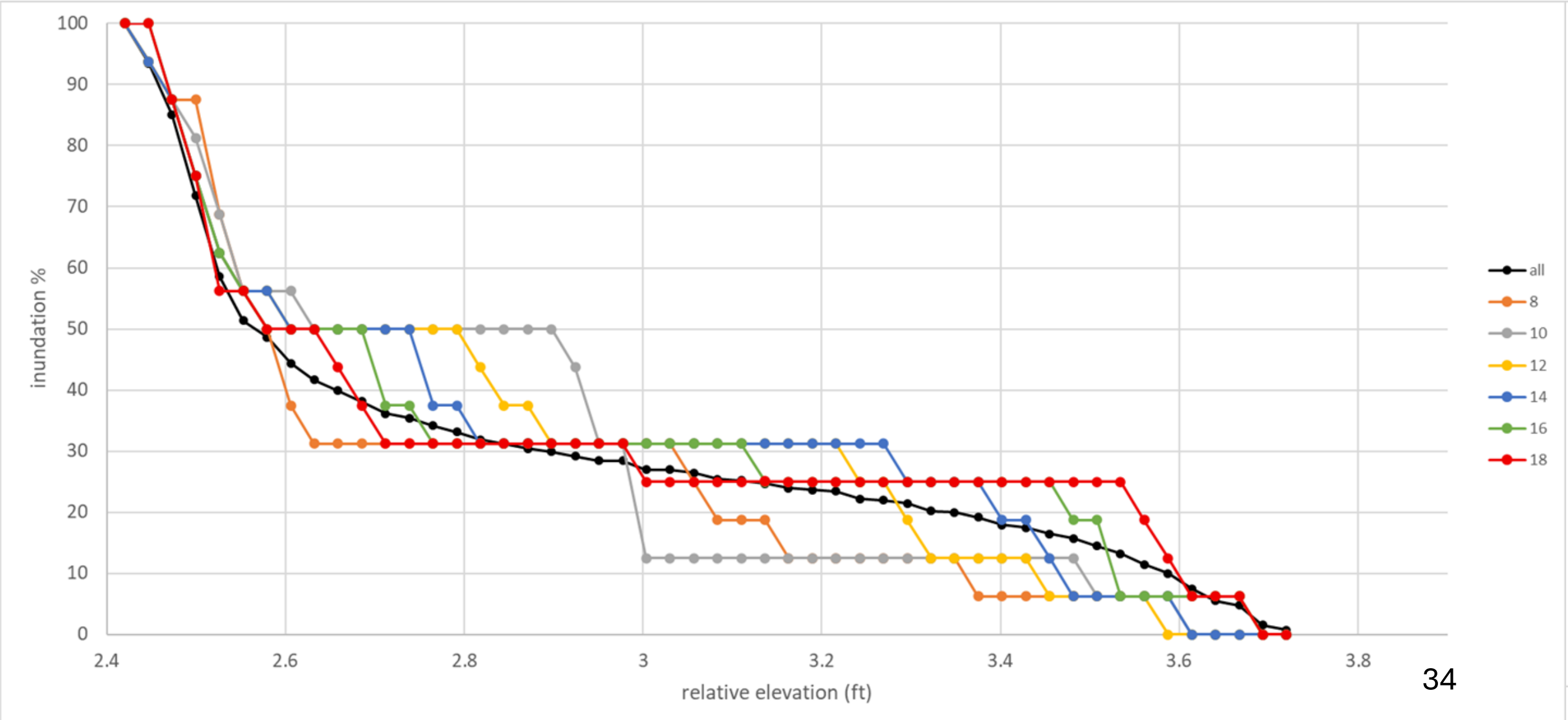
WG3 – Theoretical frequency reduction



WG3 – Theoretical frequency reduction

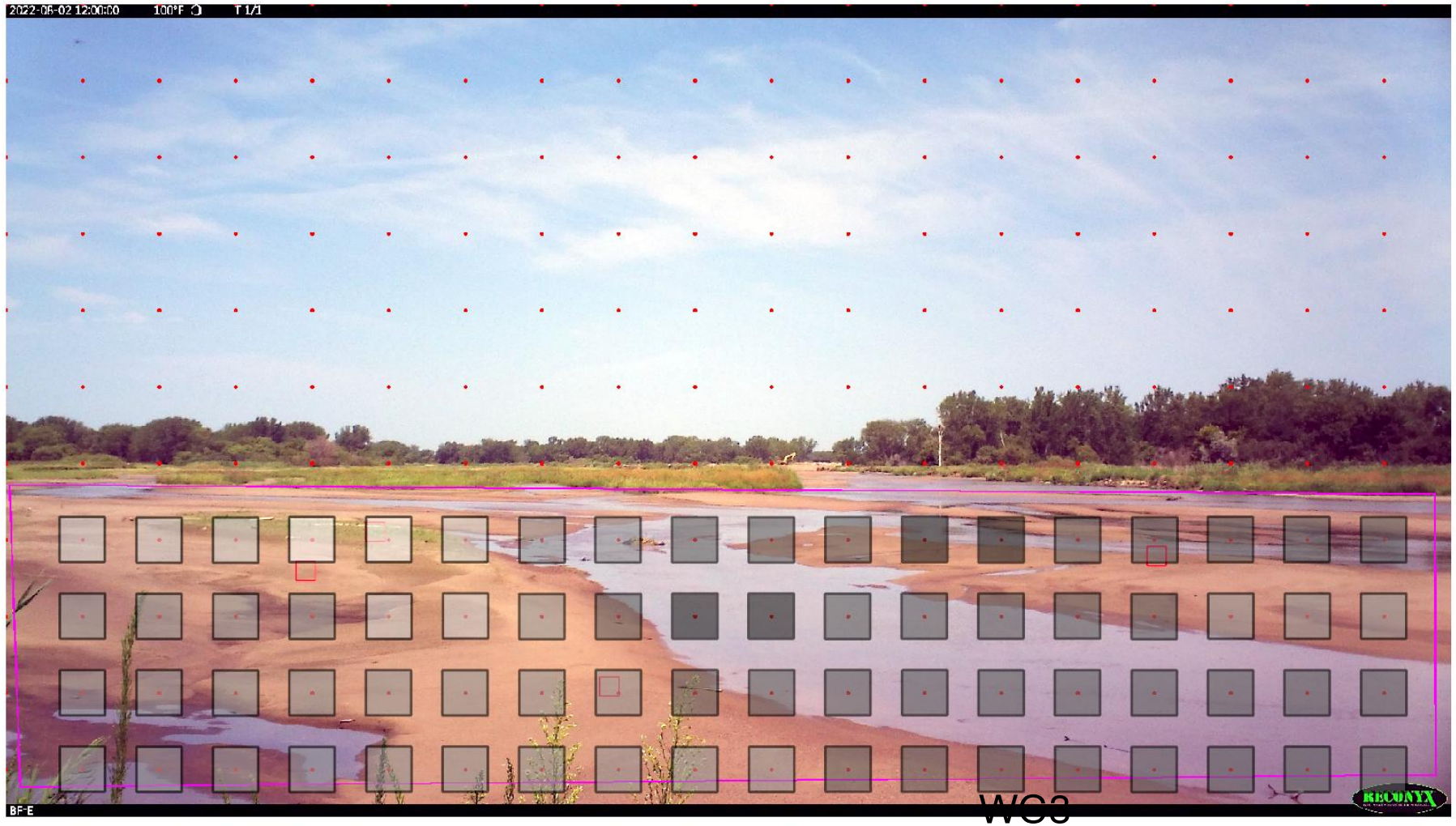


WG3 – Theoretical frequency reduction



WG3 – Actual frequency reduction

Shows in actuality reducing sampling frequency = small difference in inundation %



