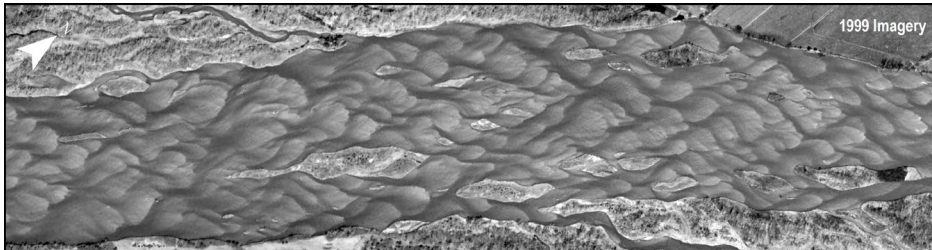




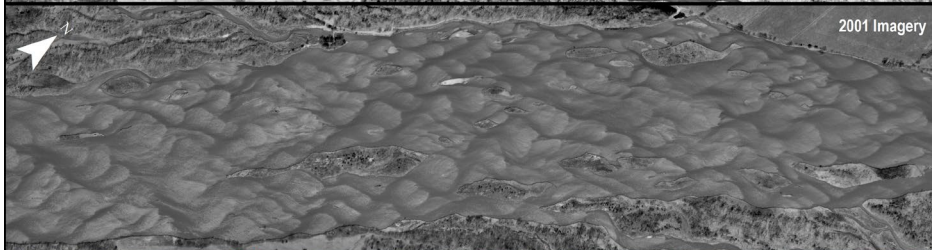
Phragmites Study

Malia Volke
Malinda Henry

1999



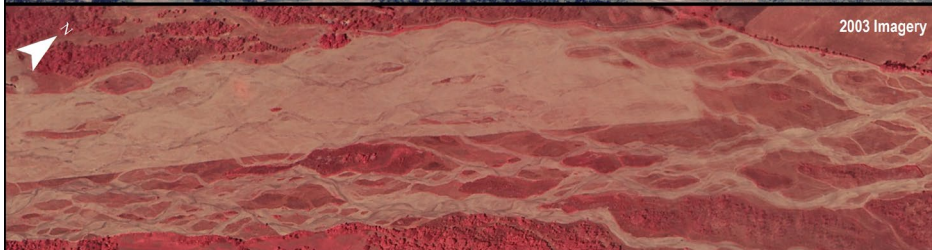
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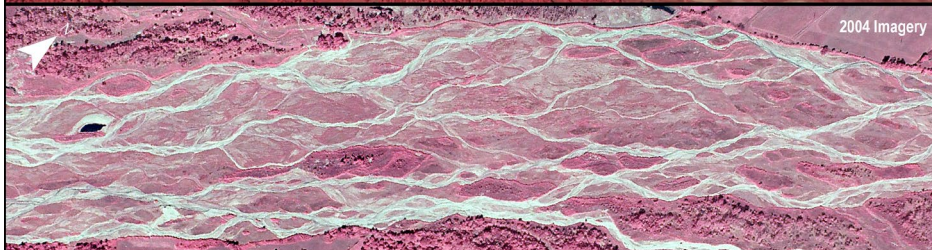
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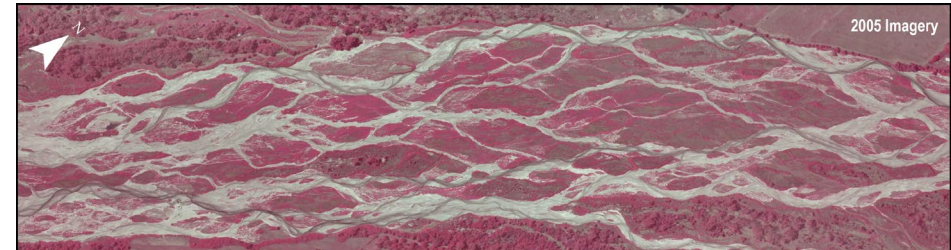
2003



2004



2005



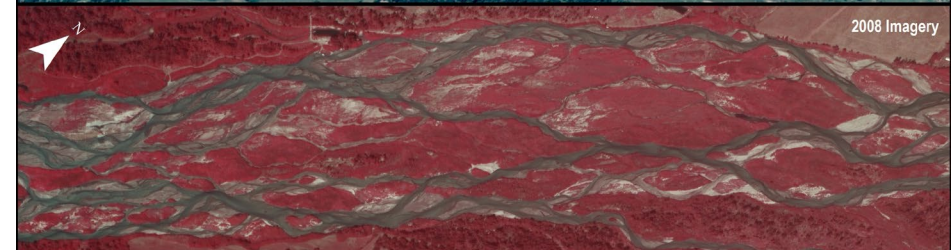
2006



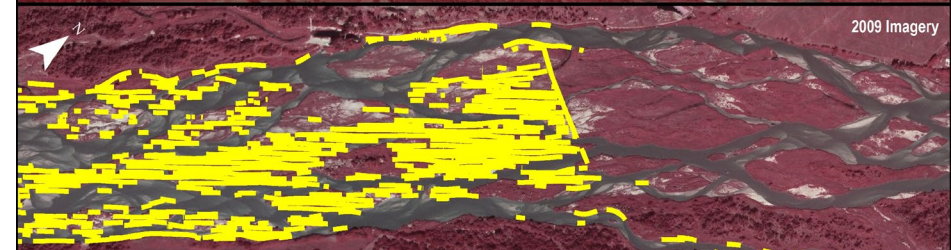
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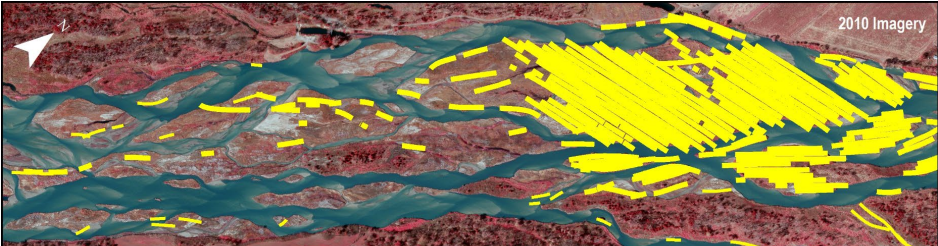
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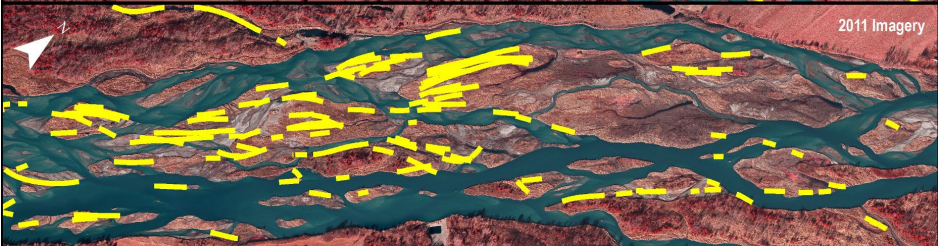
2009



