

Honing the blade: Vegetation monitoring in the age of high-resolution imagery - lessons from Active Marsh Improvement 3 (AMI 3)

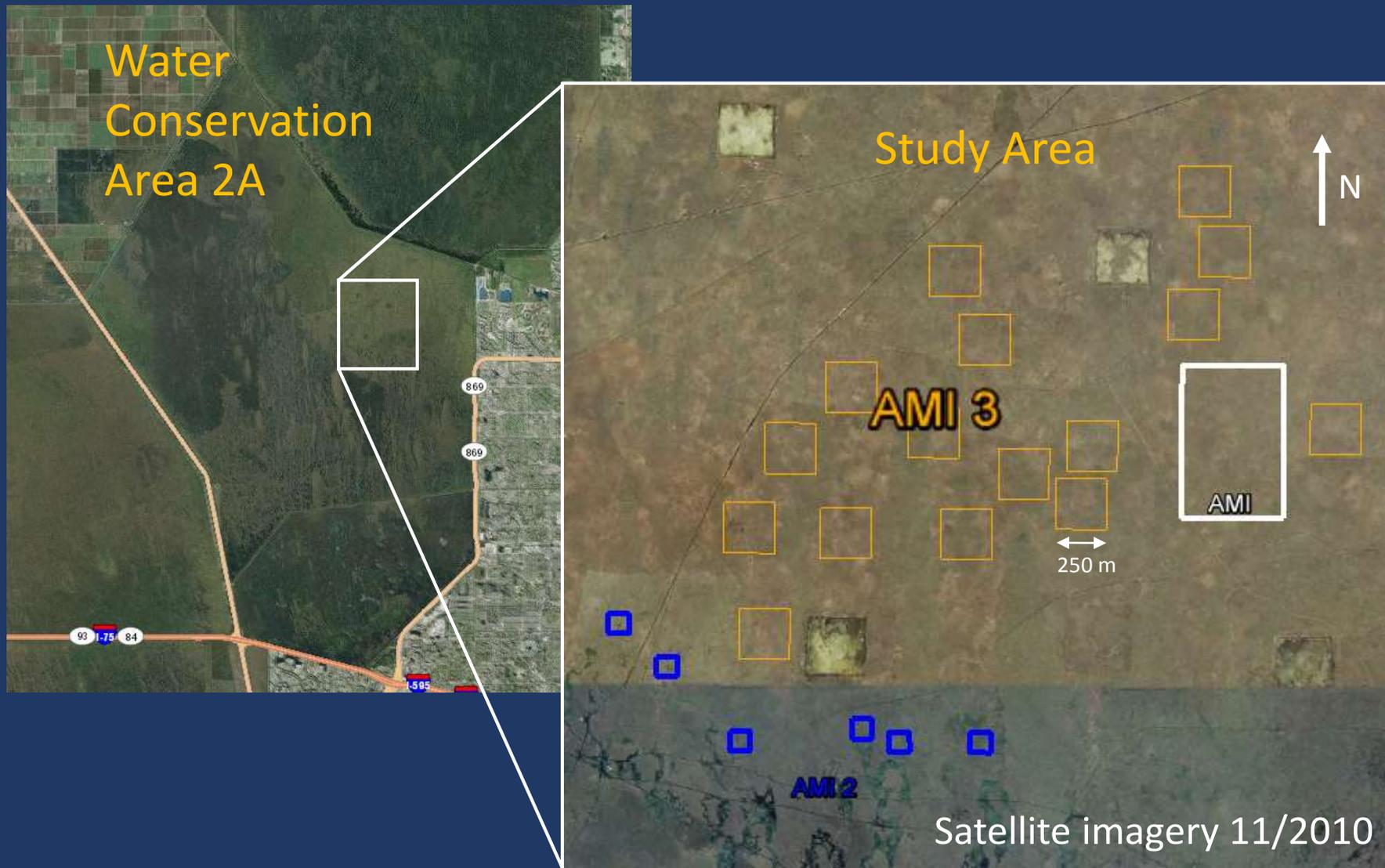
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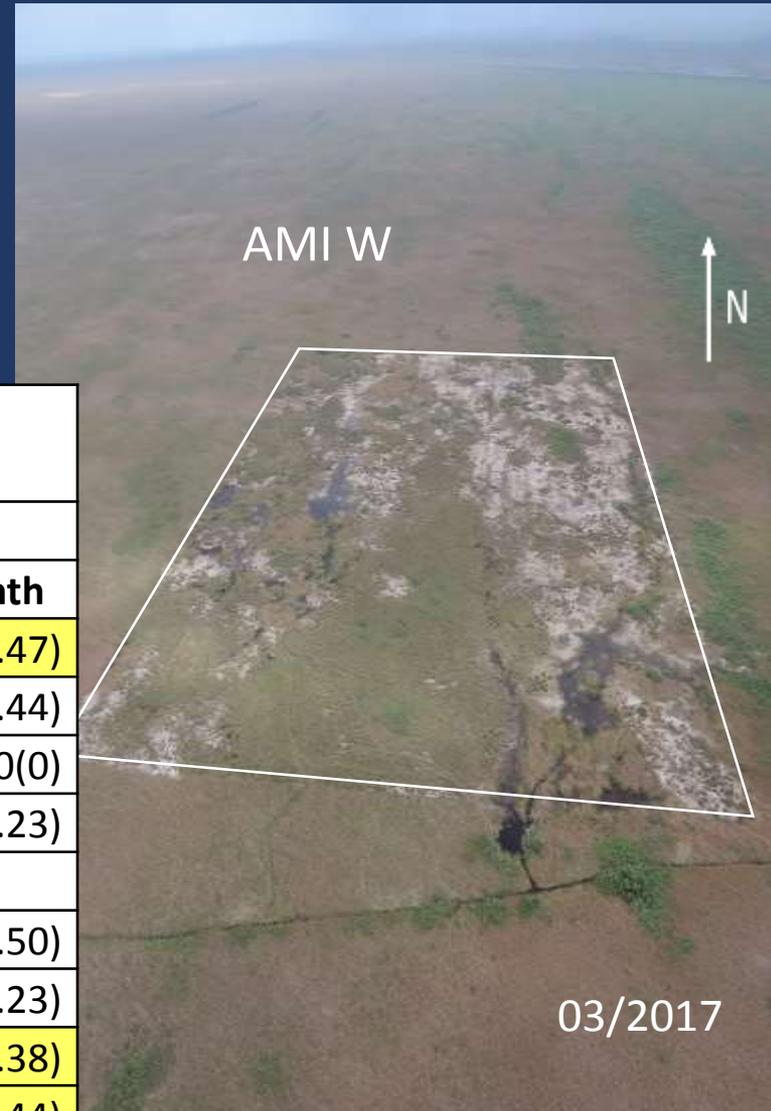
³Greenman-Pedersen Inc.