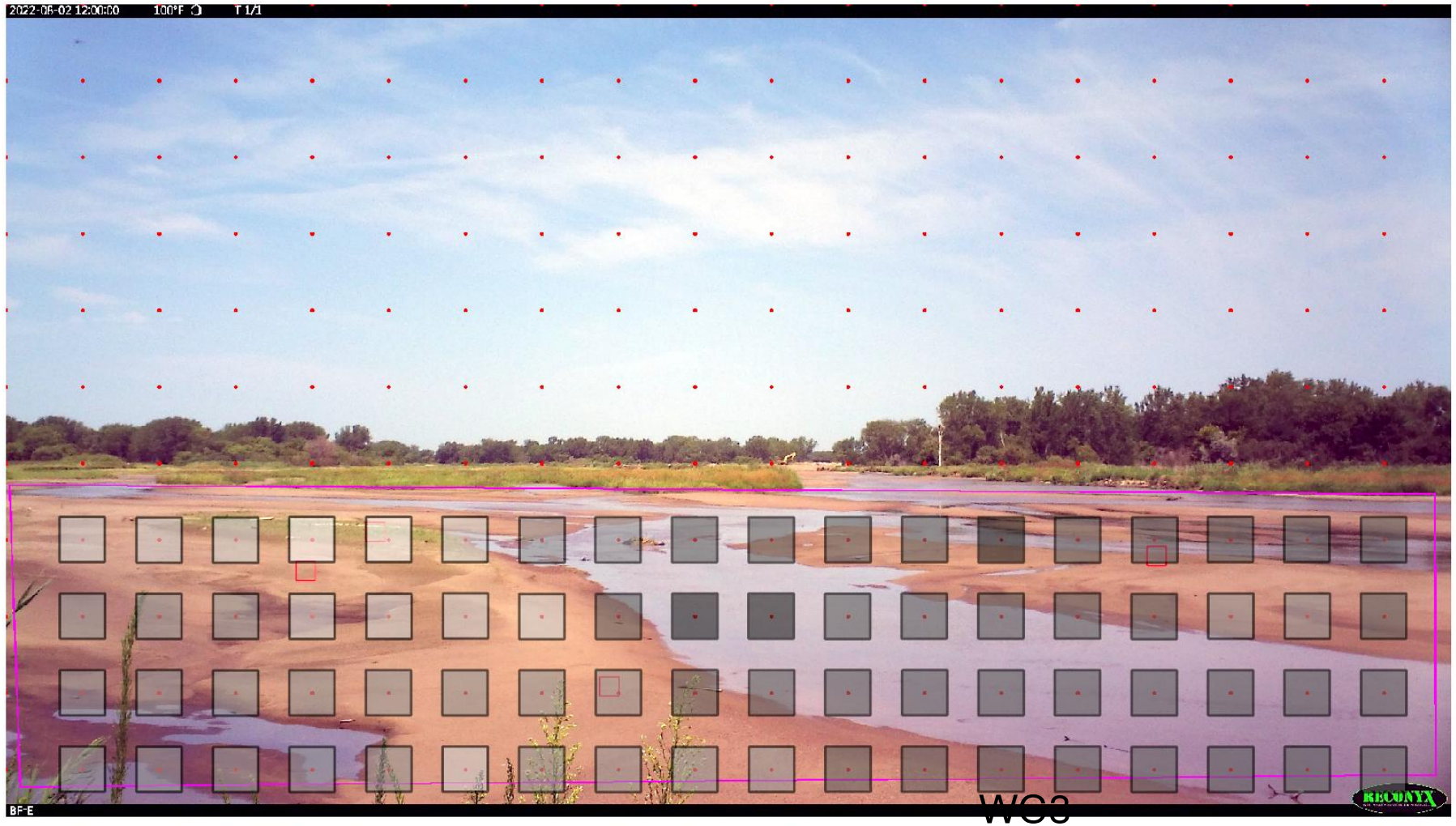
Inundation (noon)

- 17.8 - 20.0
- 20.1 - 30.0
- 30.1 - 40.0
- 40.1 - 50.0
- 50.1 - 60.0
- 60.1 - 70.0
- 70.1 - 80.0

WG3

WG3 – Actual frequency reduction

Shows in actuality reducing sampling frequency = small difference in inundation %