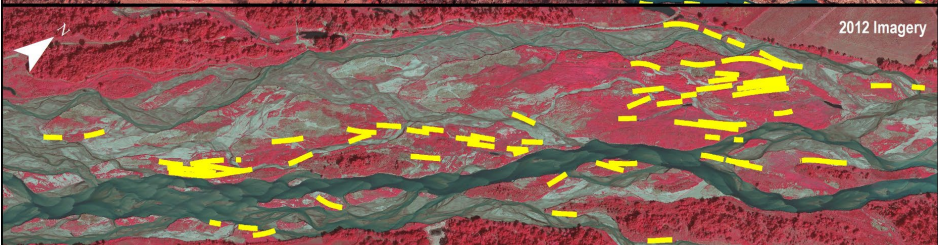
2010



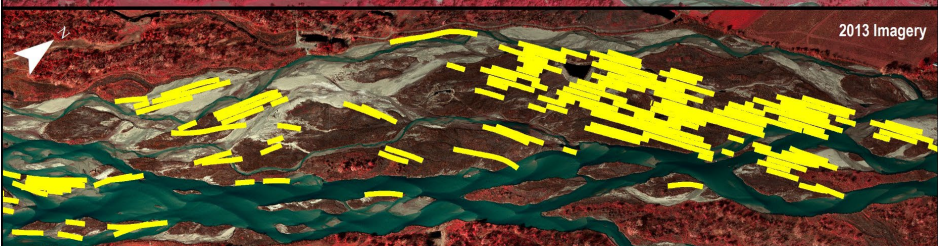
2011



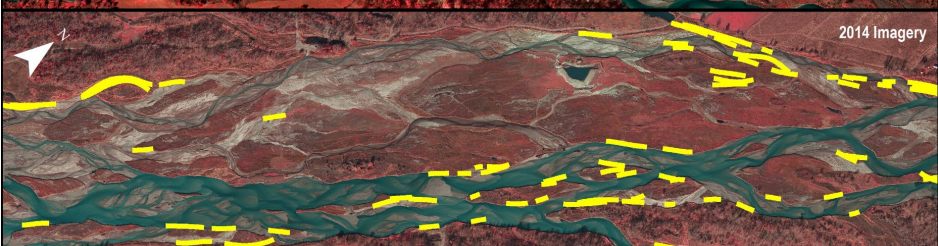
2012



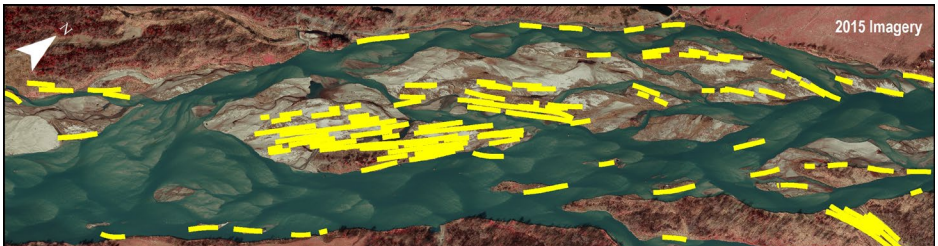
2013



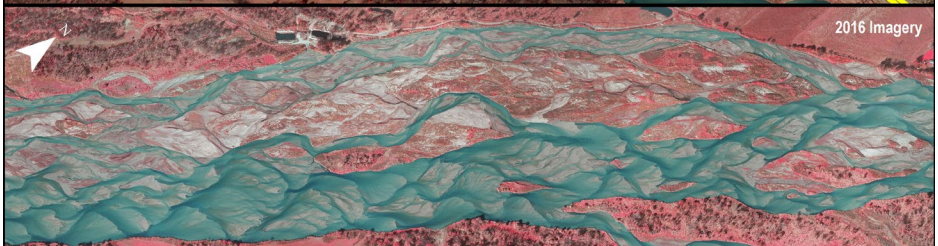
2014



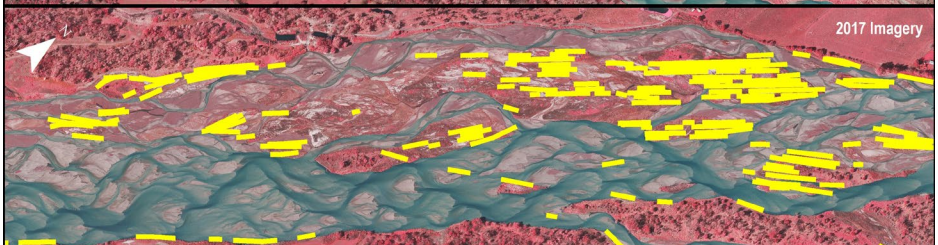
2015



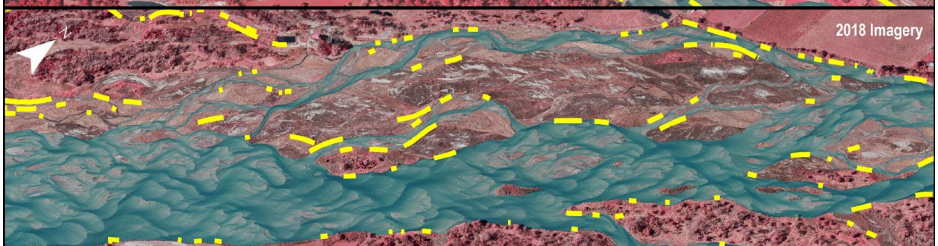
2016



2017



2018

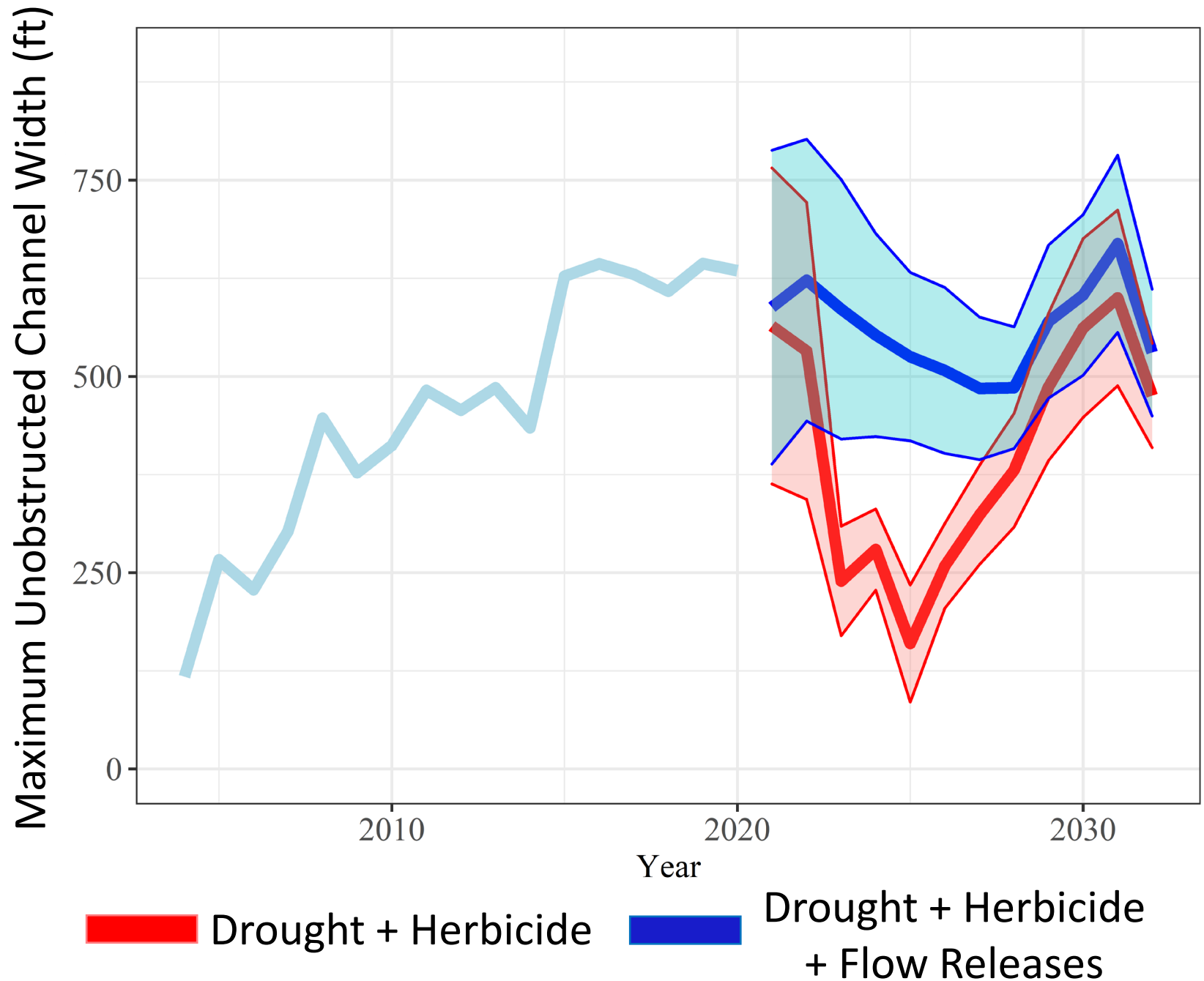


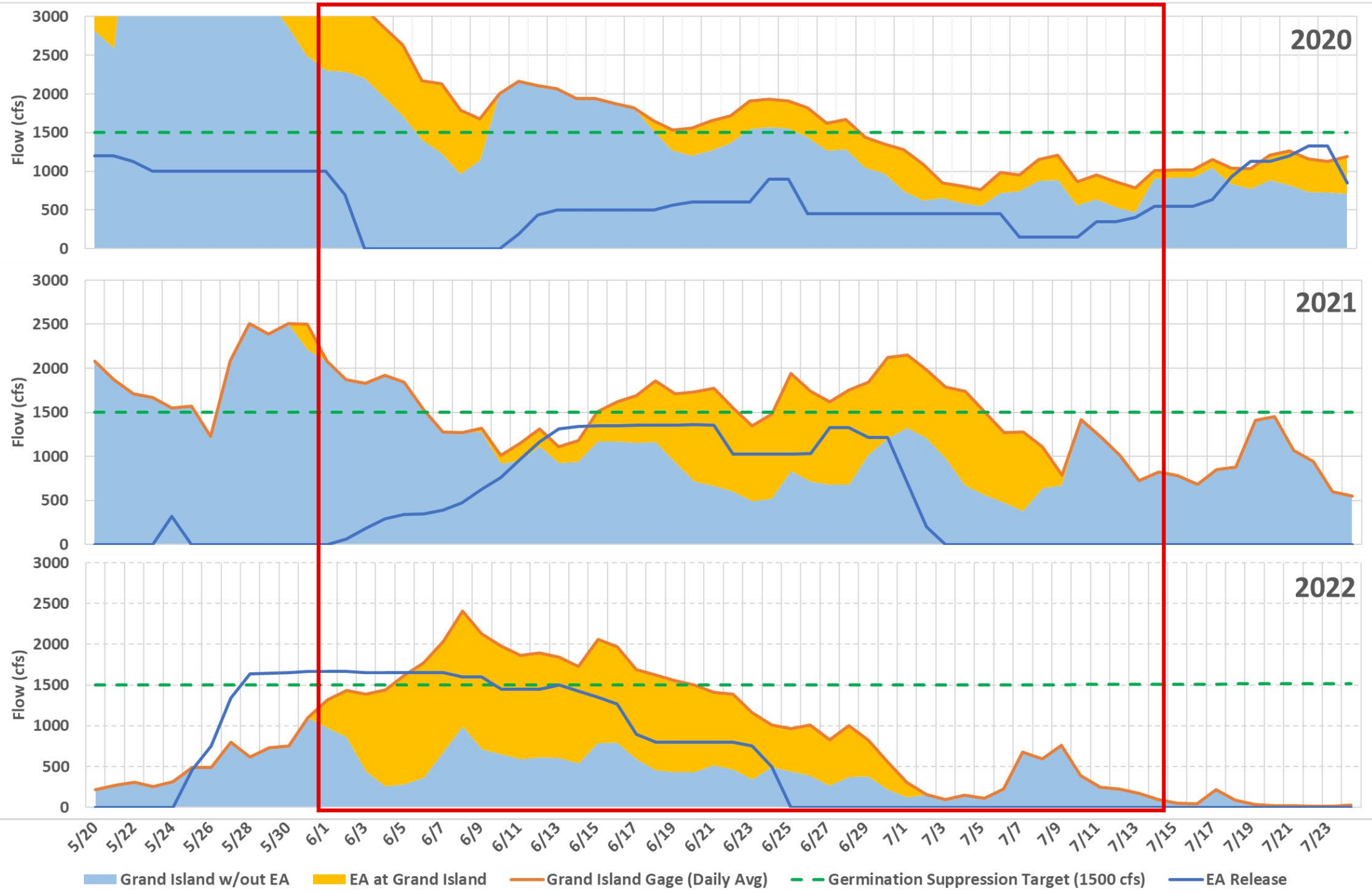
2019


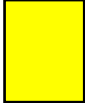


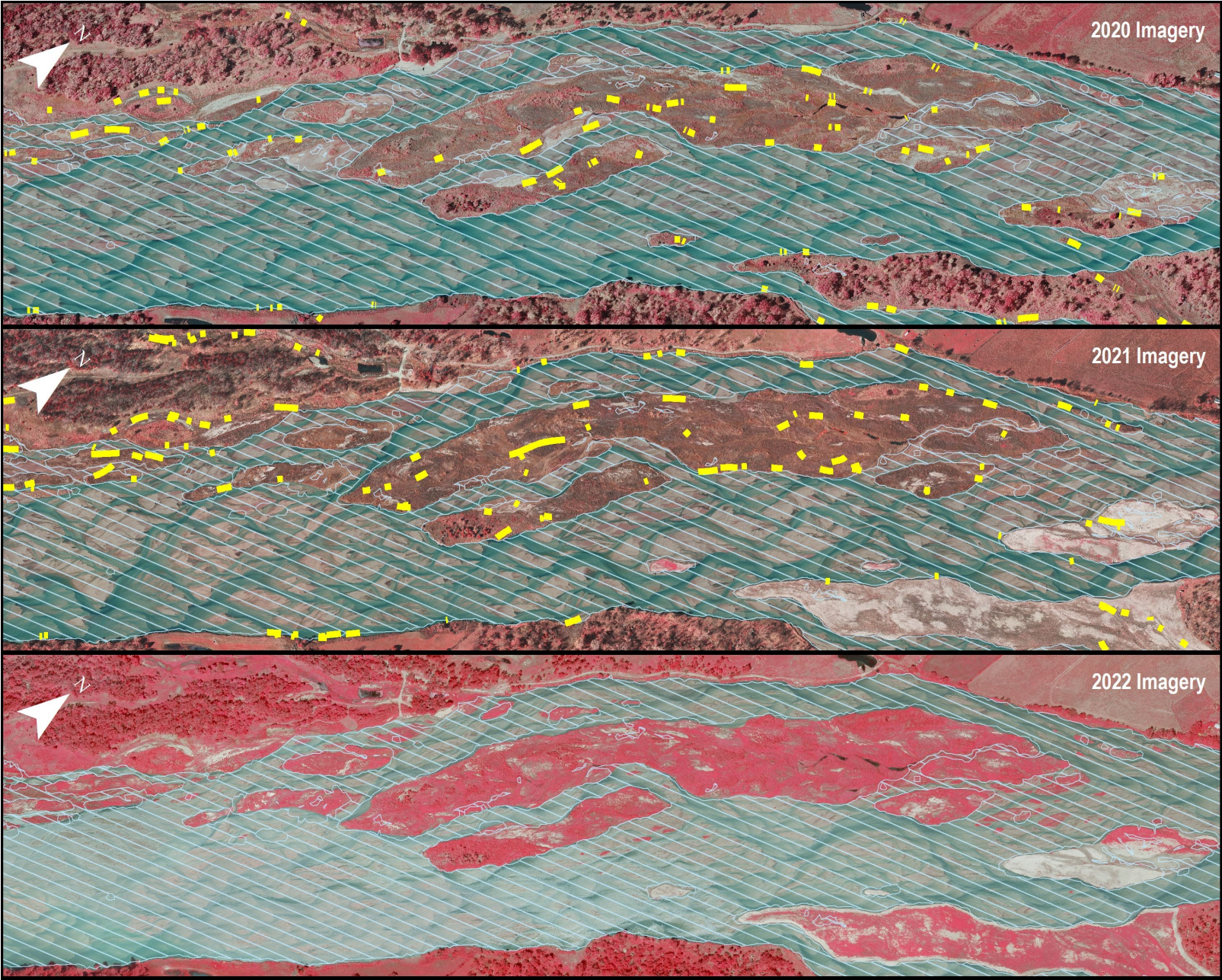
Management Hypothesis

- 1500 cfs