Active Marsh Improvement 3



Landscape Pattern Restoration (AMI 1)

- Purpose - control cattail/retain landscape
- Plot - ridge and prairie
- Method - imazamox
 - strategy of spray then burn
 - timing



Desirable vegetation frequency with annual 32 oz./ac. imazamox treatment				
Plot	Species	Sampling events		
		Initial	12 Month	24 Month
E	Sawgrass	0.94(0.23)	0.81(0.40)	0.69(0.47)
	Arrowroot	0.17(0.38)	0.14(0.35)	0.25(0.44)
	Muskgrass	0(0)	0.03(0.17)	0(0)
	Bladderwort	0(0)	0(0)	0.06(0.23)
W	Sawgrass	0.56(0.50)	0.44(0.50)	0.42(0.50)
	Arrowroot	0.03(0.17)	0.06(0.23)	0.06(0.23)
	Muskgrass	0(0)	0.08(0.28)	0.17(0.38)
	Bladderwort	0(0)	0(0)	0.25(0.44)

mean and s.d. are x100% of presence, n = 36.

Slough Restoration (AMI 2)

- Purpose – clear sloughs/control cattail
- Method - imazamox only

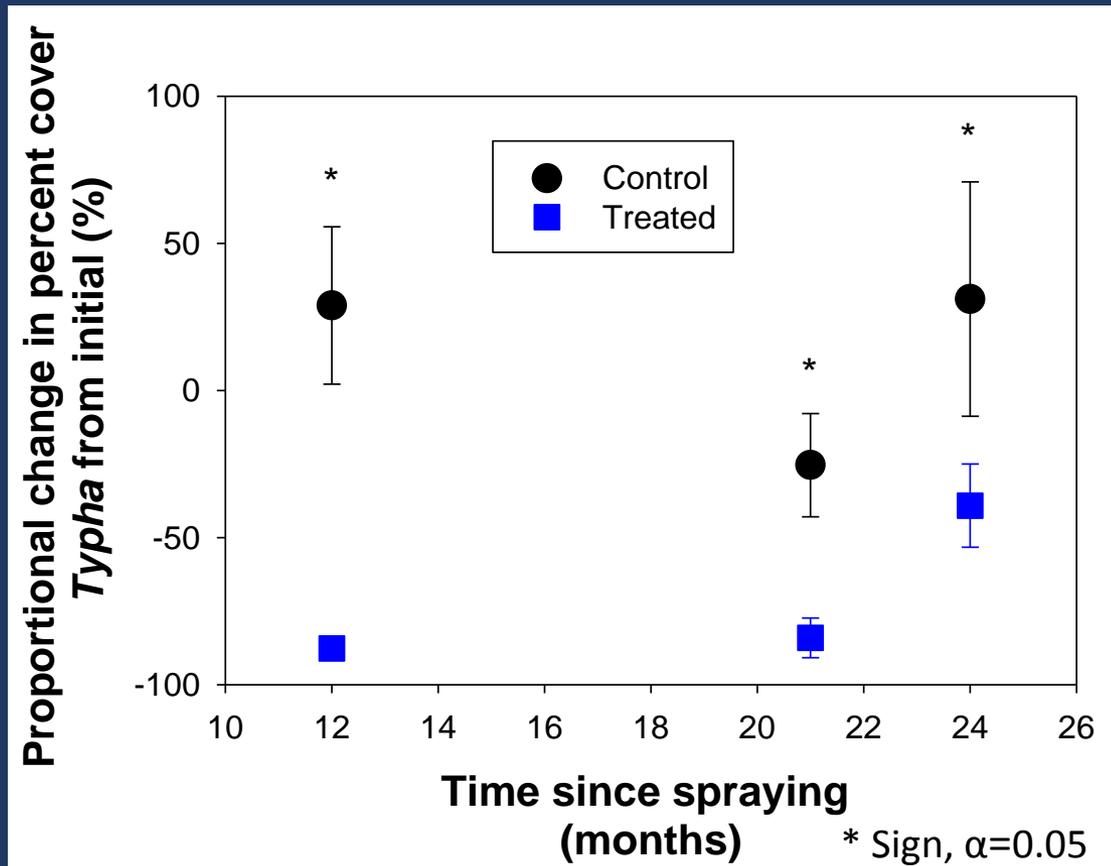
32 oz./ac. application



12 Months after treatment



24 Months after treatment



Active Marsh Improvement 3 (AMI 3) - Hypothesis

- Purpose - get better efficacy in cattail control
- Target and strategy
- Hypothesis - By burning off thatch first, we will provide better herbicide coverage to live cattail and thus obtain better cattail control than a herbicide then burn strategy.

