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Evaluation of WorldView-2 and Landsat Data to Differentiate and Map Freshwater Marsh Plant Communities at Different Spatial Scales for Two Everglades Landscapes

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Introduction

Goal: monitor wetland plant communities

- over large spatial extents
- at multiple spatial resolutions
- reliable, repeatable and inexpensive

Value of vegetation map to monitoring

- not only determined by accuracy
- but also by spatial precision
    - i.e., spatial resolution -> minimum mapping unit (MMU)
    - i.e., spatial variability of vegetation -> Classification Scheme

Method of choice: Remote Sensing → **"Detection" and "Scaling"**

Objective : Detection

Determine overall and class-specific detection accuracies

2 different spatial resolutions (spatial precision)

(1) WorldView2 → high spatial resolution

(2) Landsat → medium spatial resolution

2 levels of classification scheme precision

(1) plant community level

(2) structural level

Objective : Scaling

Determine how spatial aggregation algorithms compare to maps classified at same resolution

(1) morphological aggregation algorithm
(2) grid-based (arbitrary origin) majority rule

aggregated vs. classified resolution:
(1) 30x30 m Landsat

Methods : Detection

prediction level	model name	variable set	classifier
community class (comClass)	wetSeason	8 refl. bands of 11/2010	randomForest (rndFor)
	drySeason	8 refl. bands of 5/2011	
	biSeason	16 refl. bands of 2010/2011	
community structure (comStruc)	wetTexture	8 refl. bands and 16 text. layers of 11/2010	Ctree (cTree)
	dryTexture	8 refl. bands and 16 text. layers of 5/2011	
	biTexture	16 refl. bands and 32 text. Layers of 2010/2011	

1) variable set: spectral reflectance, first-order textural derivatives (variance) and for single- and dual-date imagery
2) classifier: single tree (cTree) vs. randomForest recursive partitioning
3) prediction level

evaluation metrics: overall and class-specific accuracies and Kappa

1) model-based cross-validated results
2) design-based post-classification stratified random samples

Methods : Scaling

1) hierarchical thematic aggregation

   e.g., Short Graminoid (GS) *Rhynchospora* and Short Graminoid *Eleocharis* aggregated to GS