- 30 days (between June 1 – July 15)
- + herbicide





-  2D model water surface elevation @ 1500 cfs
-  Herbicide polygons



2020

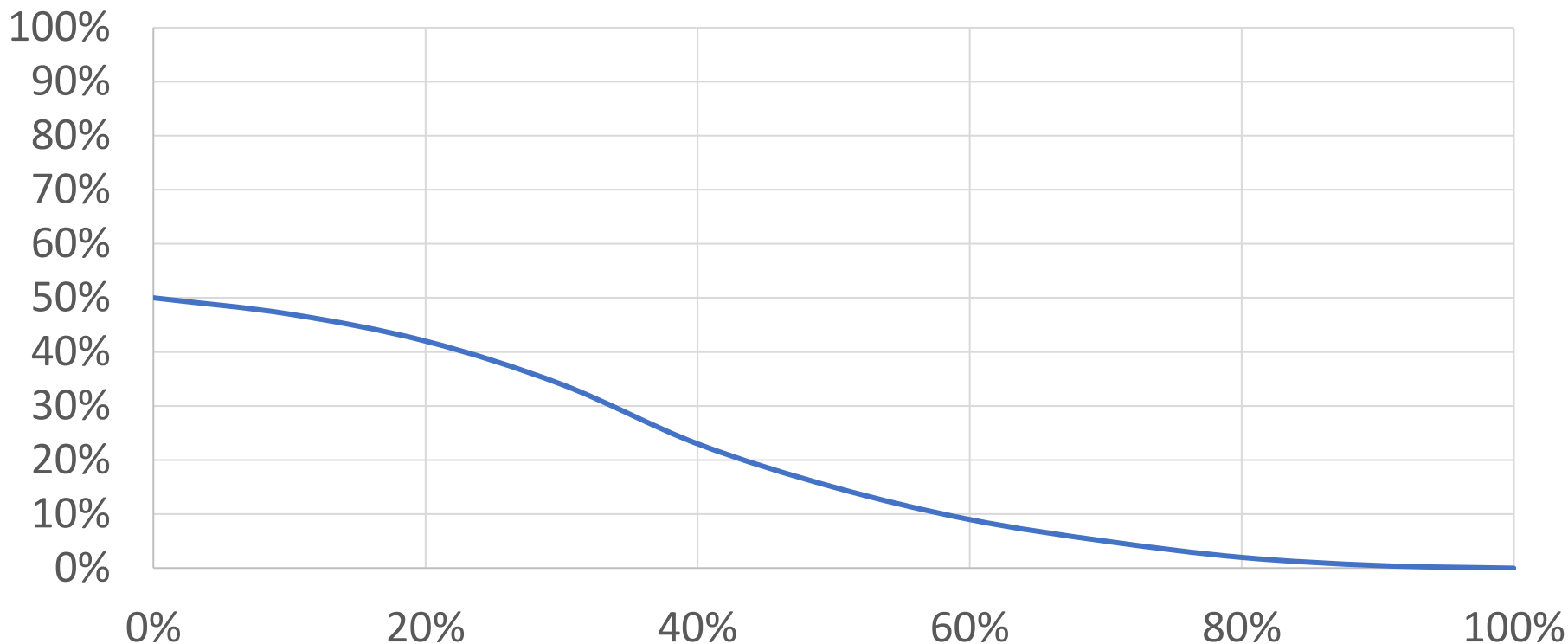
2021

2022

Physical Process Hypothesis

Area of *Phragmites* Patch

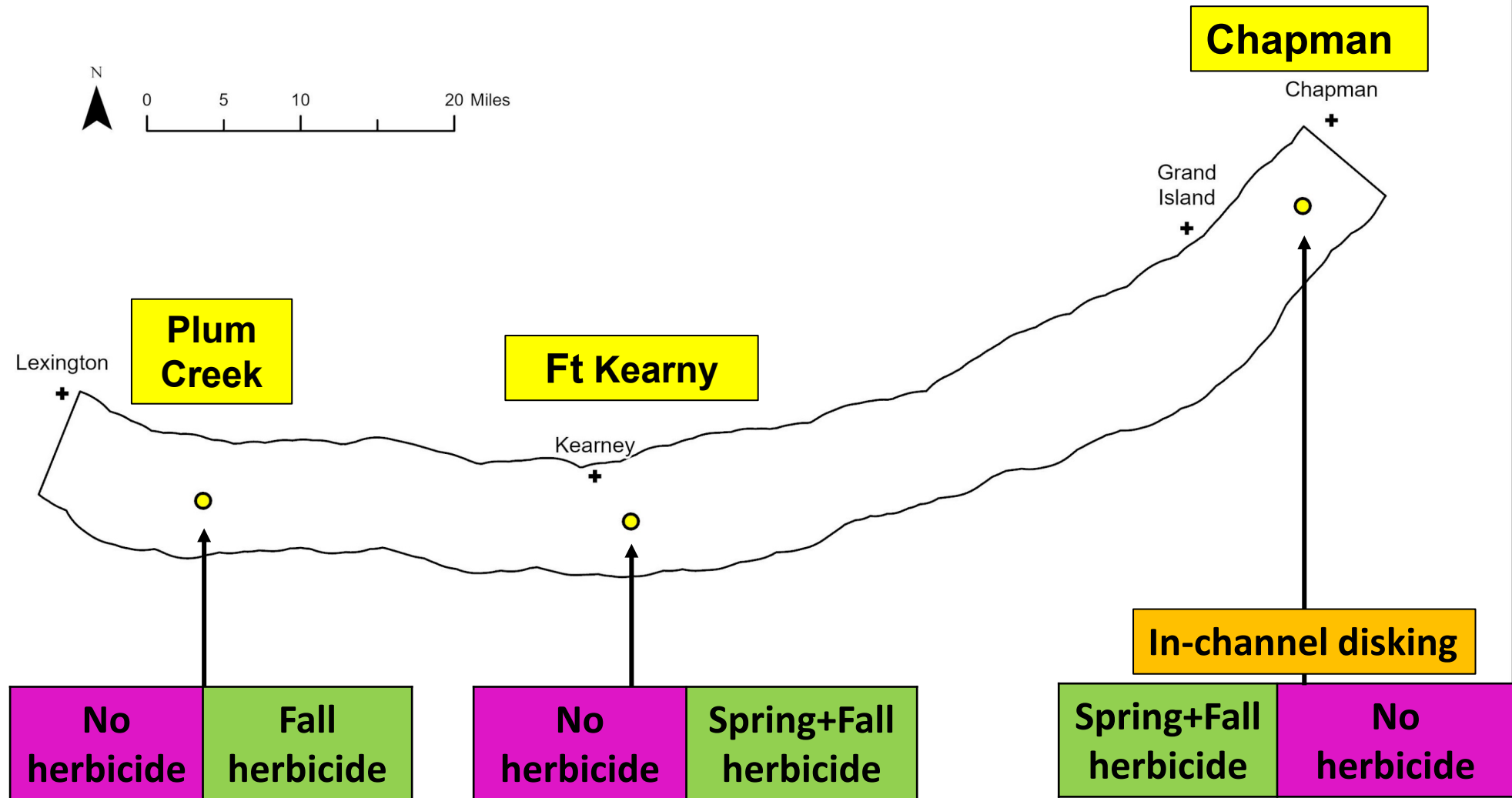
% Annual Increase in
Phragmites Patch Size

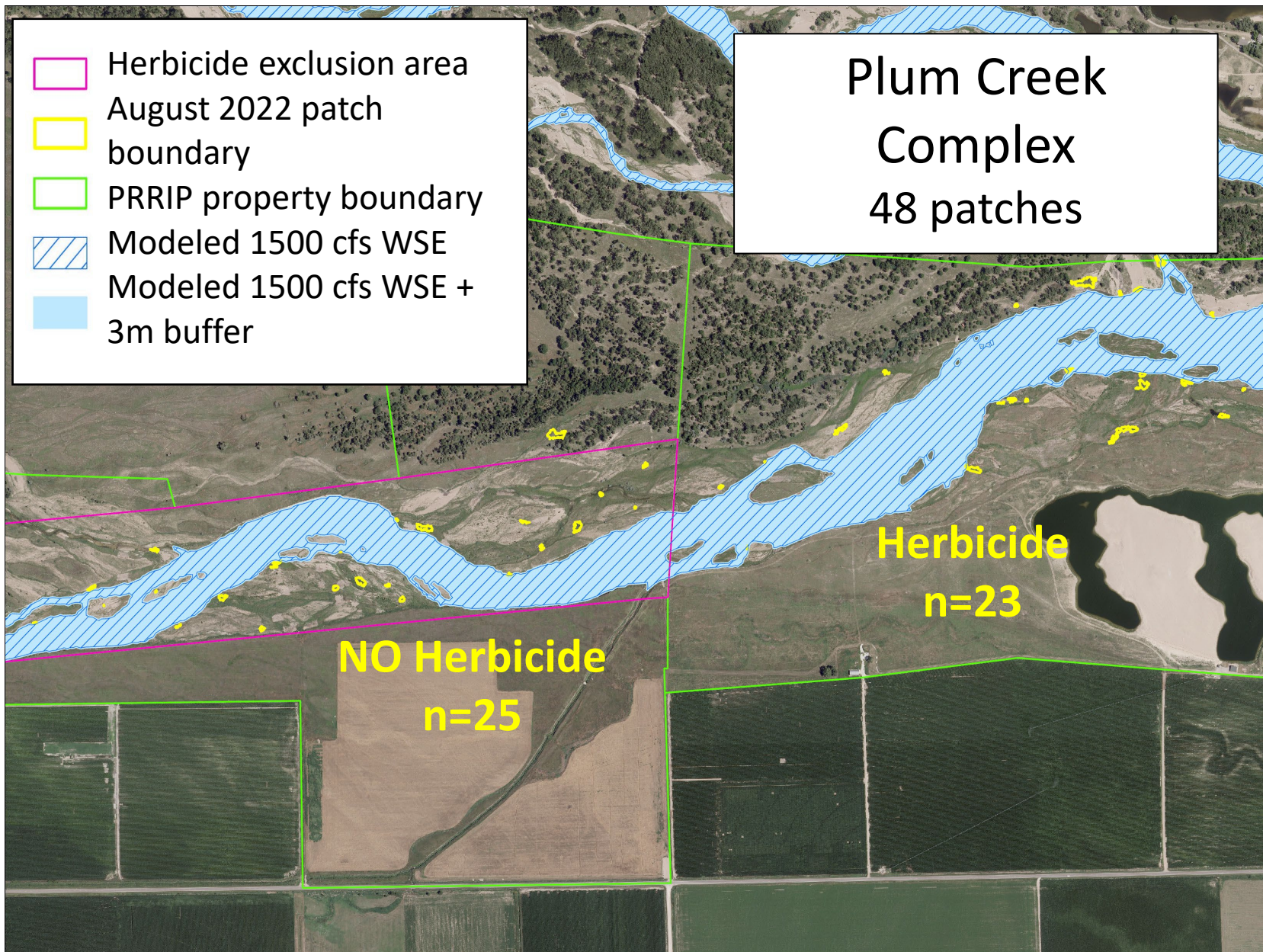


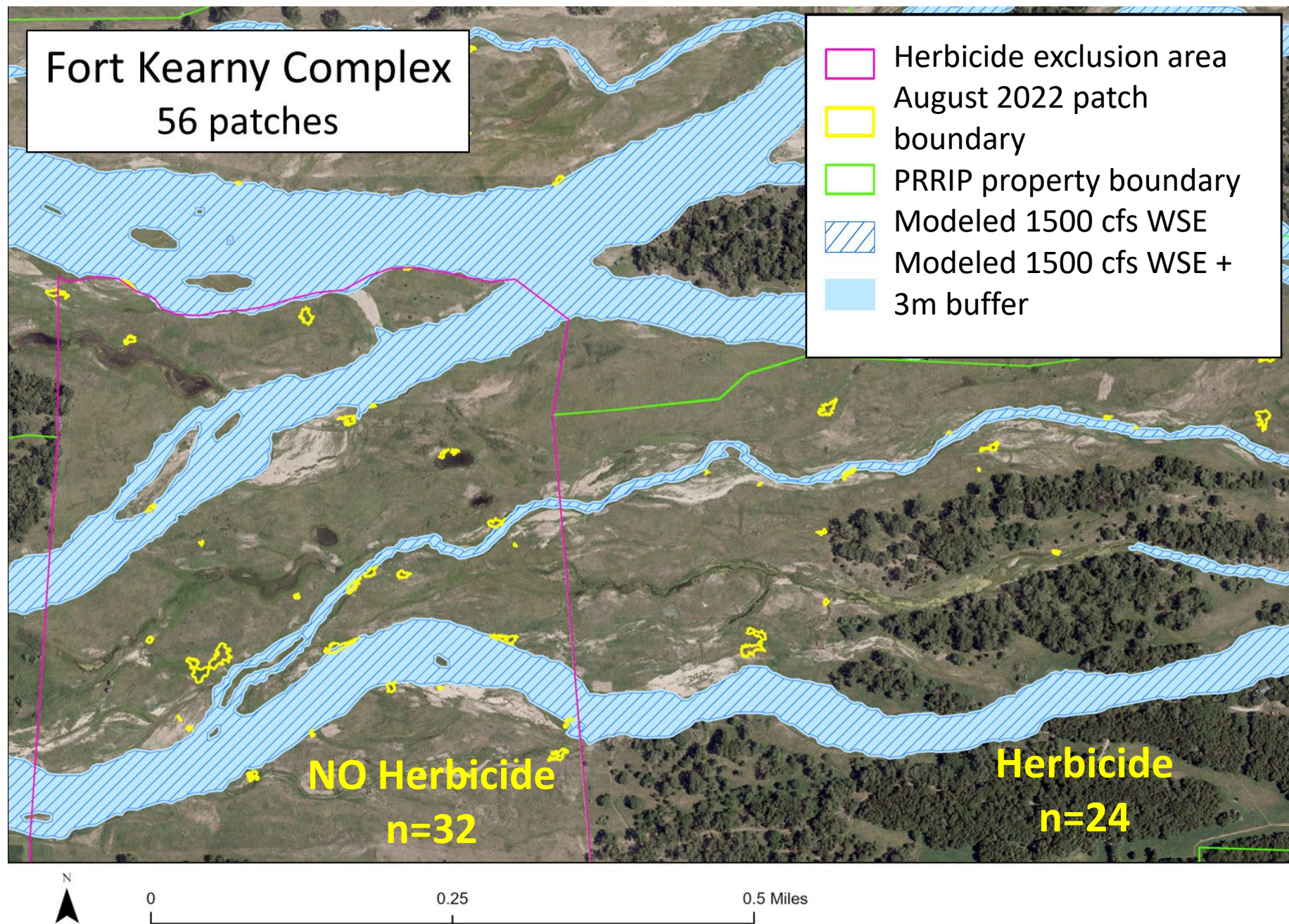
Percent of Time Substrate Inundated
(30-day period between June 1 - July 15)

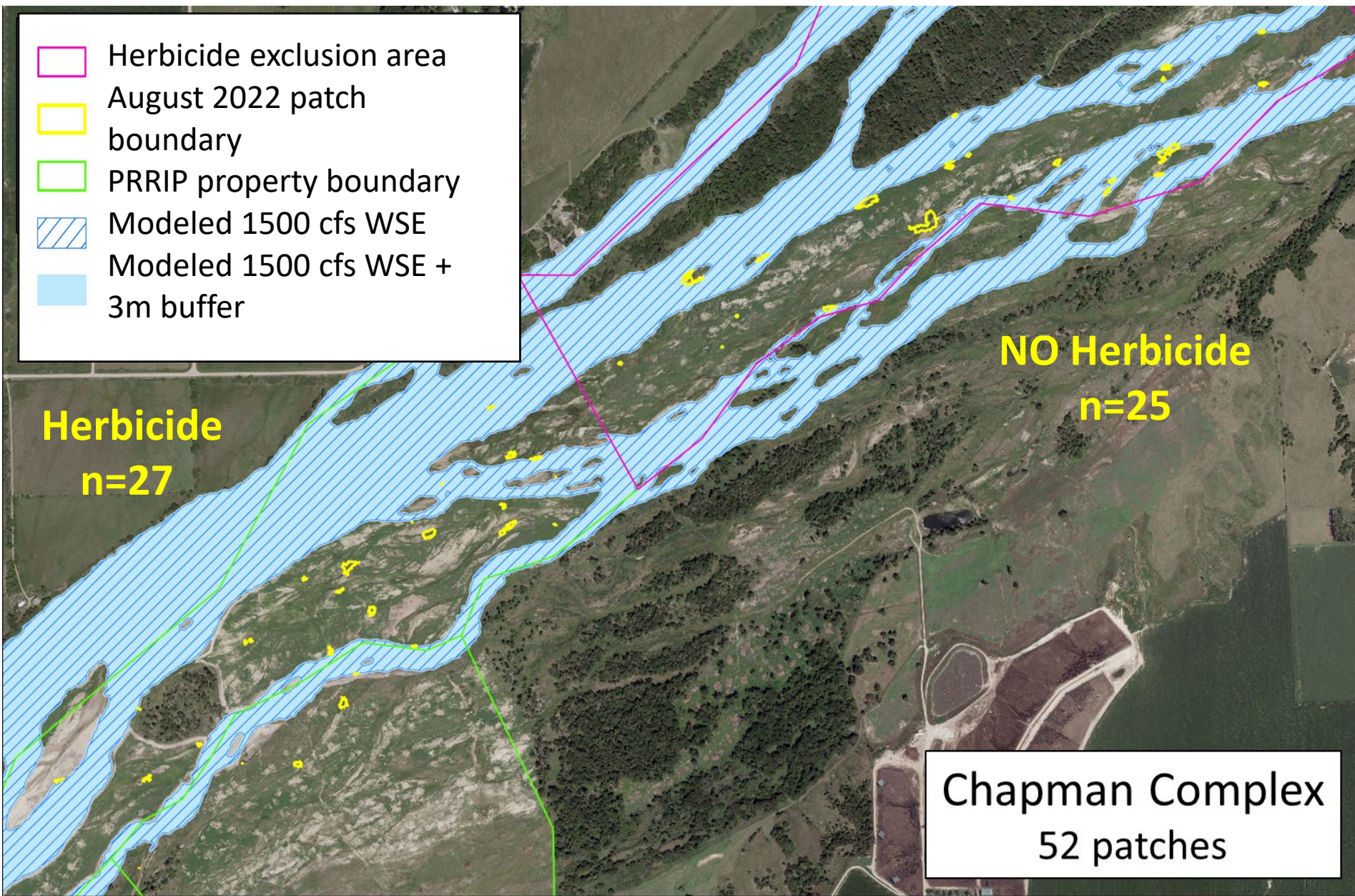
Number of Days Inundated
% of Patch Area Inundated