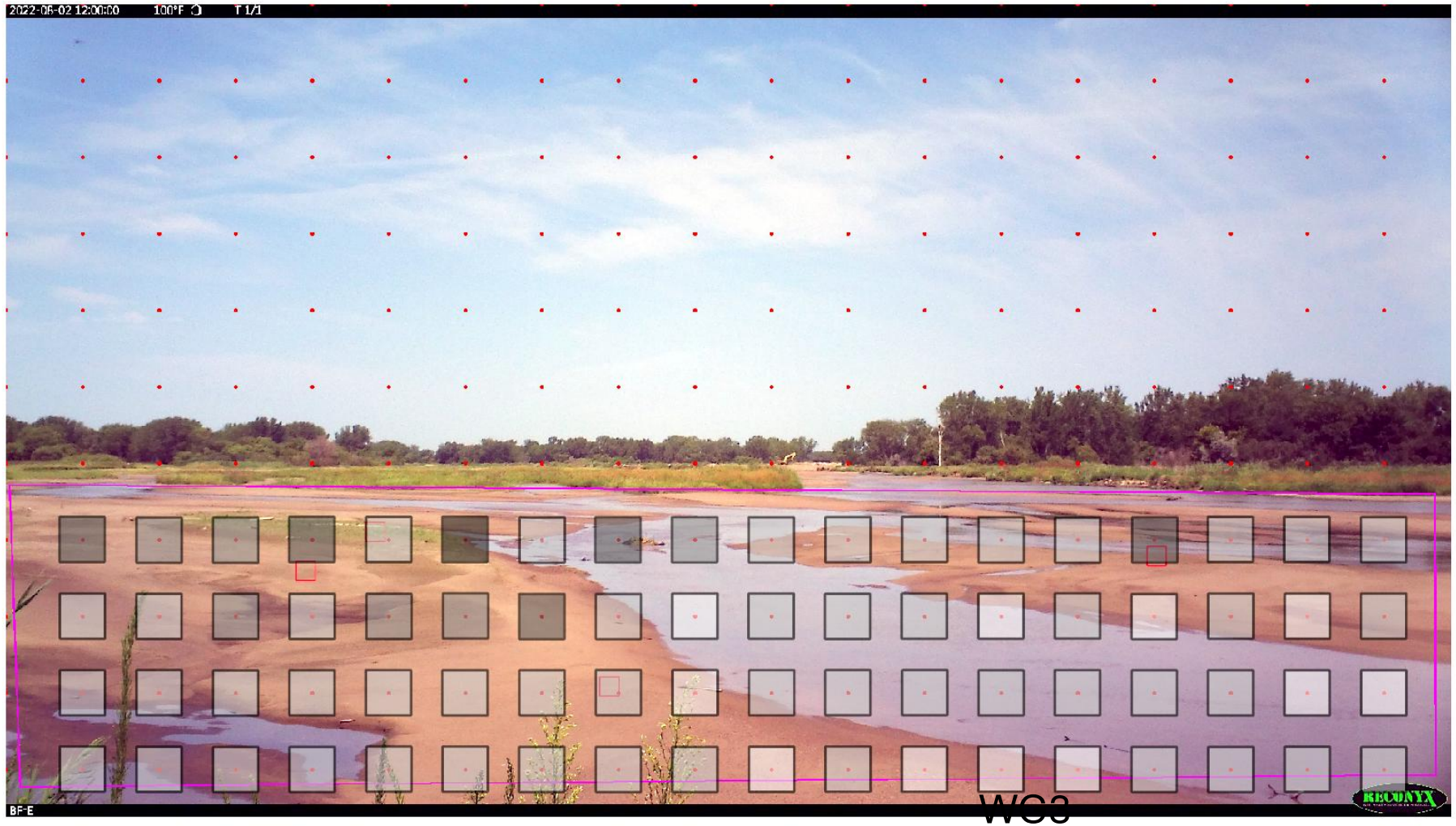
Inundation
(all 15)

- 17.8 - 20.0
- 20.1 - 30.0
- 30.1 - 40.0
- 40.1 - 50.0
- 50.1 - 60.0
- 60.1 - 70.0
- 70.1 - 80.0

WG3

WG3 – Actual frequency reduction

Shows in actuality reducing sampling frequency = small difference in inundation %



Avg range = 4.0
Med range = 3.7

Inundation range
(max-min, time of day)