2) grid-based spatial aggregation

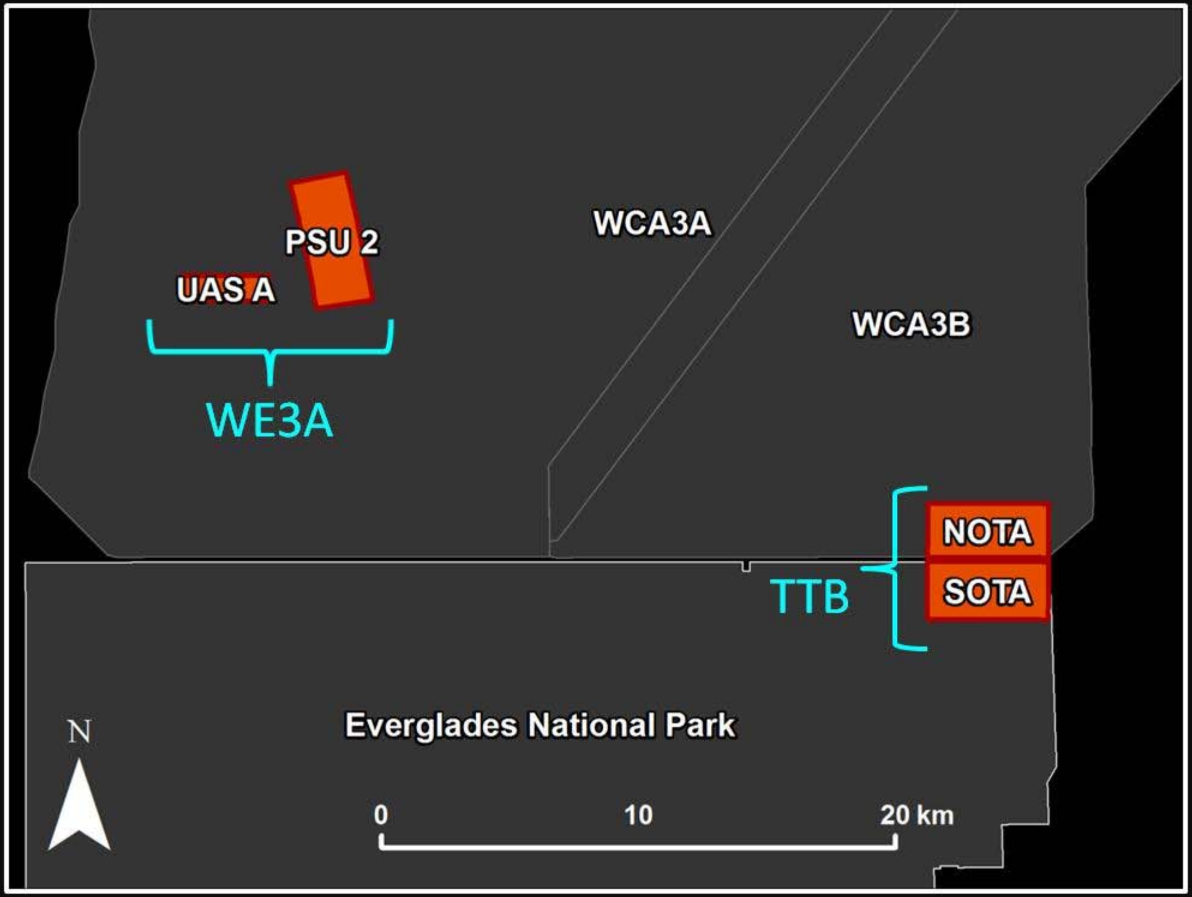
   e.g., an area of 25 2x2 m grid cells are aggregated to one grid cell of 10x10 m

3) morphological spatial aggregation algorithm

   e.g., contiguous grid cells with the same class membership with area less than the minimum mapping unit are absorbed by the surrounding polygon

evaluation metrics: areal coverage change of plant community abundances and changes in class diversity