Study Design







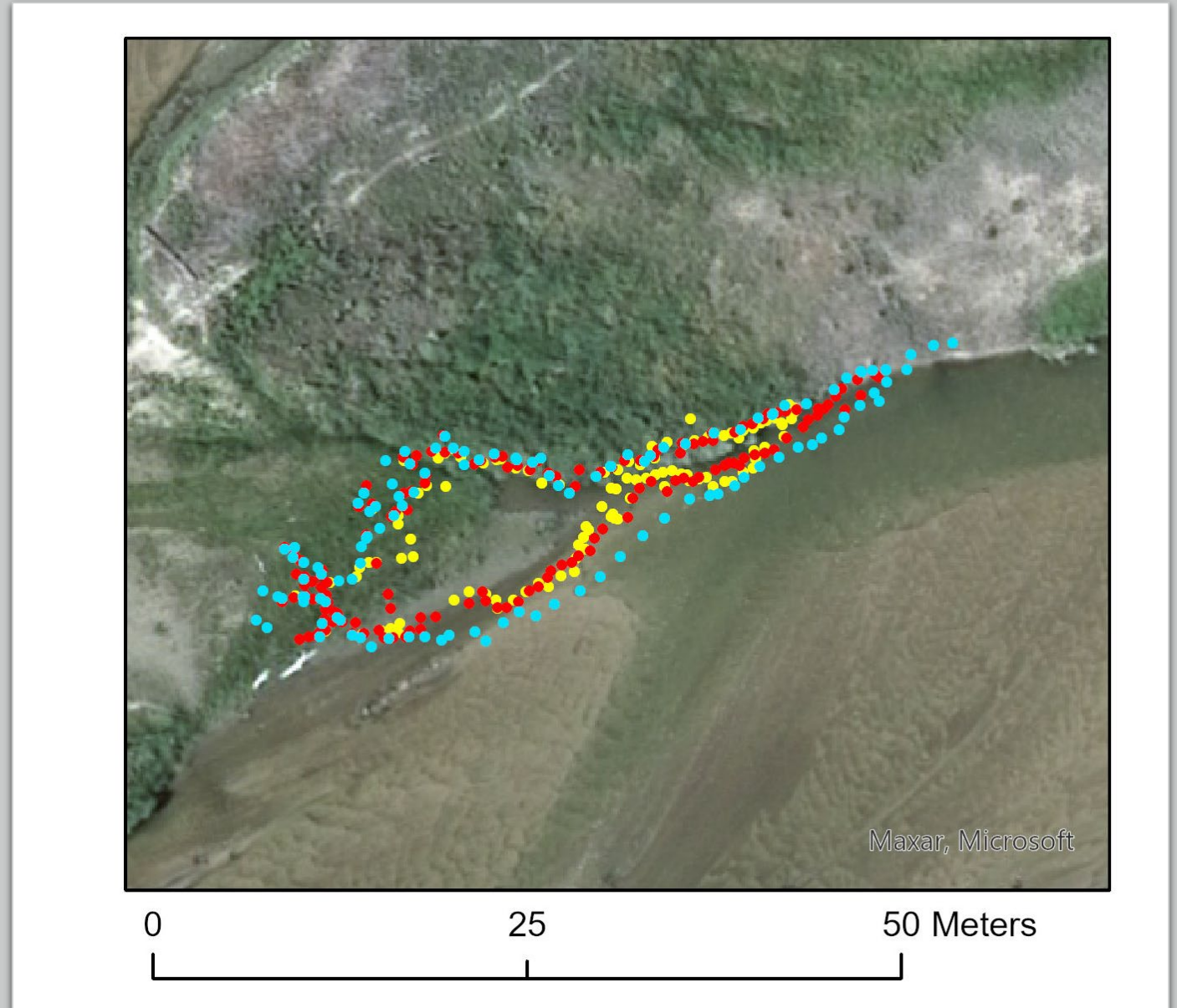


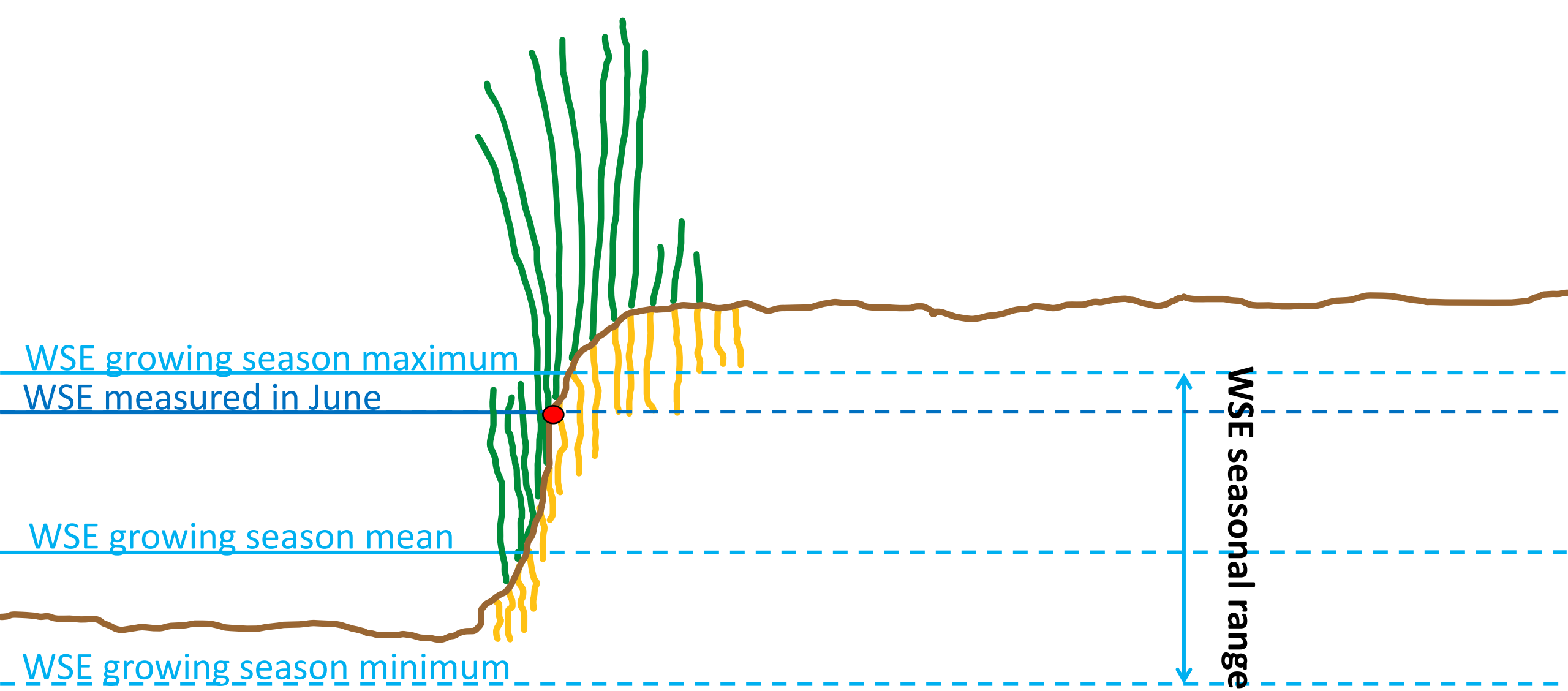


Study Design

- 156 patches
- Patch delineation and assessment
- Repeated sampling


●	June	During flow release Pre-spring herbicide
●	July	After flow release
●	August	Post-spring Pre-fall herbicide
	October	After flow release Post-fall herbicide