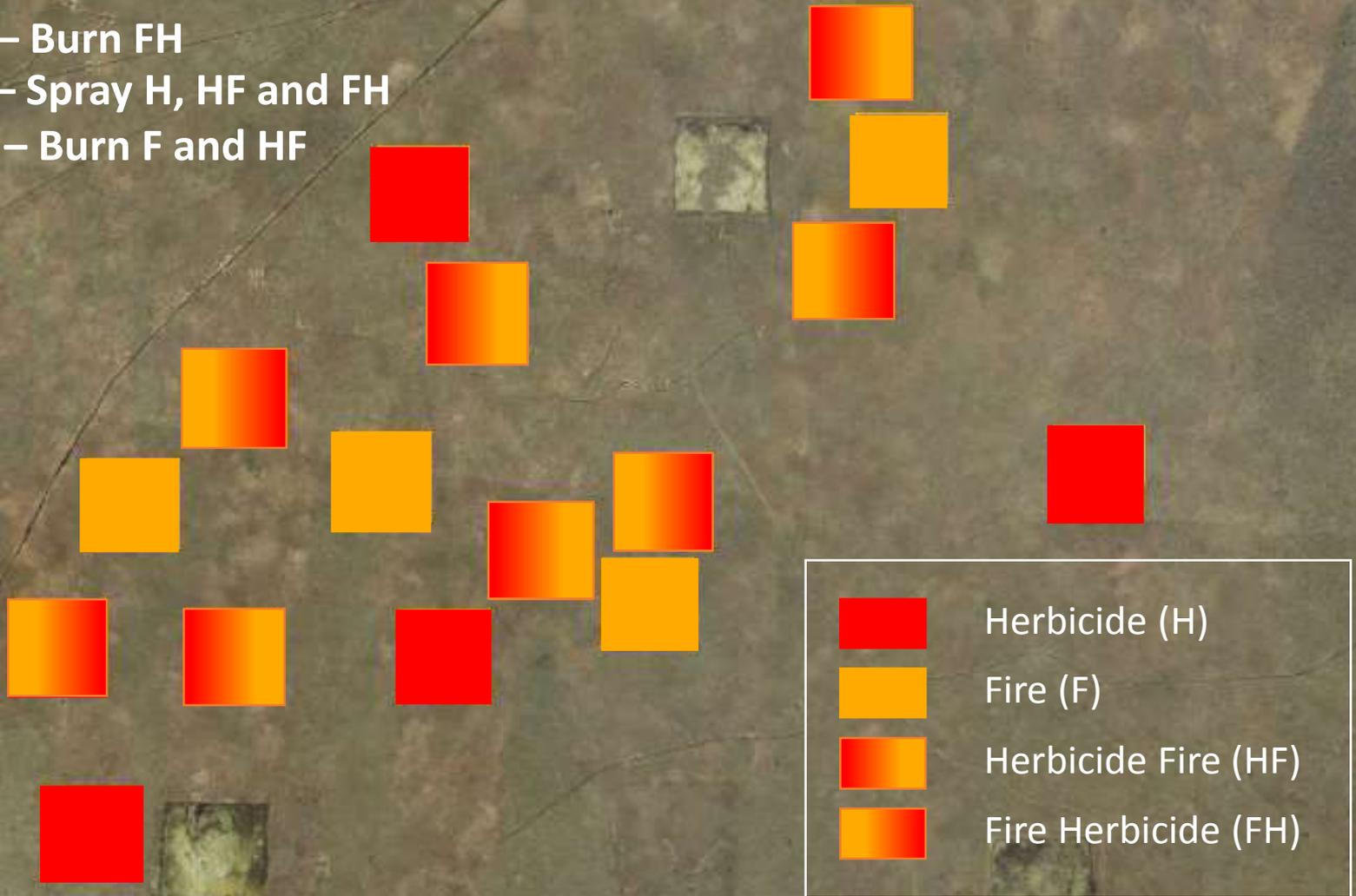


AMI 3 Experimental design

Oct 2015 – Burn FH

Jan 2016 – Spray H, HF and FH

Aug 2016 – Burn F and HF

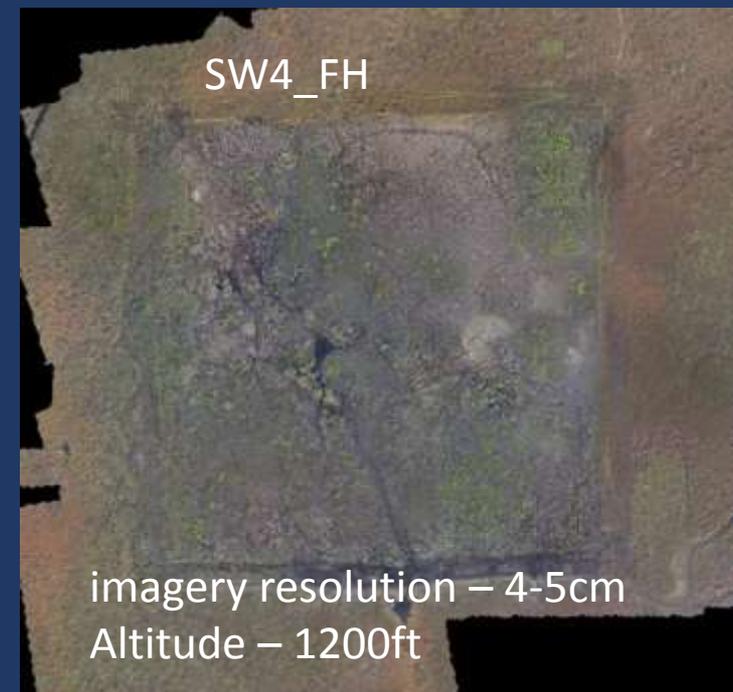
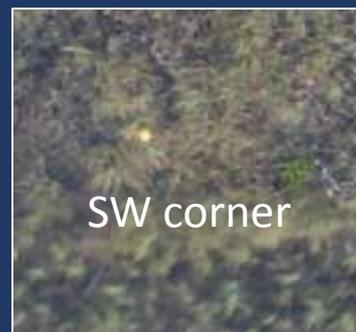