Methods : Study Areas



2 landscape formations

1) Wet Prairie, Shrubland

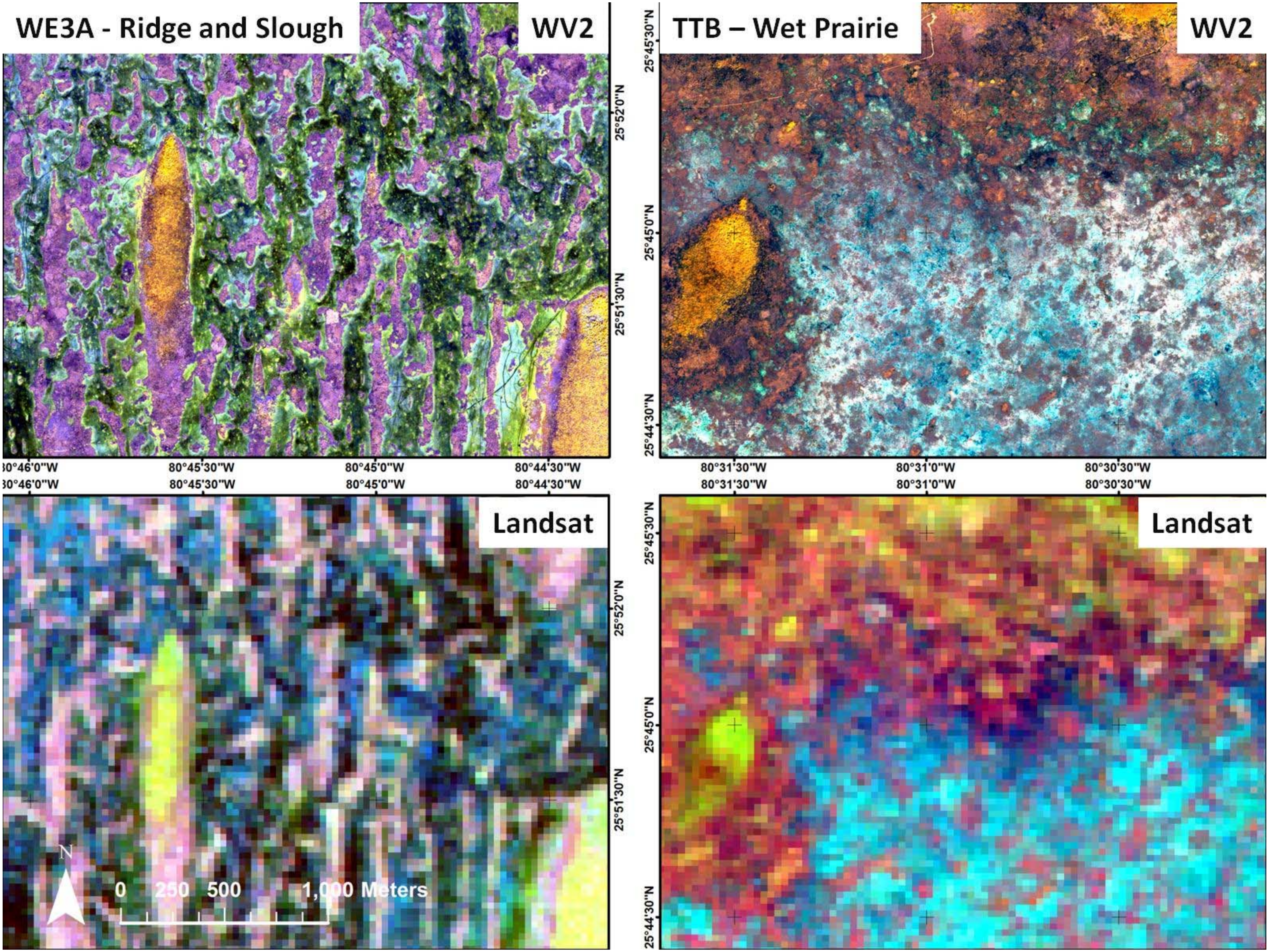
Tamiami Trail Bridge (TTB)

NOTA & SOTA

2) Ridge, Slough, Tree Island

WEstern 3A (WE3A)

PSU 2 & UAS A



WE3A - Ridge and Slough
WV2
TTB – Wet Prairie
WV2
Landsat
Landsat
25°52'0"N
25°51'30"N
25°45'30"N
25°45'0"N
25°44'30"N
80°46'0"W
80°45'30"W
80°45'0"W
80°44'30"W
80°31'30"W
80°31'0"W
80°30'30"W
N
0 250 500 1,000 Meters