Bankline Patch 47 Ft. Kearny

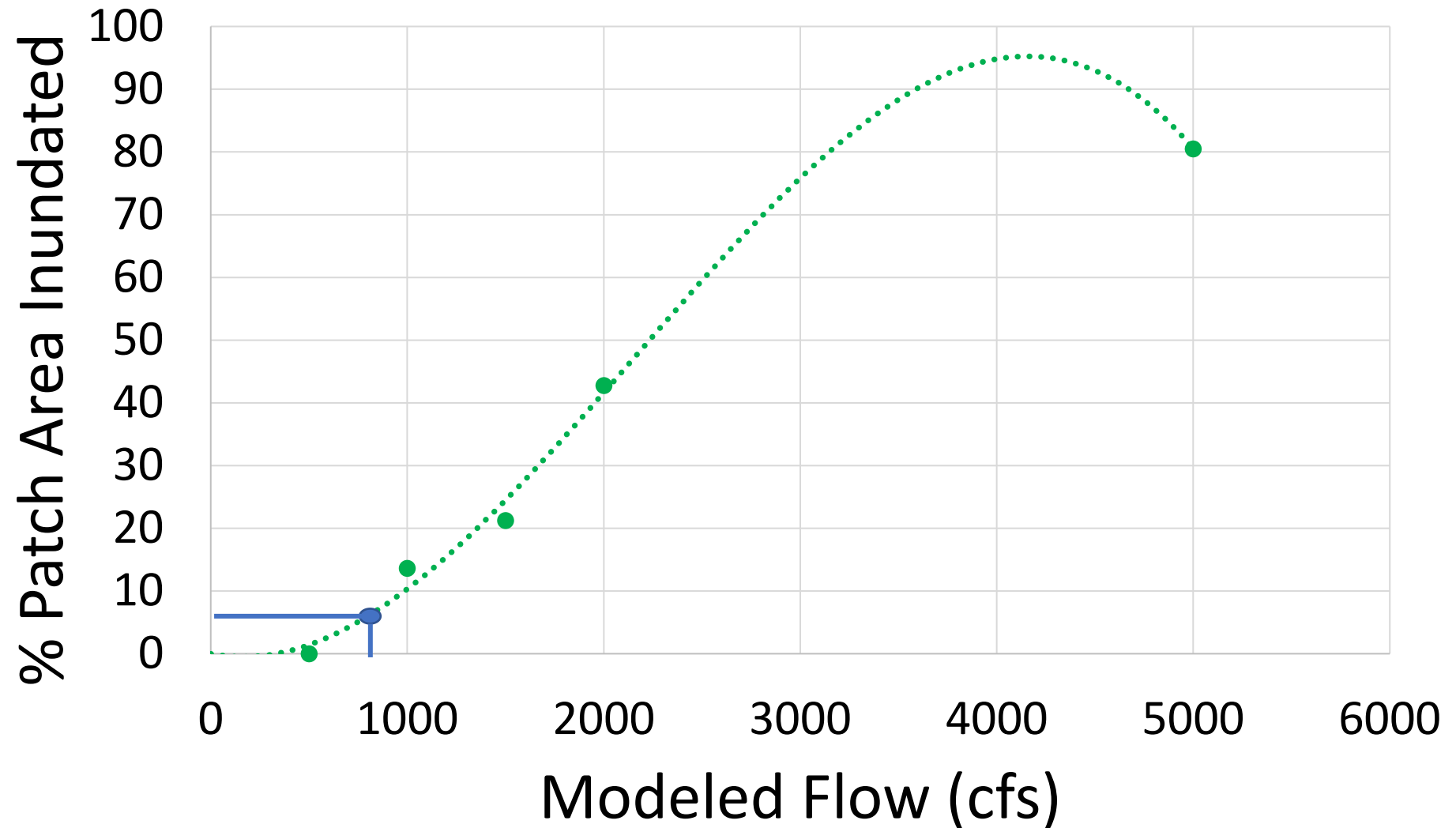
 June area = 1673 ft²

 1500 cfs WSE

 Area inundated @ 1500 cfs
= 355 ft²
21% of patch

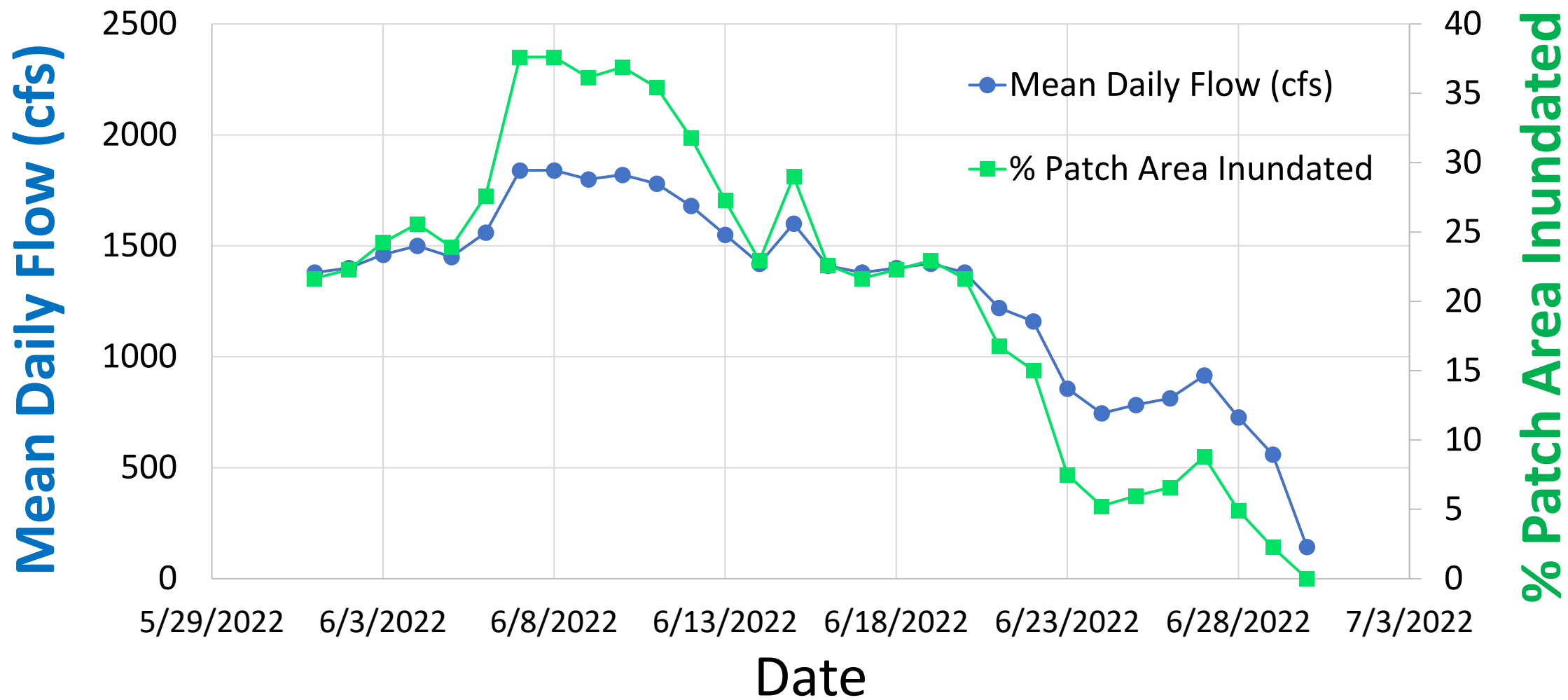


Patch 47

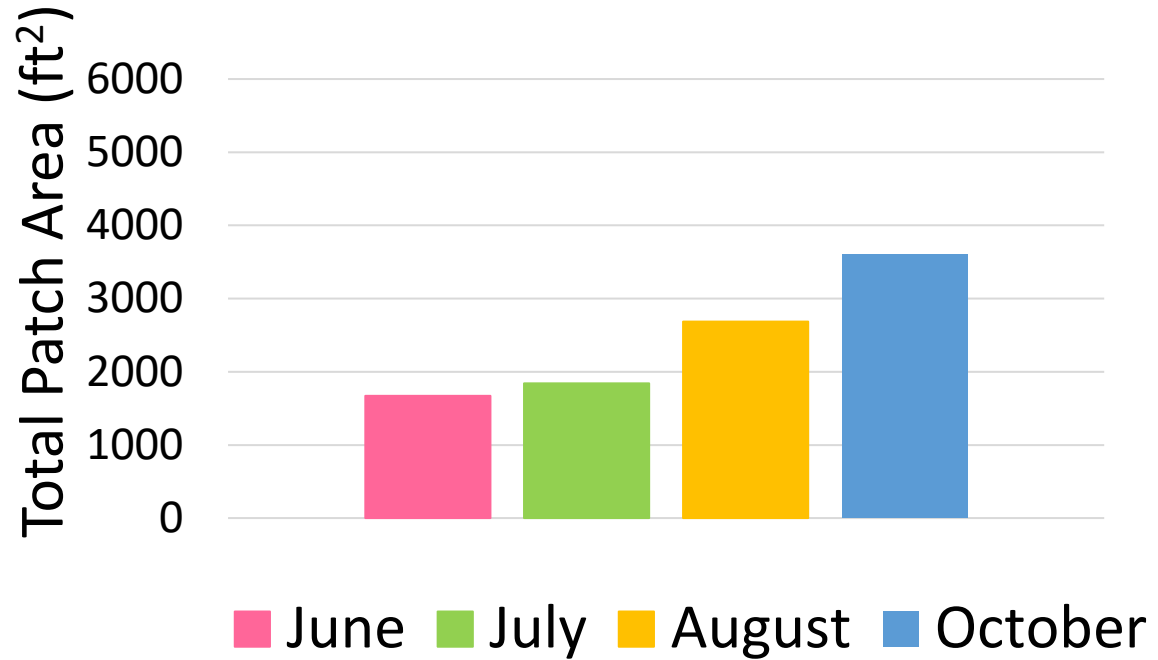


Patch 47

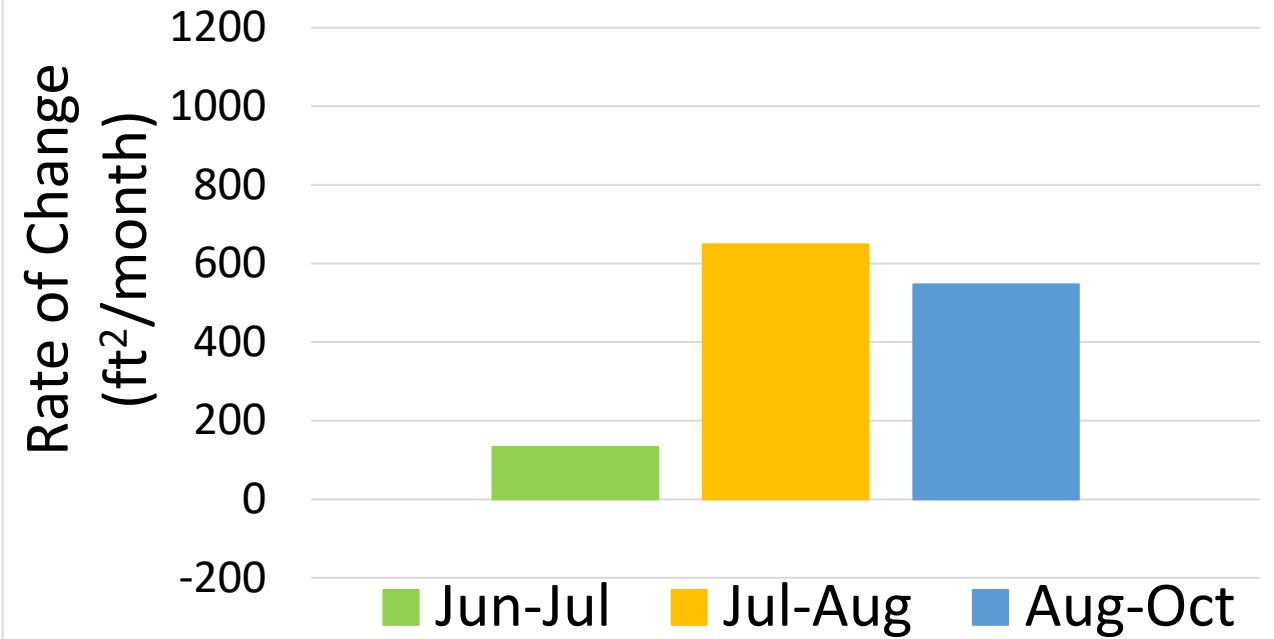