Satellite imagery 11/2010

Methods

Vegetation comparison process

1. Imagery collection
 - High-resolution aerial imagery
 - Box on a helicopter (BOA)
2. Groundtruthing - training points
3. Imagery analysis
 - Computer aided classification
 - Feature Analyst
4. Groundtruthing - verification points
5. Feature Analyst accuracy
6. Imagery comparisons



Results

Vegetation responses – 10 Months

- Thatch – H, F, FH and HF
- Cattail - not monoculture but complex
- Community and dominant
- Desirable species presence
- Imazamox – jump start

Fire Herbicide

11/2016



Herbicide

11/2016



Fire

11/2016



Results

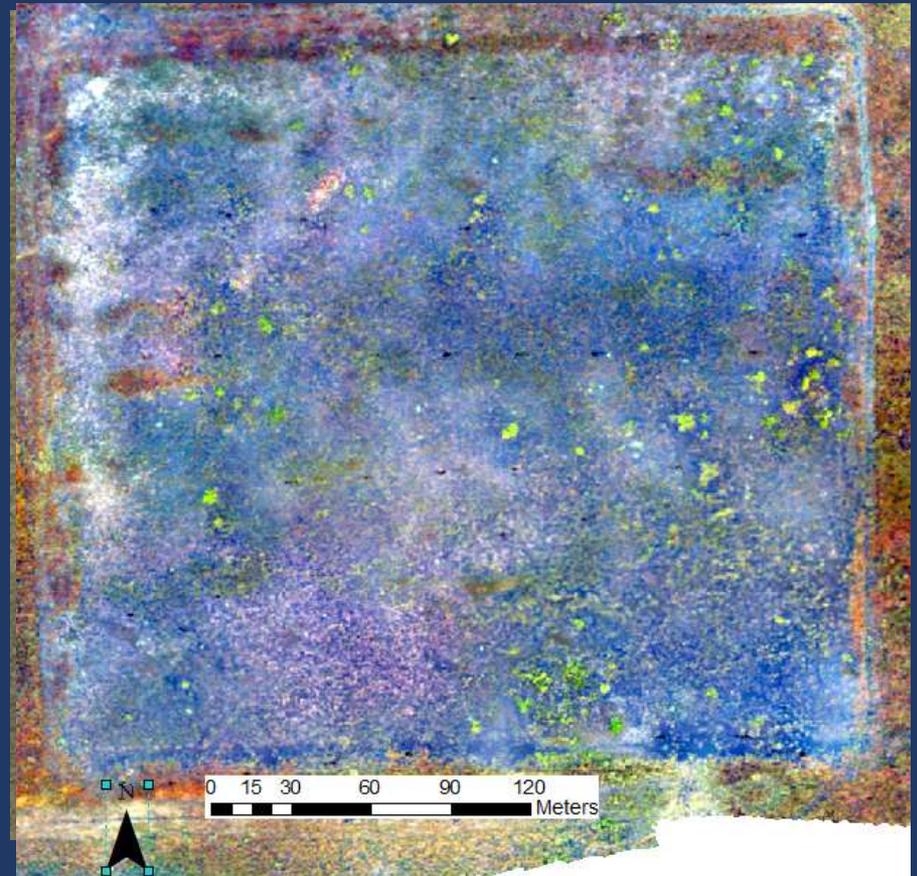
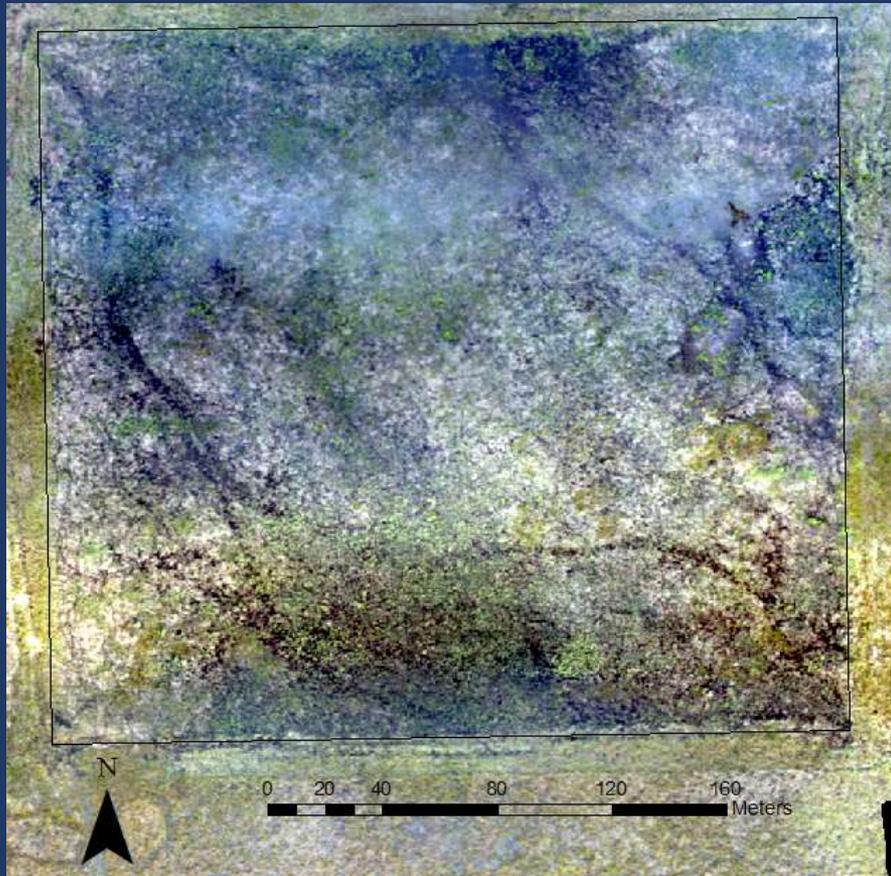
Vegetation responses – groundtruthing

- FH and HF similar
 - largely mixed communities
 - Cattail similar presence and density profile
 - Cattail mainly sparse (1-3 plants/m)
- Submerged aquatic vegetation (SAV) - present at 12% points

Cattail density (% of Total points)						
Treatment	0	1	2	3	.	total points
FH	15%	56%	20%	4%	5%	80
HF	15%	62%	20%	3%	0%	60
				Cattail density		
SAV presence				0 – no cattail		
FH	11.3%			1 – 1 to 3 plants m ⁻²		
				2 – 4 to 8 plants m ⁻²		
HF	13.3%			3 – 8+ plants m ⁻²		