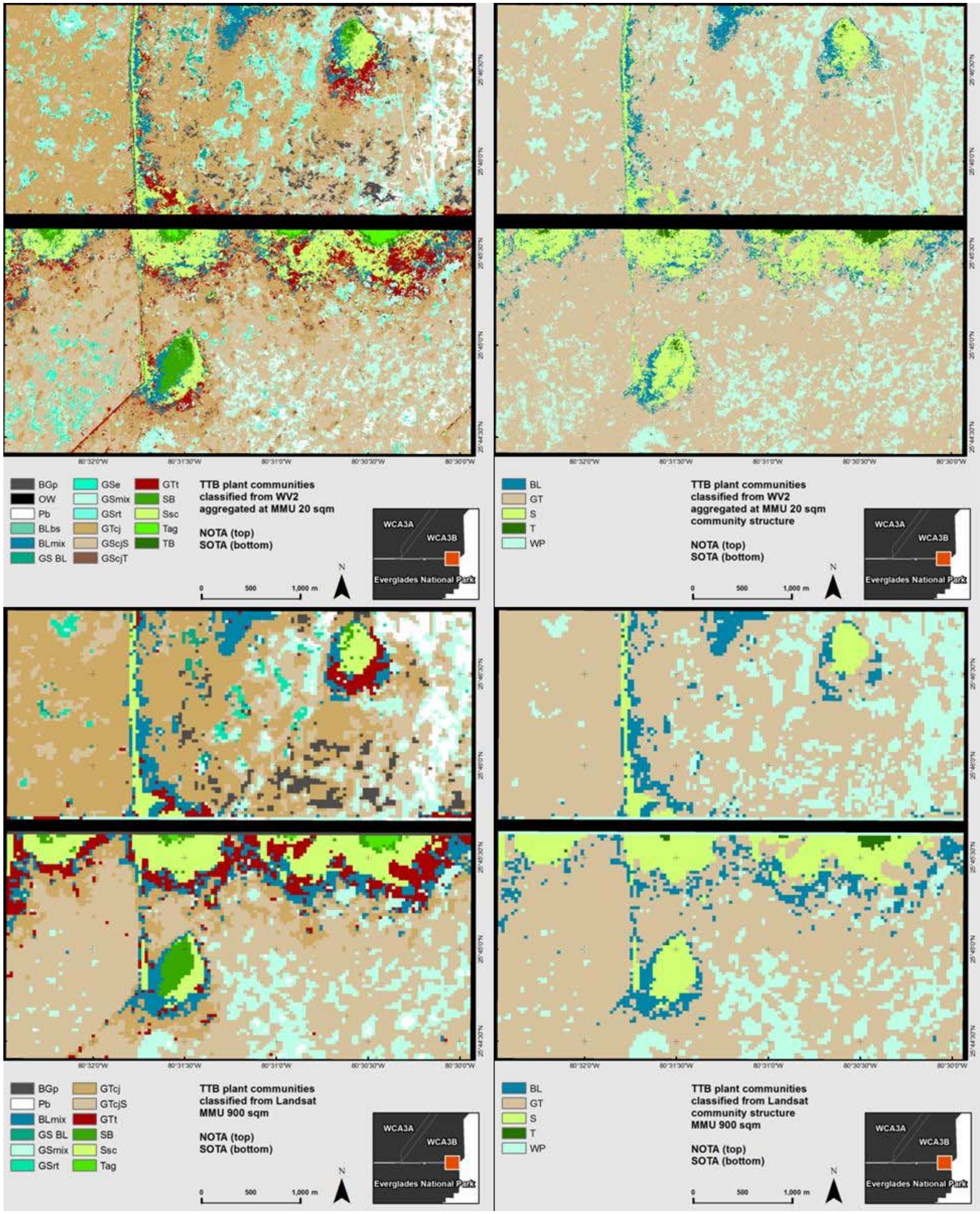
Methods : Classification Scheme

community structure	community class	community class description	TTB	WE3A
SL	Flno	*Nymphaea odorata*	0	1
SL	FLu	*Utricularia ssp.*	0	1
SL	_Pf	floating periphyton mat	0	1
SL	_OW	open water in Slough matrix	0	1
BL	BLmix	Broadleaf mix (i.e., *Sagittaria, Pontederia, Crinum, Peltandra*)	1	1
BL	BLpv	*Peltandra virginica*	1	1
BL	BLbs	*Blechnum serrulatum*	1	1
WP	GS_BL	short graminoid broadleaf mix	1	0
WP	GSmix	short graminoid mix (i.e., *Eleocharis, Panicum, Rynchospora*)	1	0
WP	Gse	*Eleocharis ssp.*	1	0
WP	GSrt	*Rhynchospora tracyi*	1	0
WP	_Pb	benthic periphyton mat	1	0
WP	_BGp	bare ground peat (w/wo water)	1	0
GT	GTcj	*Cladium jamaicense*	1	1
GT	GTcjS	*Cladium jamaicense* Short	1	0
GT	GTcjT	*Cladium jamaicense* Tall	1	1
GT	GTt	*Typha ssp.*	1	1
S	Ssc	*Salix caroliniana*	1	1
S	SB	Bayhead (i.e., *Annona, Myrica, Persea, Magnolia*)	1	1
T	TB	Bayhead (i.e., *Annona, Myrica, Persea, Magnolia*)	1	1
T	Tag	*Annona glabra*	1	0
		total number of classes	17	13