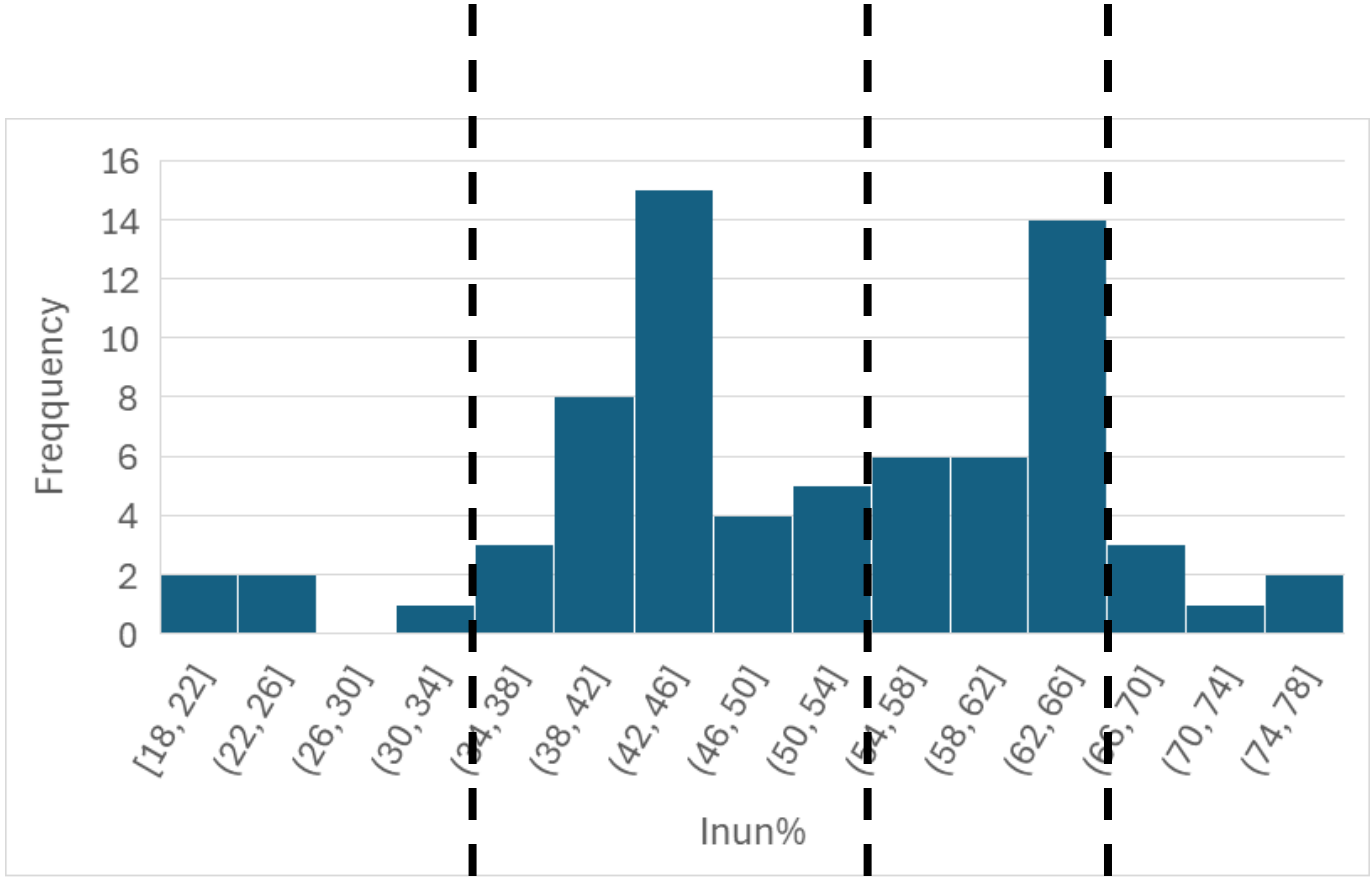
- 0.5 - 2.0
- 2.1 - 4.0
- 4.1 - 6.0
- 6.1 - 8.0
- 8.1 - 10.0
- 10.1 - 12.0
- 12.1 - 14.0

WG3 – Actual frequency reduction

4 “expert analysis” samples?

Choose based on histogram

Even if ~5% error in these bars, shape of histogram will be similar.