Results

Vegetation responses – Aerial imagery



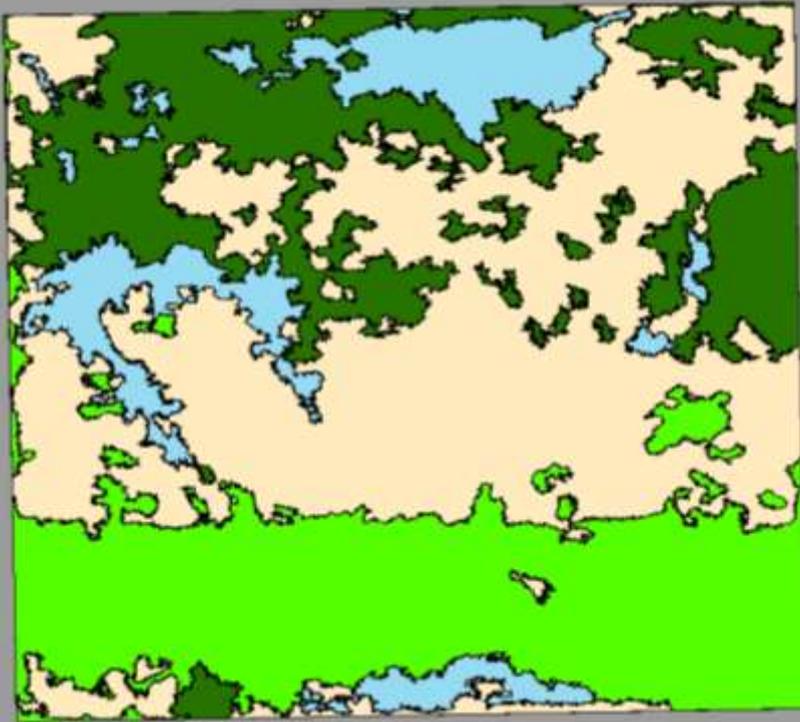
HF

Satellite imagery - 11/2006

FH

Results

Vegetation responses – Feature Analyst classification accuracy



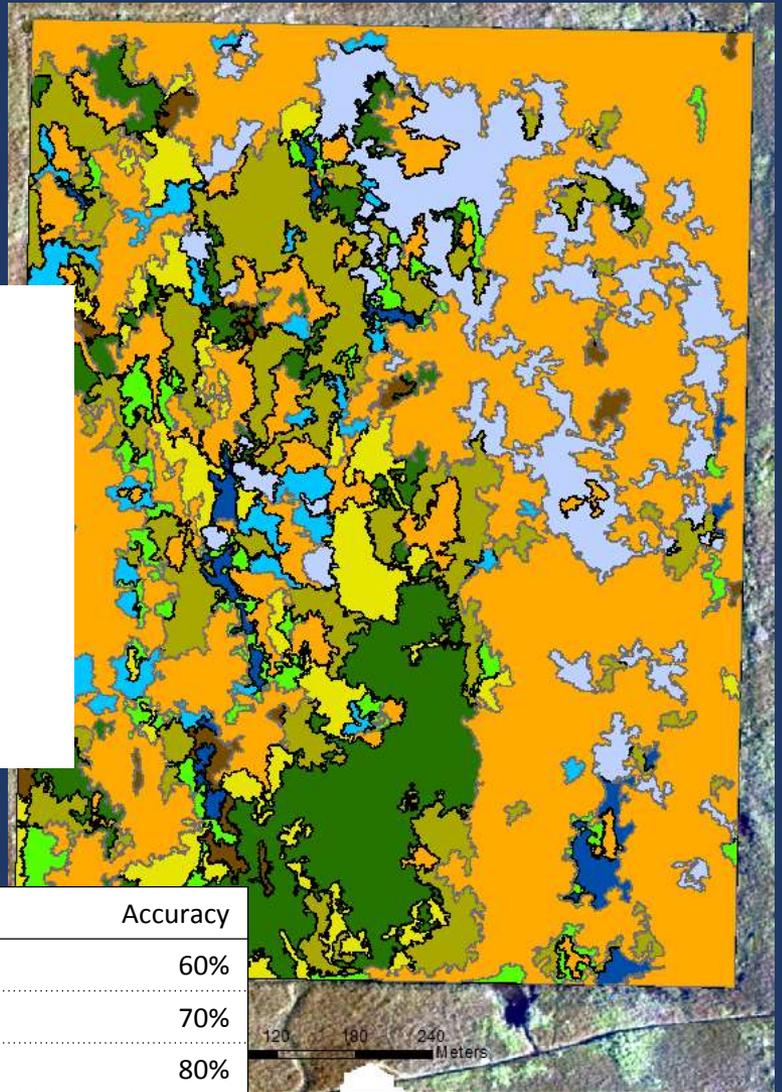
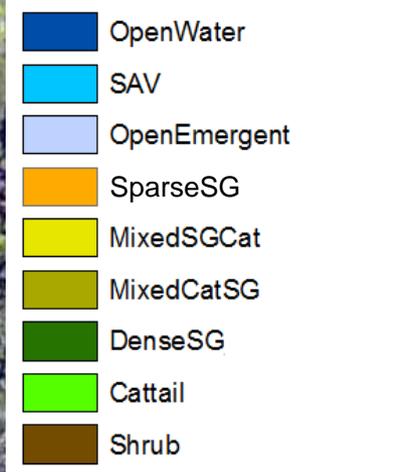
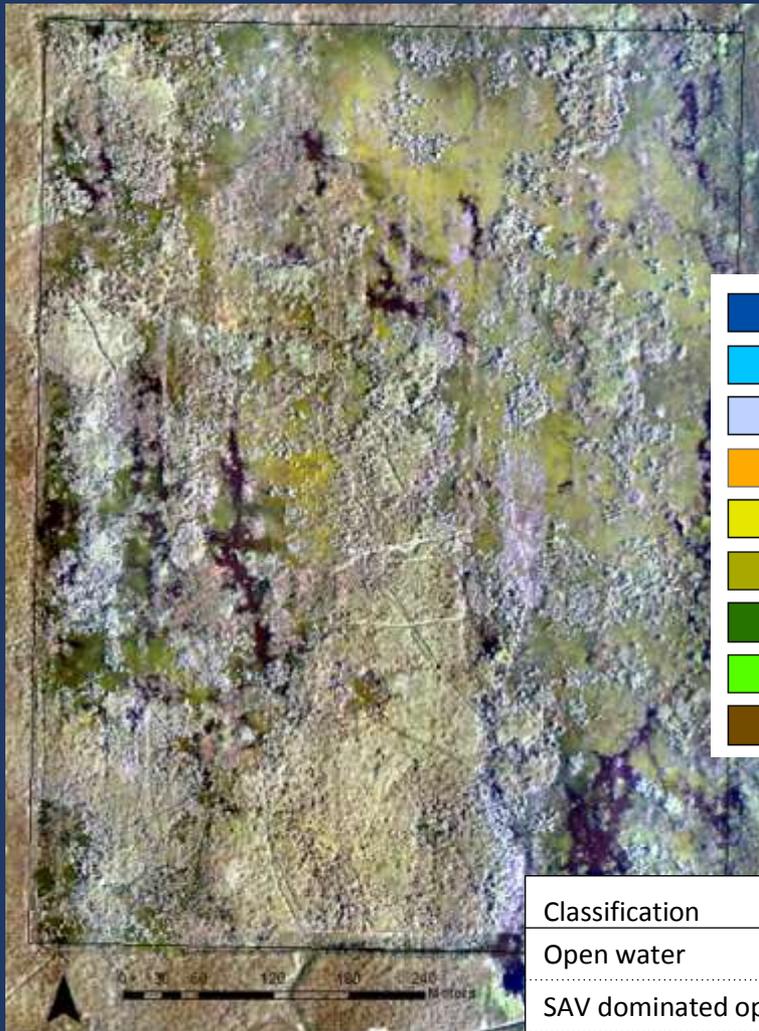
Classification	Accuracy
OpenCattail	0%
Sawgrass	43%
Cattail	25%
Dead UnkMix	24%



Classification	Accuracy
Sawgrass	35%
Cattail	36%
SparseDeadCattail	14%
MixedSGCat	13%
Shrub Ridge	50%

HF

FH



Classification	Accuracy
Open water	60%
SAV dominated open	70%
SG dominated	80%
Cattail dominated	60%
Shrub	20%

Aerial imagery - 11/2016

Conclusions

- Original hypothesis: Burning then spraying strategy will provide better herbicide coverage and thus obtain better cattail control than a herbicide then burn strategy. - too soon.

Lessons

- Working with High resolution imagery
 - Open water SAV/ thatch – similar signatures
 - Cattail monocultures – complex patchwork with desirable species
 - Imagery - involved in complex landscapes
 - Species – important to visualize from ground/air
 - Community maturity – leaf canopy important

Future

- Cattail control
- Long-term imagery – vegetation canopy
- Groundtruthing, Groundtruthing, Groundtruthing, oh my!

Easter egg - AMI 3 - Wildlife response

Acknowledgements

This take away - Fire alone does not provide a

My colleagues for all their help and insight. FWC for prescription burning a **significant resource for wildlife.**