2 landscape formations

Wet Prairie, Shrubland
TTB (NOTA; SOTA)

Ridge, Slough, Tree Island
WE3A (PSU 2; UAS A)



Results : Detection

TTB

top: WV2

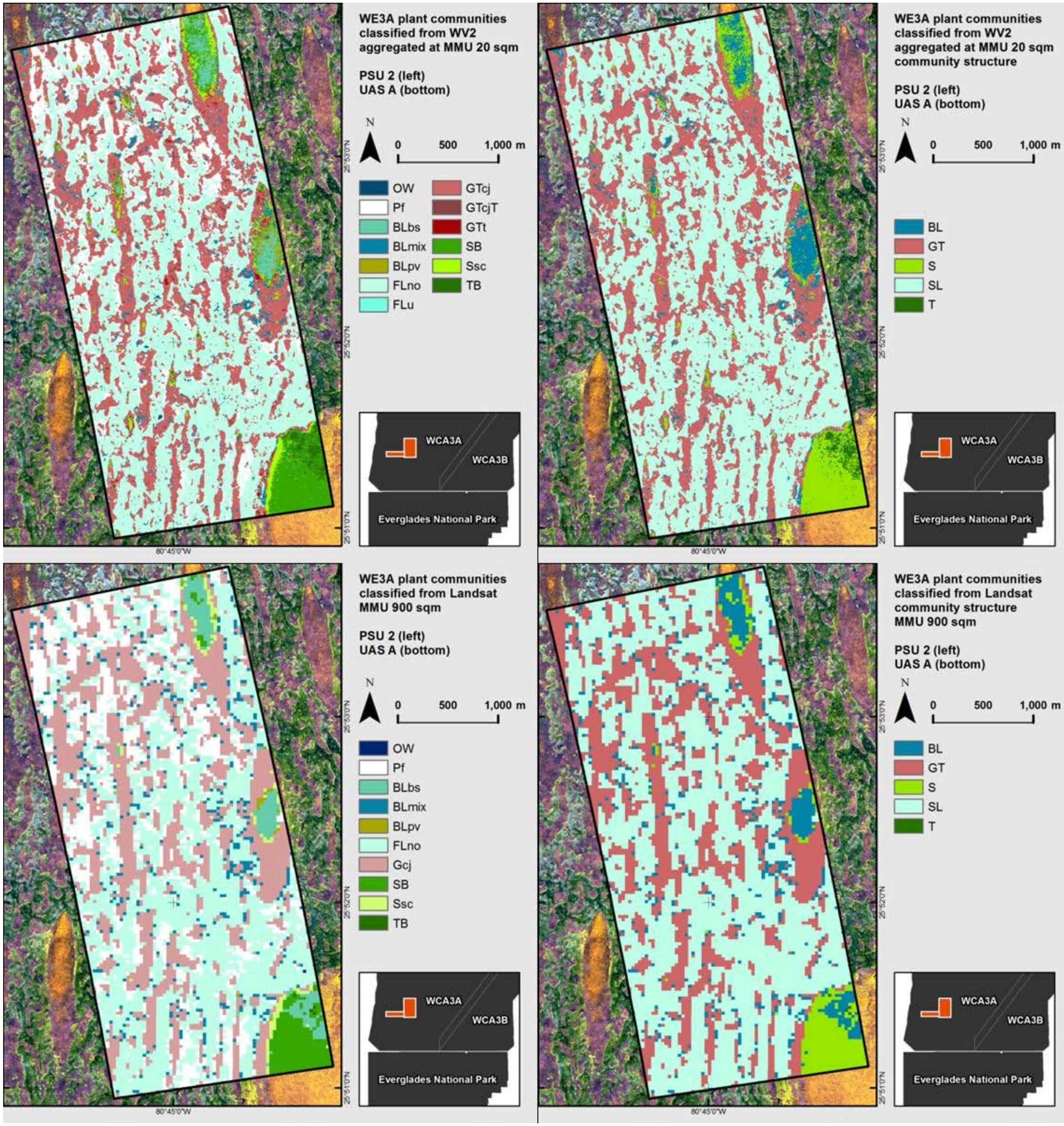
left: Community level

right: Structural level

bottom: Landsat

left: Community level

right: Structural level



Results : Detection