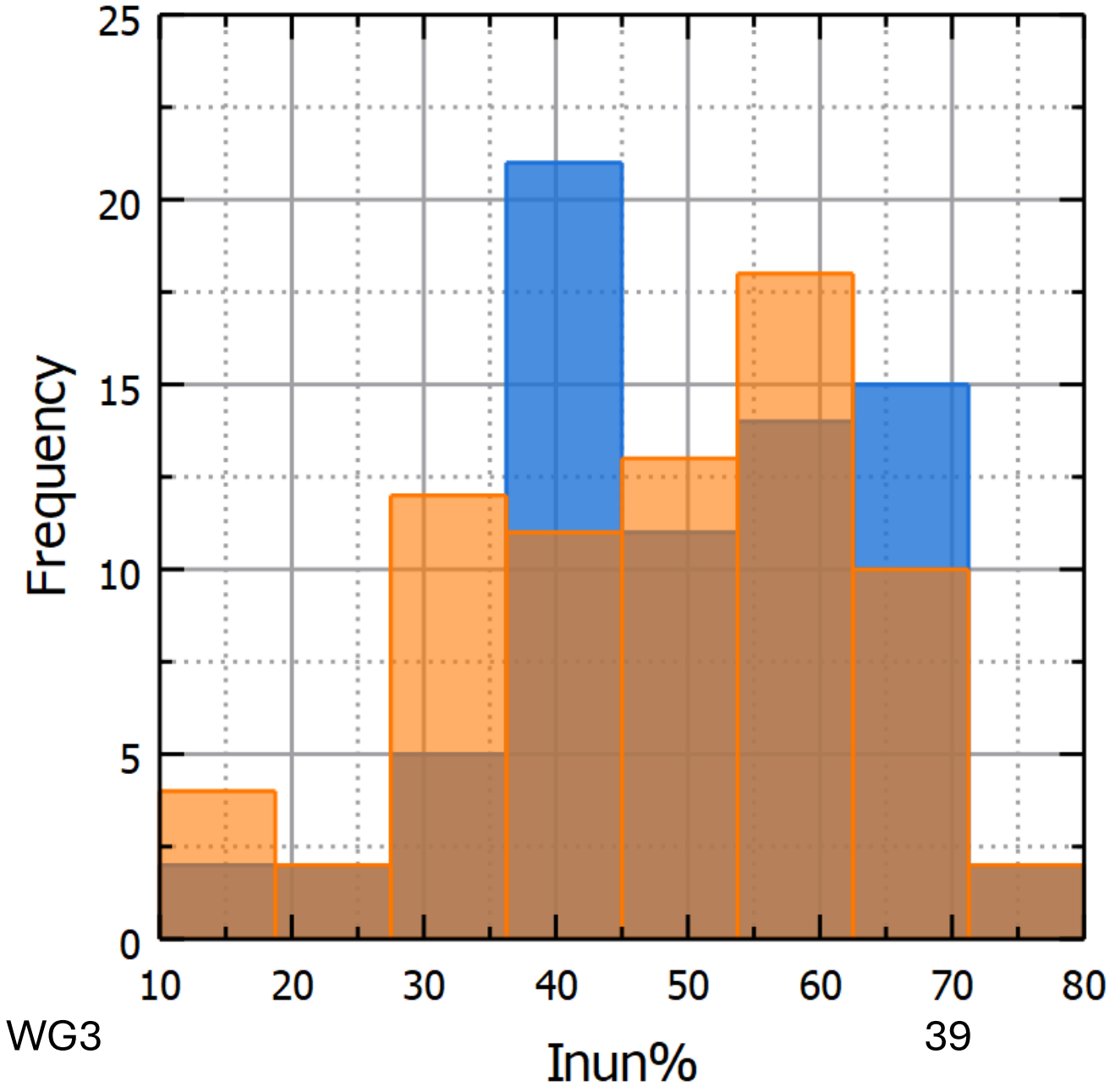


X samples from each zone

WG3 – Actual frequency reduction

Added random error (orange) between -5 and 5% to each grid point.