% Area Inundated



Patch 47





Patch 47

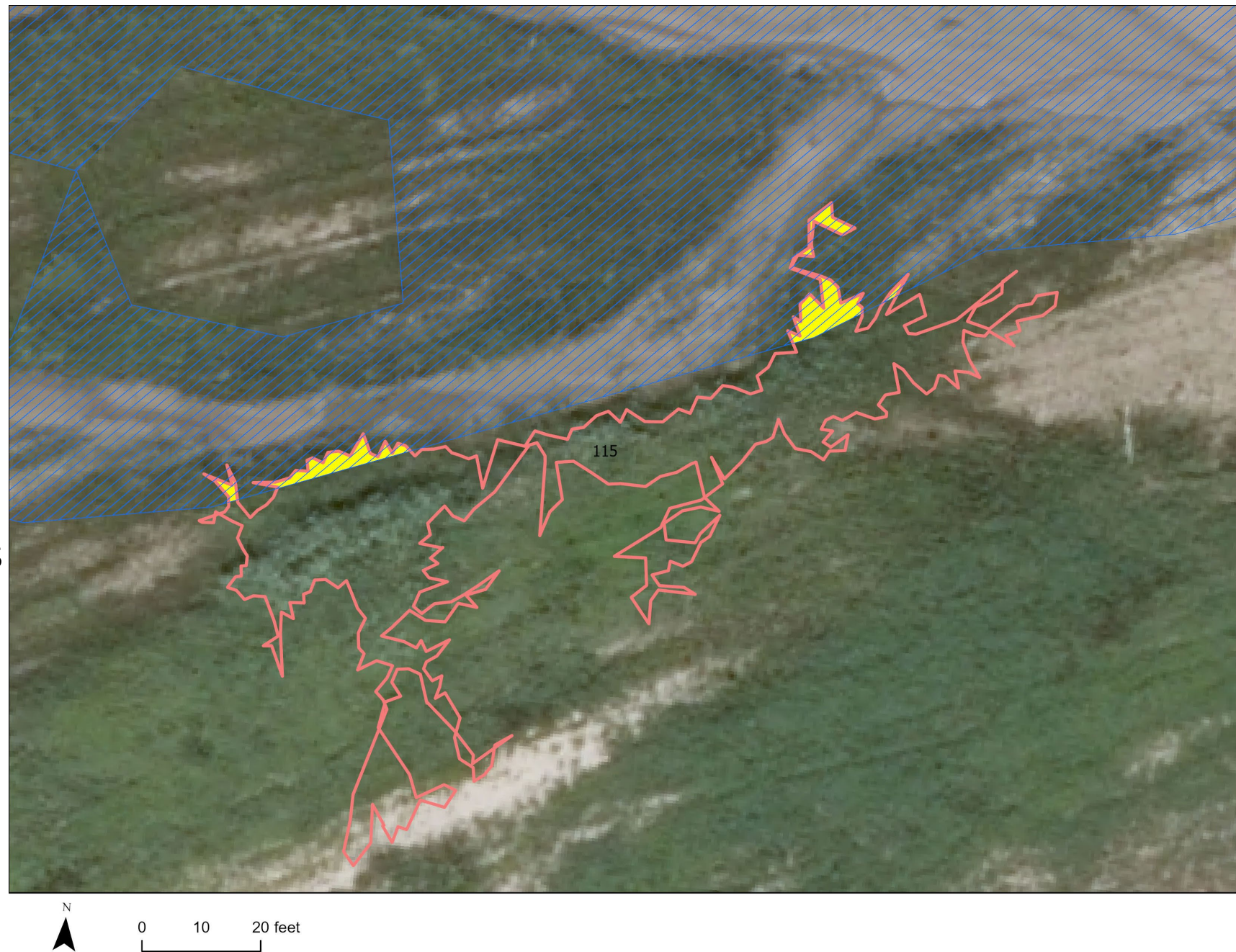


Bankline Patch 115 Chapman

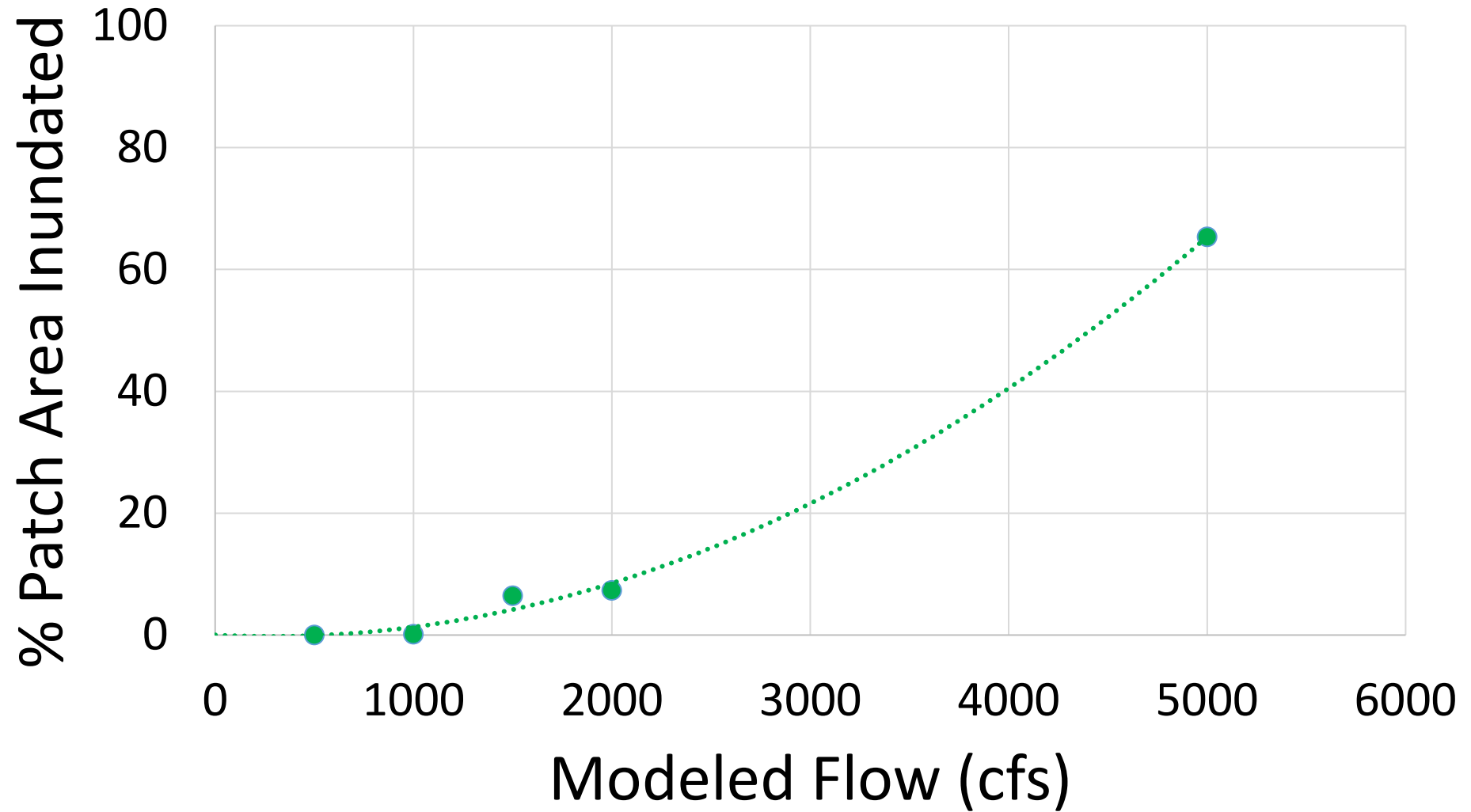
 June area = 2319 ft²

 1500 cfs WSE

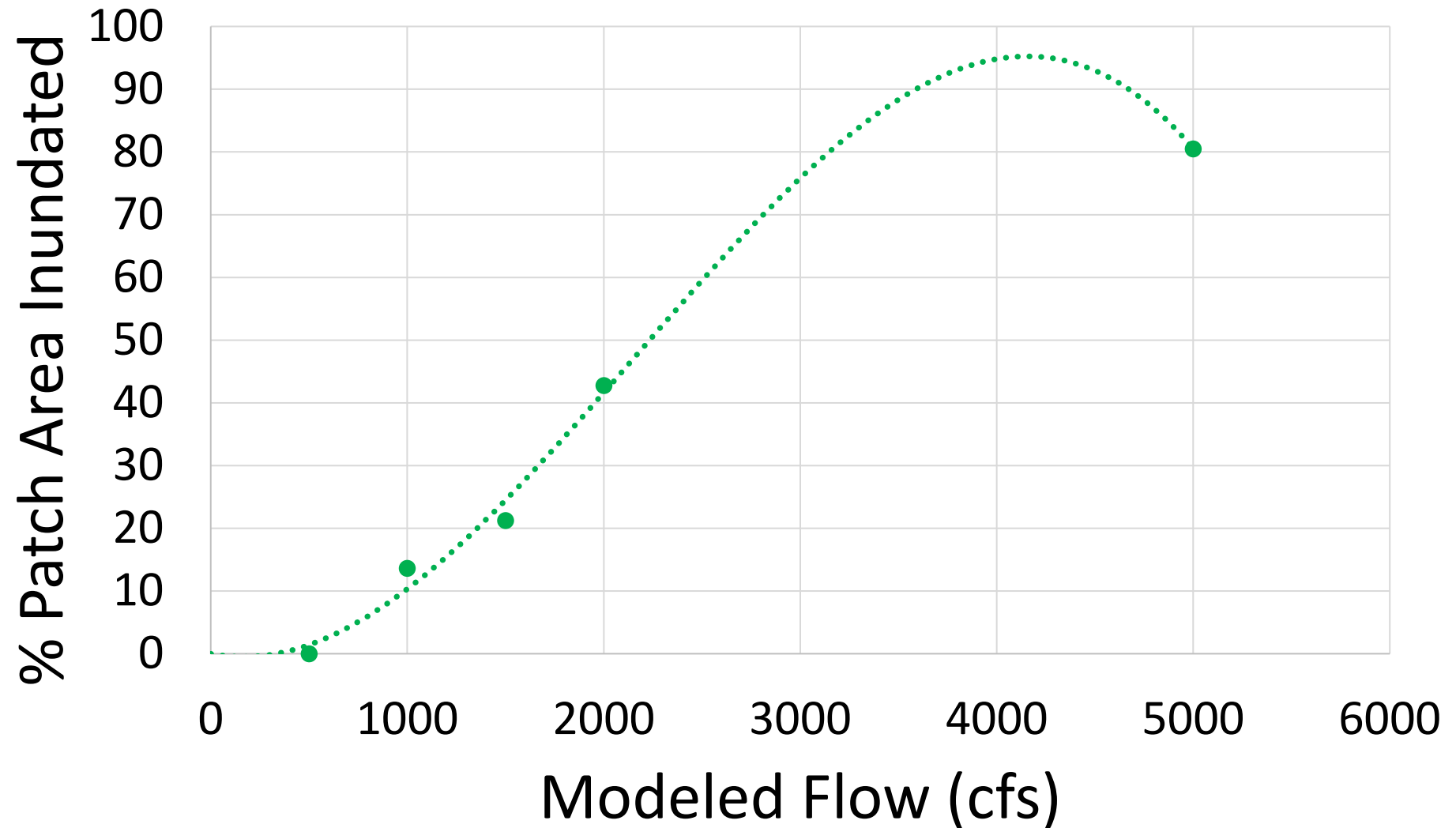
 Area inundated @ 1500 cfs
= 149 ft²
6% of patch



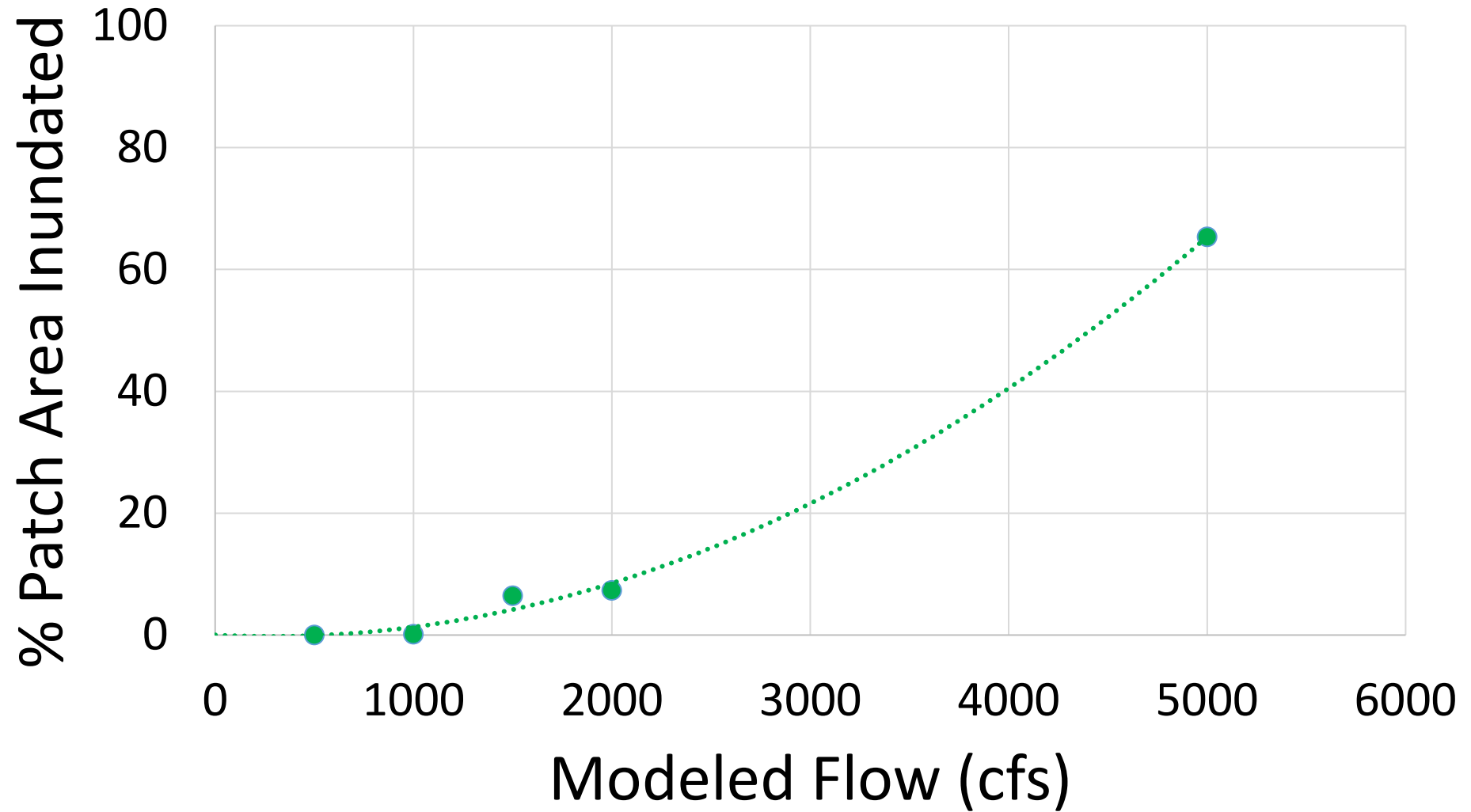
Patch 115



Patch 47

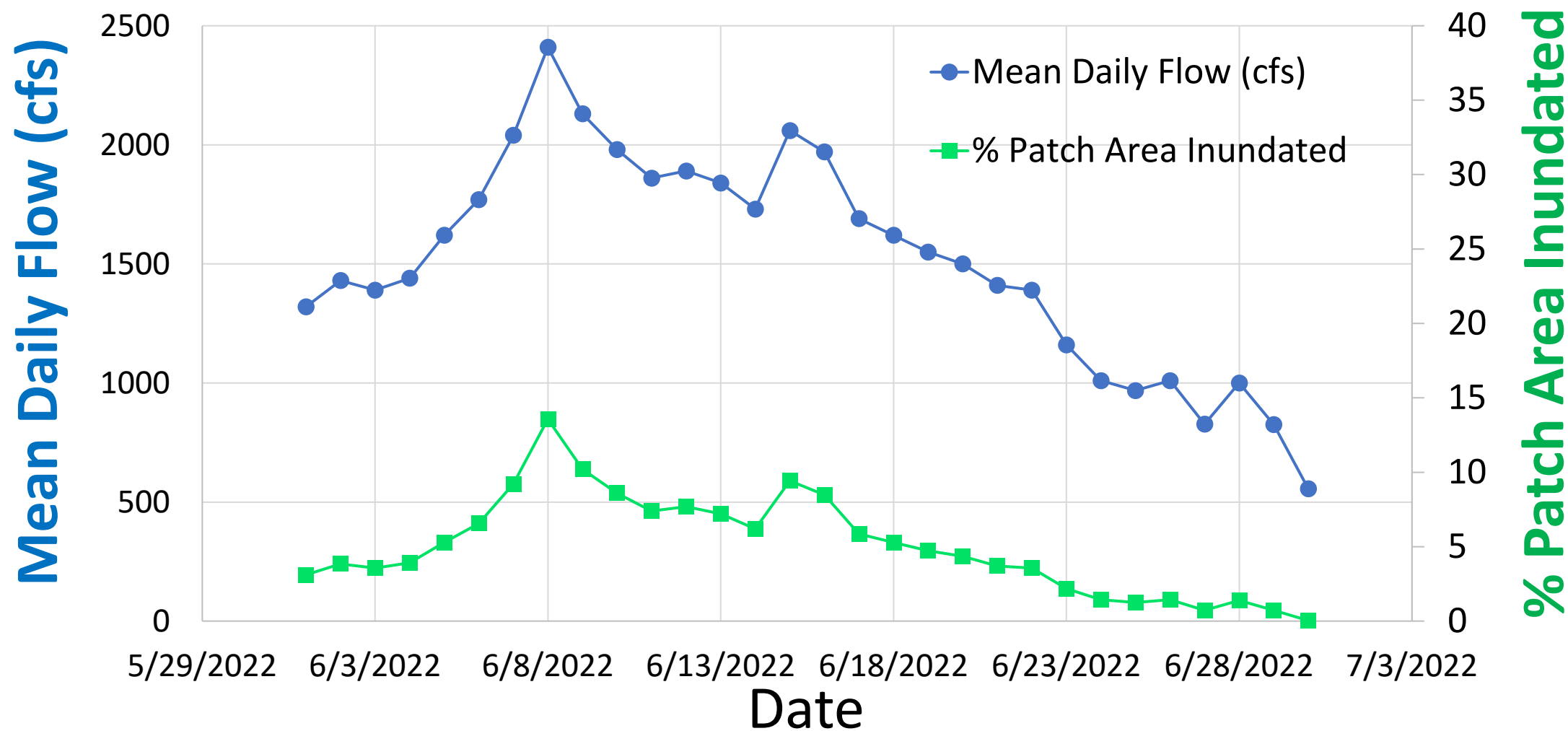


Patch 115

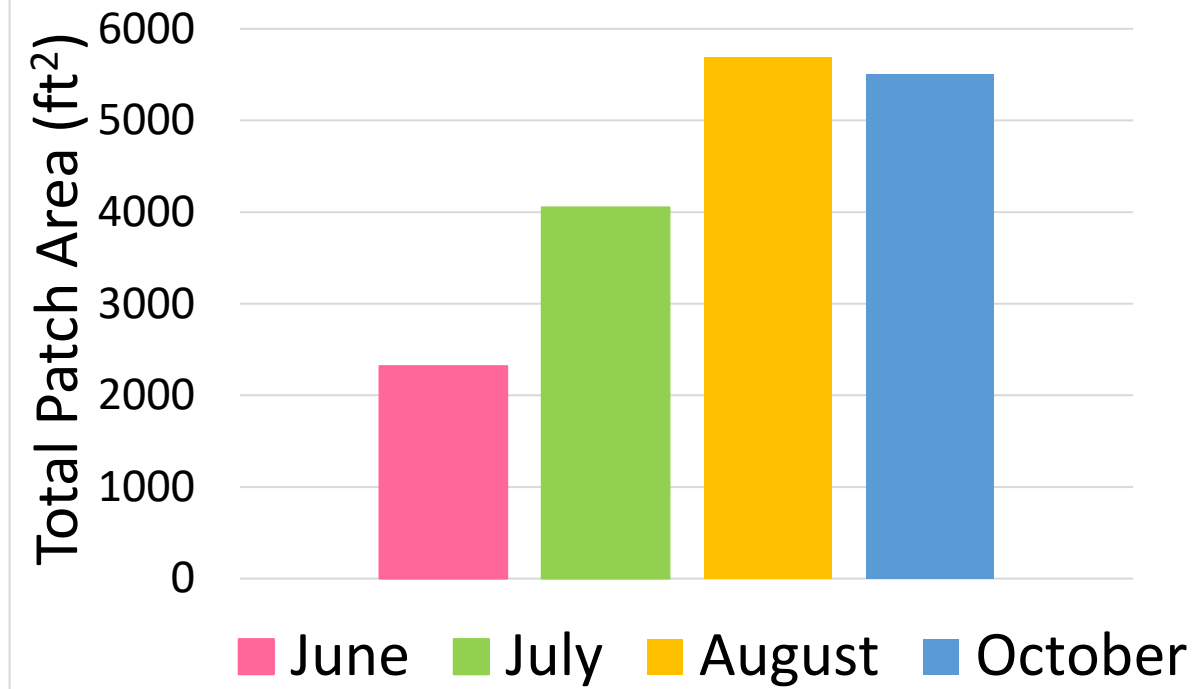


Patch 115

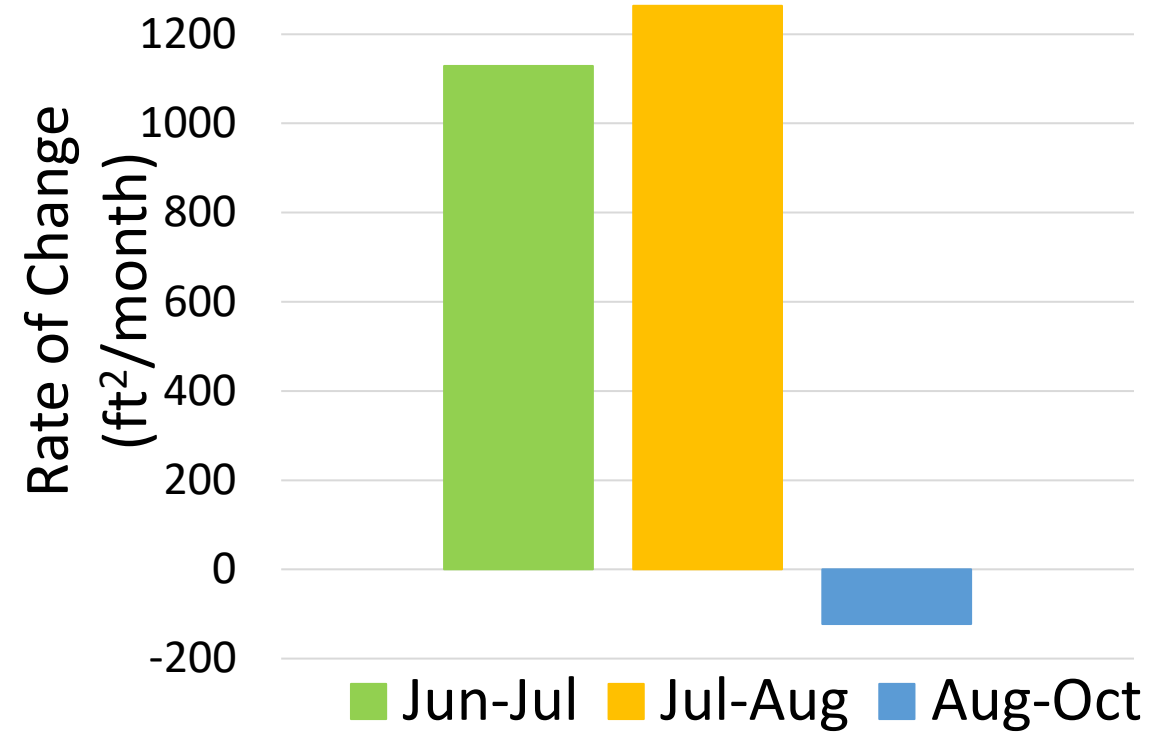
% Area Inundated

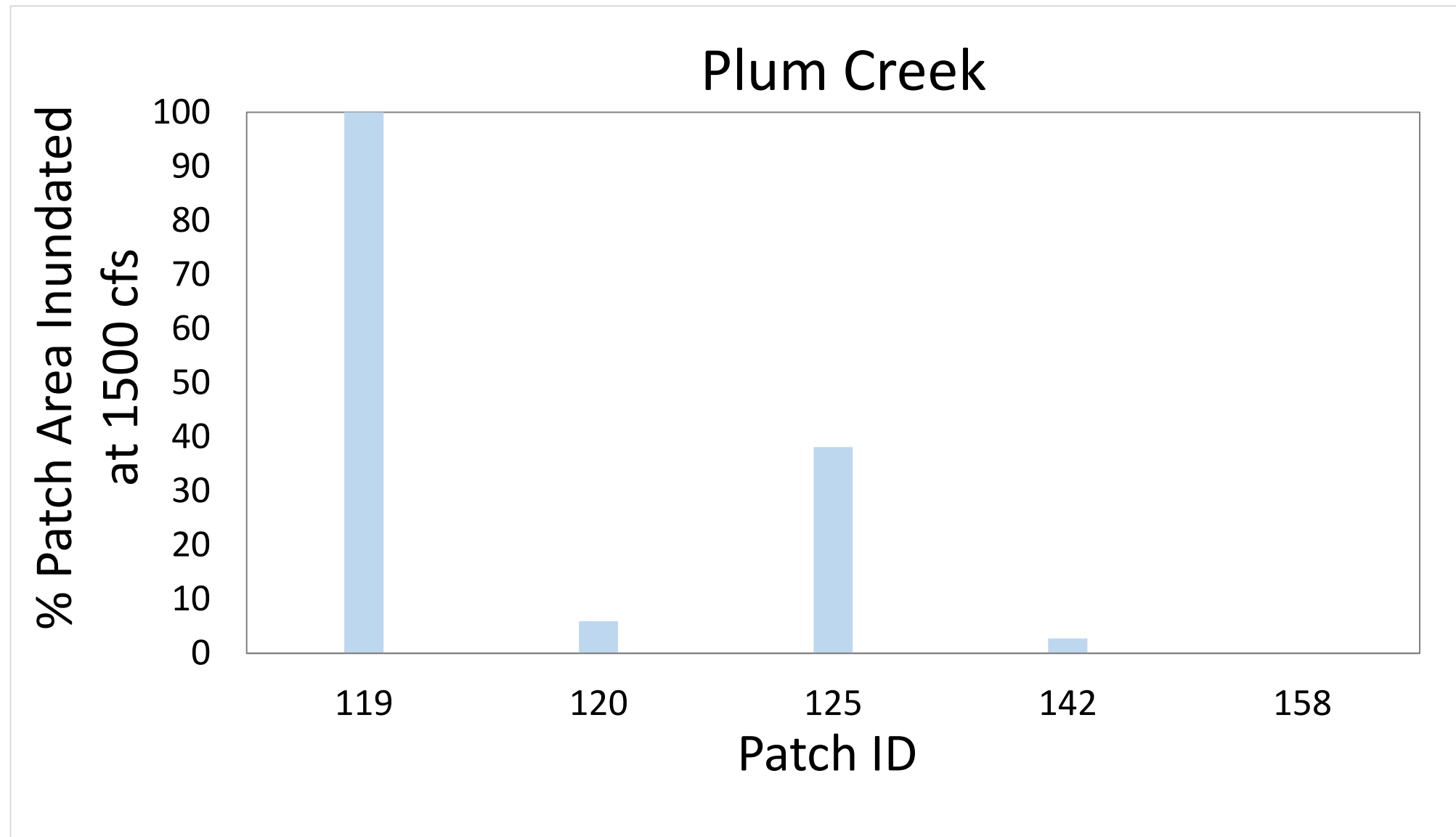


Patch 115



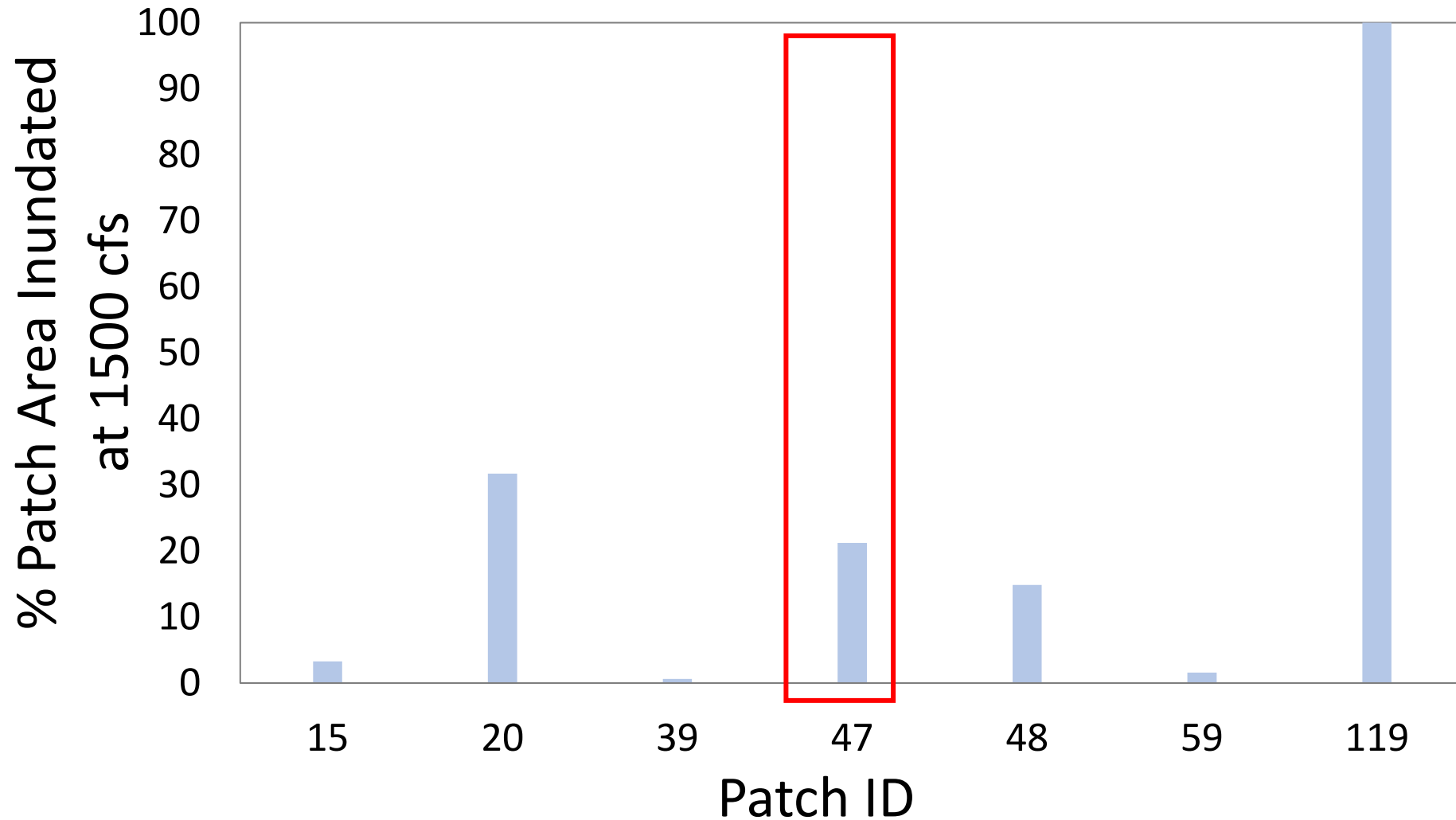
Patch 115





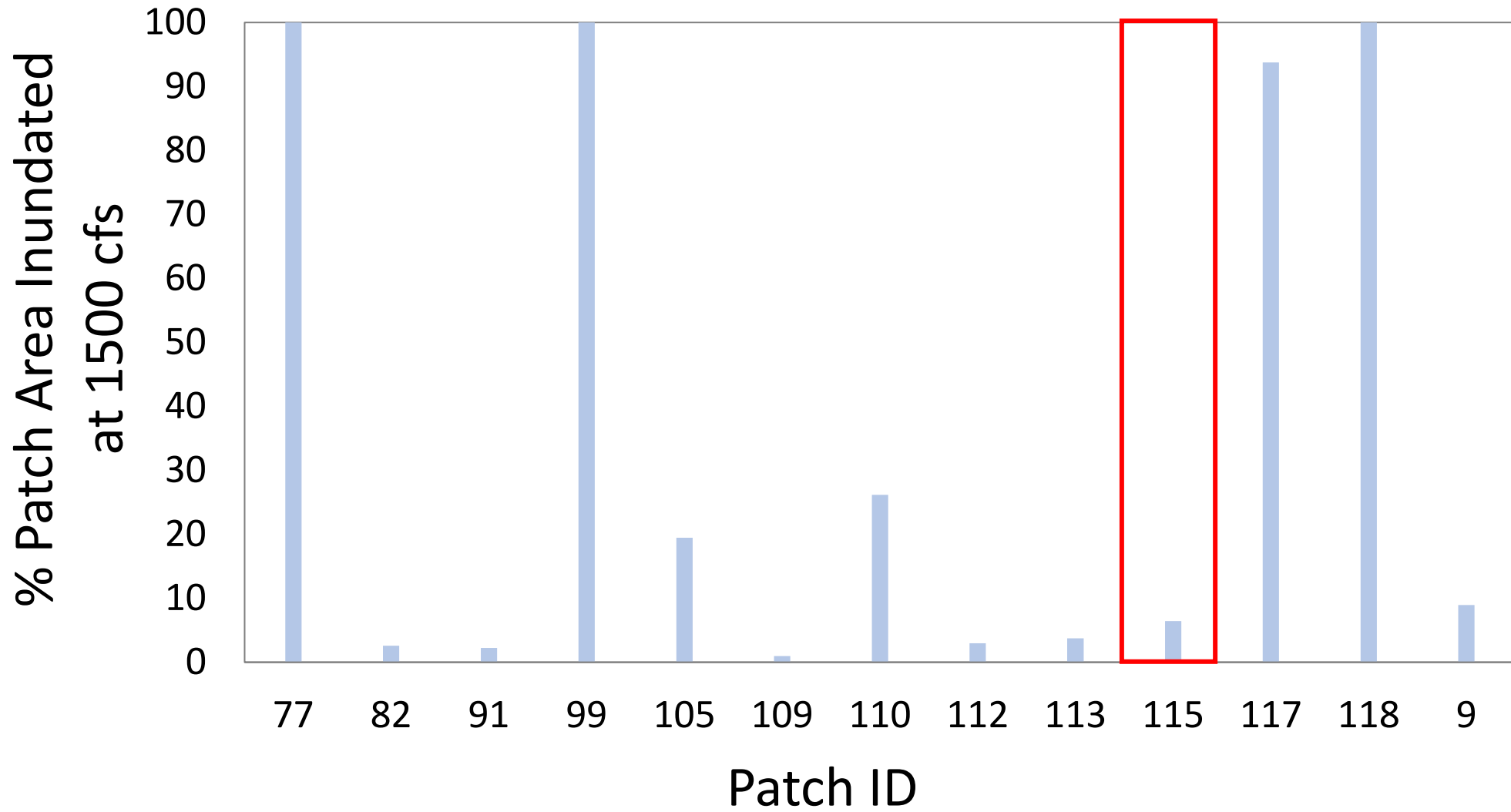
5 intersect with 1500 cfs

Fort Kearny

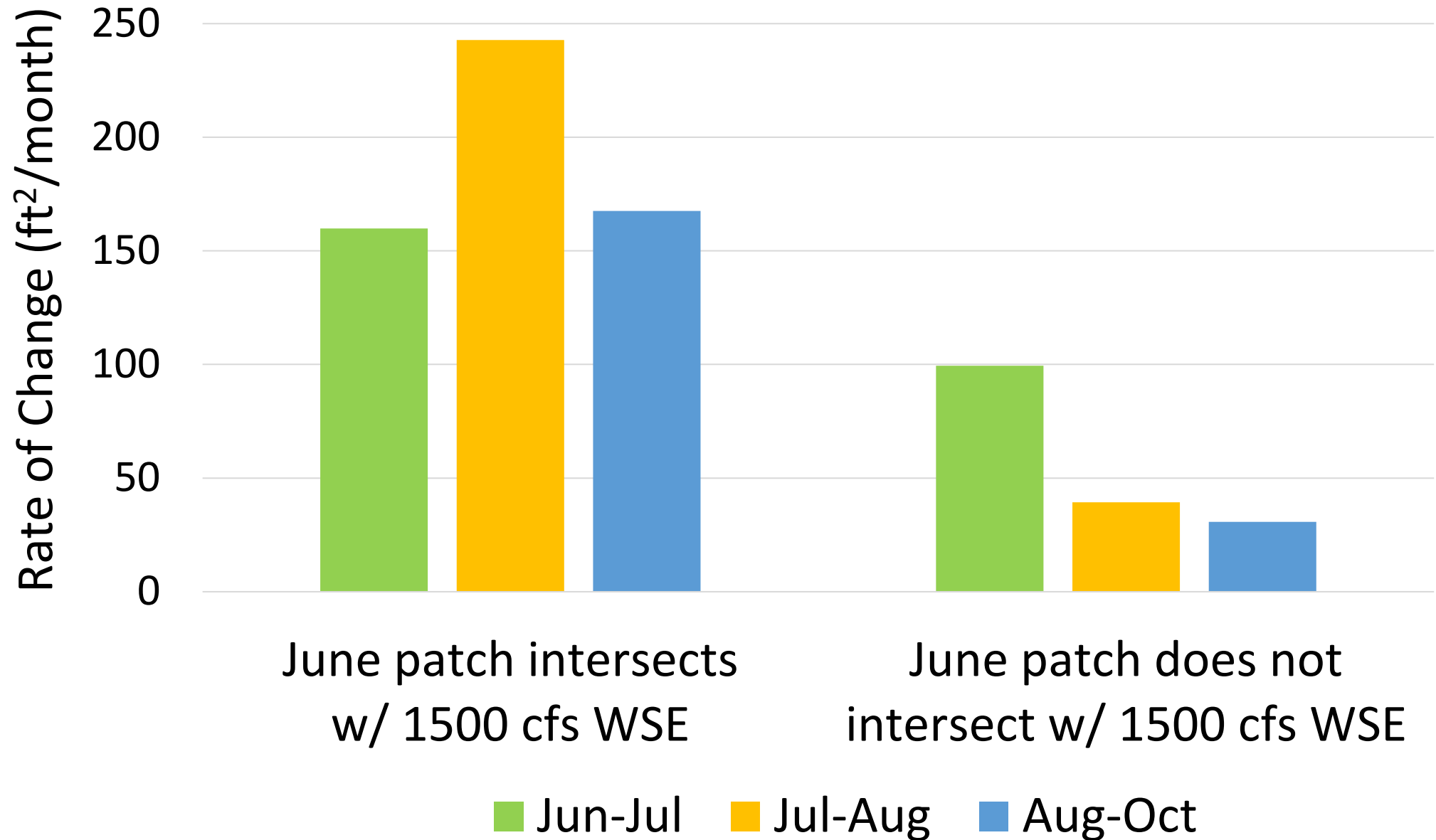


7 intersect with 1500 cfs

Chapman



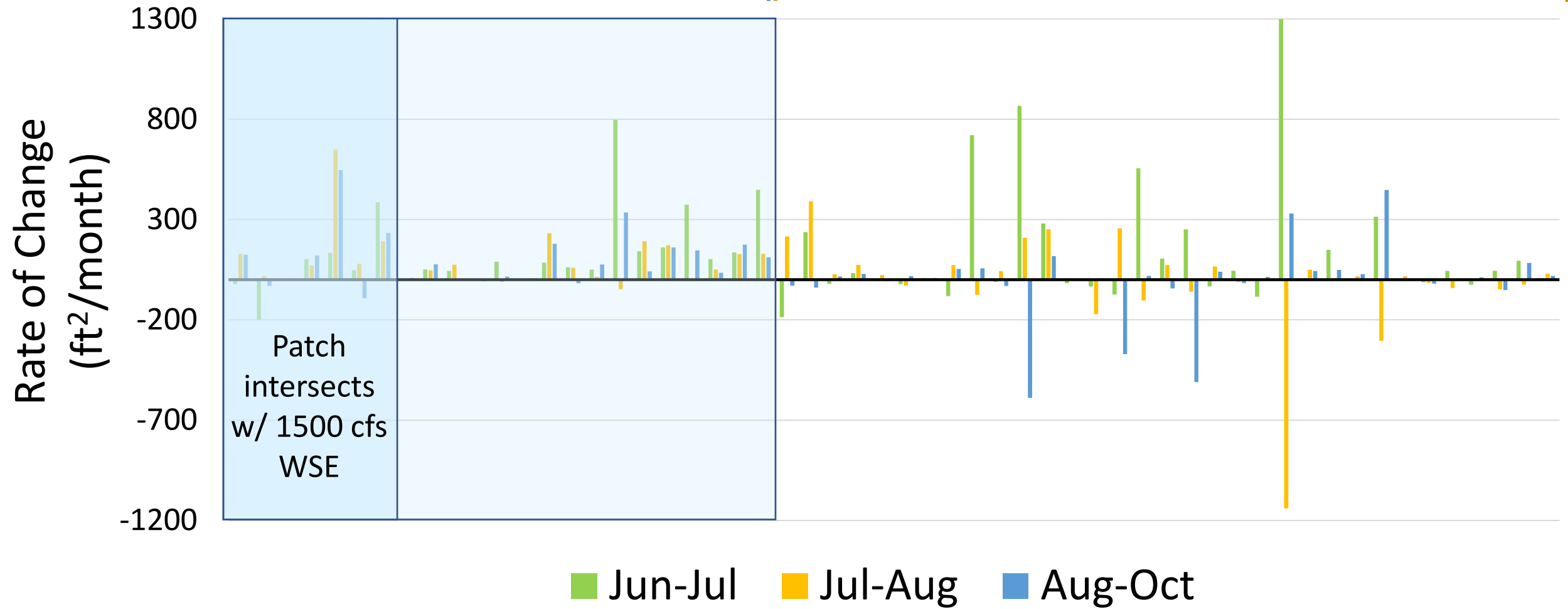
13 intersect with 1500 cfs



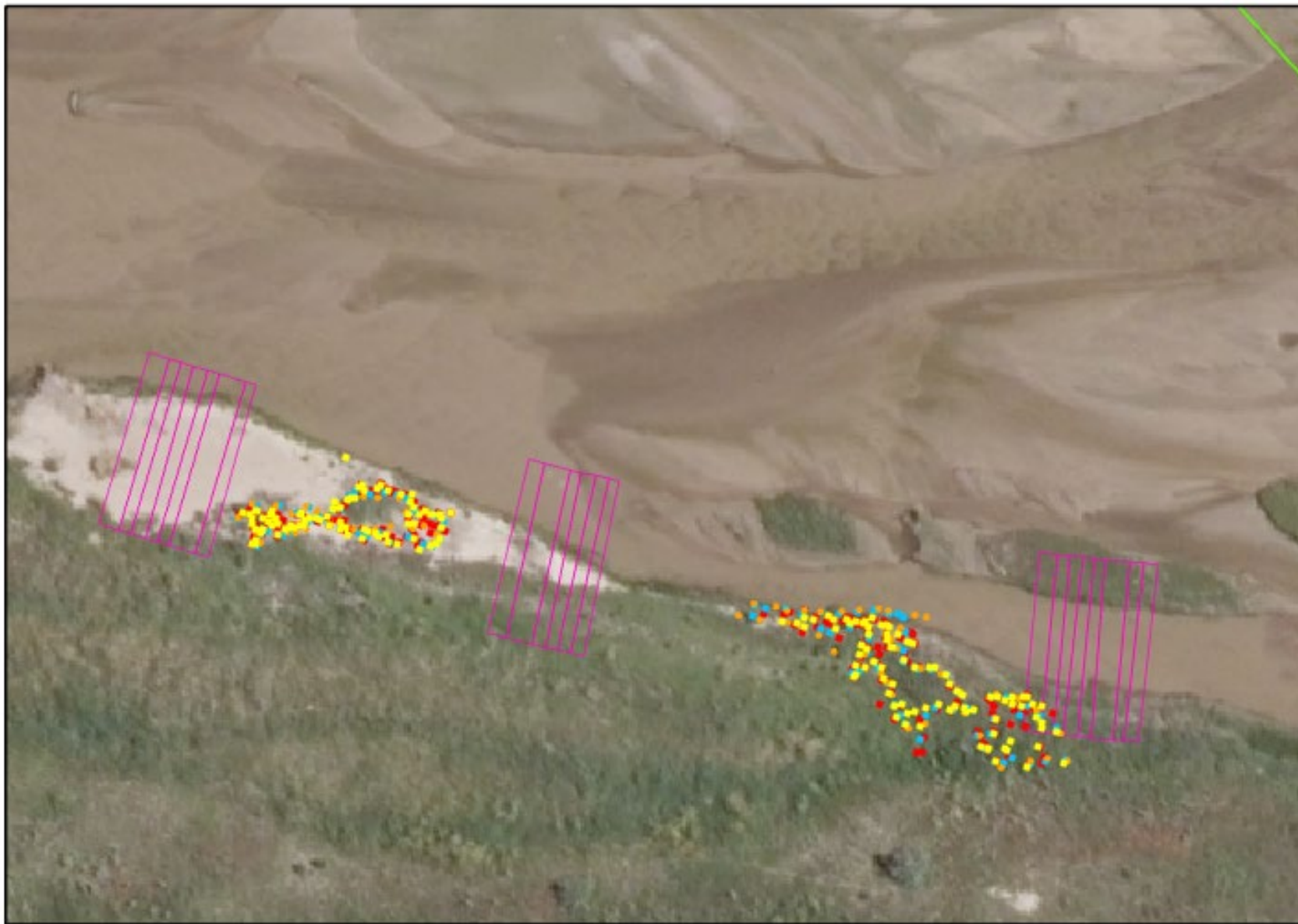
Ft Kearny

Bankline Patches

Inland Patches



2022 Pilot Study	Number of patches						
	Plum Creek herbicide (23)	Plum Creek no herbicide (25)	Fort Kearny herbicide (24)	Fort Kearny no herbicide (32)	Chapman herbicide (27)	Chapman no herbicide (25)	Total
Received herbicide June 2022	0	0	5	0	6	0	11
Received herbicide Sept 2022	1	0	0	0	0	1	2



0 10 20 40 US Feet



2022 Main Takeaways

- Most patches above 1500 cfs June flows
- Most patches not sprayed with herbicide
- 20% of patches with minor expansion
- Some patches decreased in area, showing drought stress and dieback







Questions & Discussion Points

- Study design adjustments
- Metrics collected
- Testing for effects of June inundation flow





	Number of bankline patches (68)				Number of inland patches (88)			
Property complex	TIER 1	TIER 2	TIER 3	TIER 4	TIER 1	TIER 2	TIER 3	TIER 4
Plum Creek (48)	11	8	2	0	14	8	3	2
Fort Kearny (56)	11	9	2	1	14	7	9	3
Chapman (52)	8	9	7	0	1	15	12	0
Total (156)	30	26	11	1	29	30	24	5

- Recommend dropping tiers in red text from the 2023 monthly sampling
- Recommend adding bankline patches in tiers 1-2
 - 70% bankline, 30% inland



Thank You
henrym@headwaterscorp.com