Acceptable difference? Depends on bin/**block** size

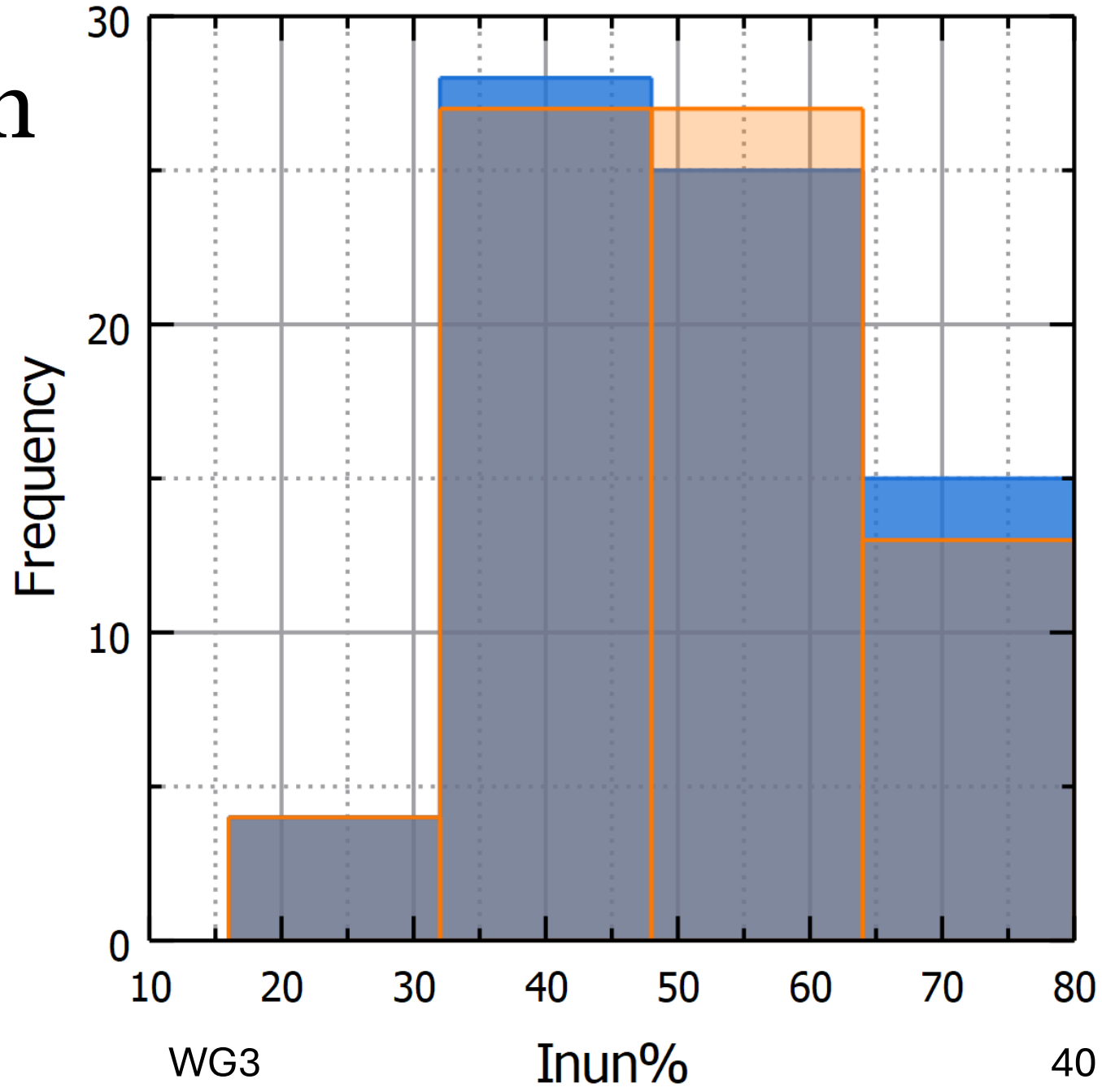


WG3 – Actual frequency reduction

Blue = buckets for actual data

Orange = buckets with random 5% error added

If "buckets" are large, most points won't change buckets

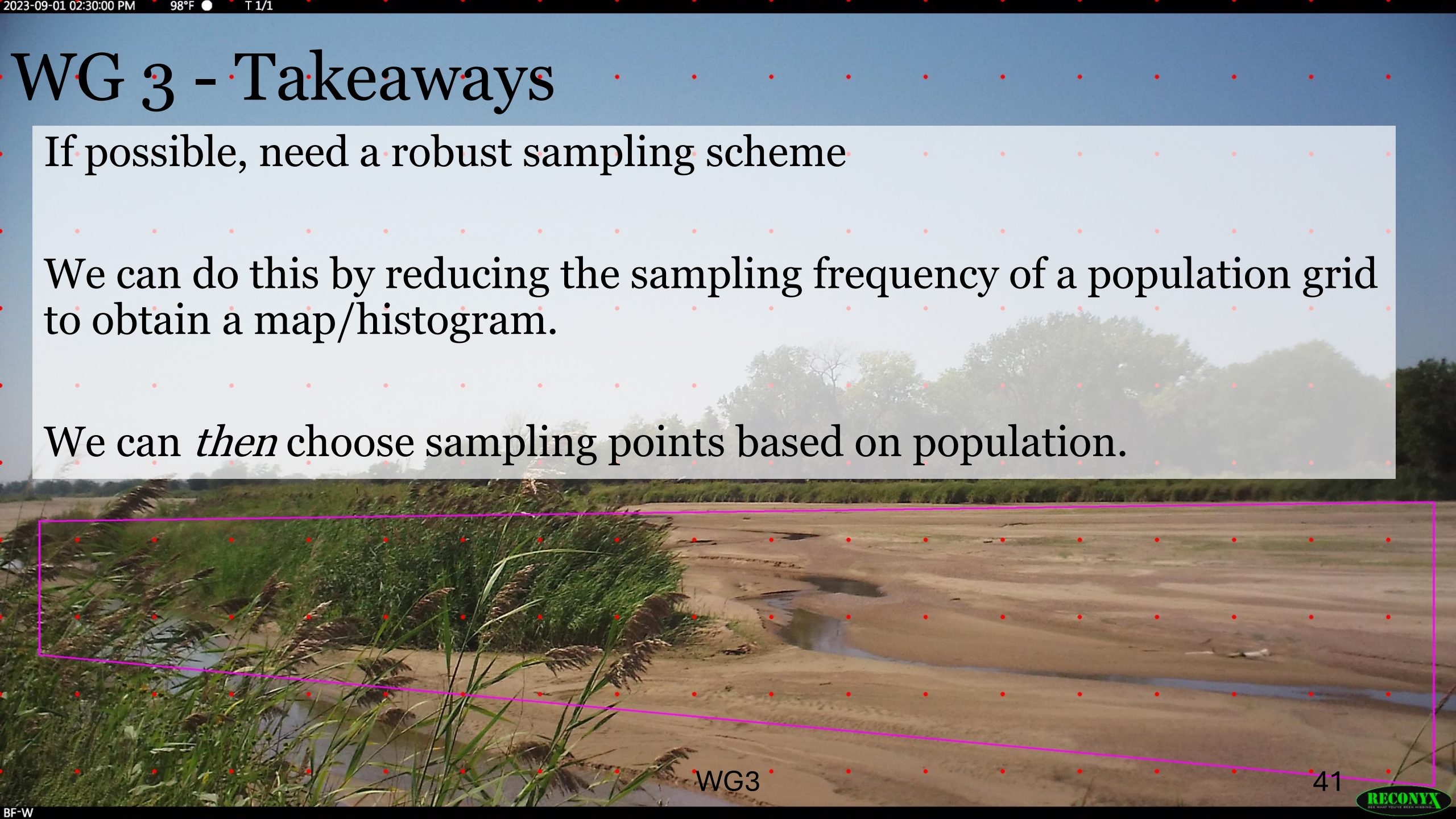


WG 3 - Takeaways

If possible, need a robust sampling scheme

We can do this by reducing the sampling frequency of a population grid to obtain a map/histogram.

We can *then* choose sampling points based on population.



WG Progress – Review Moving Forward

Manual vegetation classification is possible and accurate/consistent enough – establish this statistically with tests/training

Can, with certain considerations, robustly choose our sampling points

Next? EDO obtains all histograms and builds full study sample – then checks back in with WG before proceeding with sample

Feedback and Discussion