WE3A

top: WV2

left: Community level

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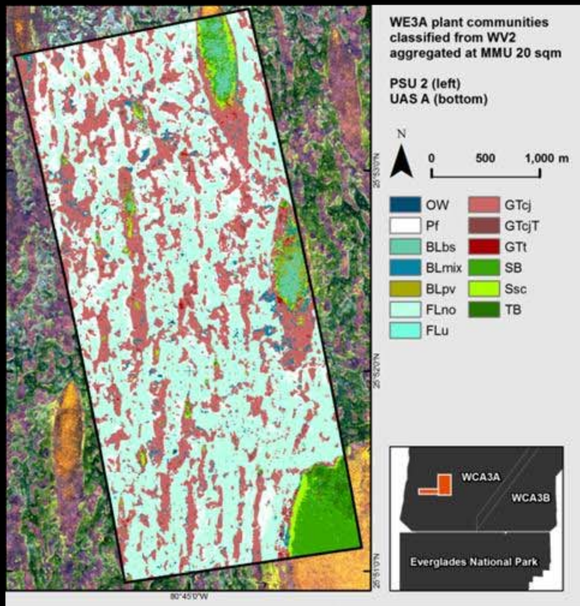
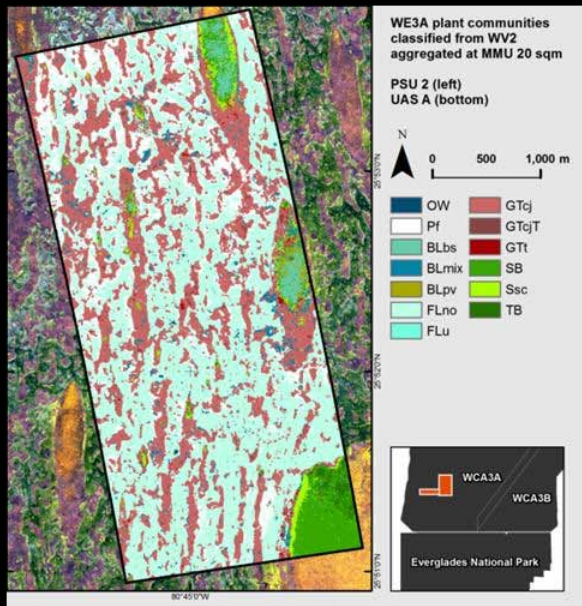
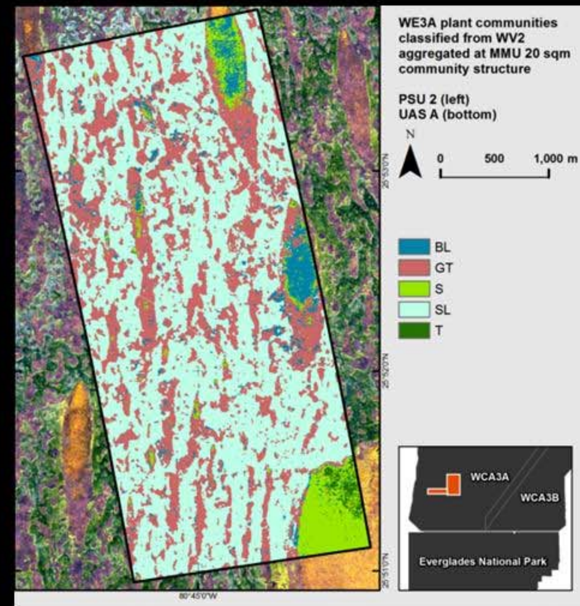


evaluation: overall and class-specific accuracies and Kappa statistic estimates

	_OW	_Pf	BLbs	BLmix	BLpv	FLno	FLu	GTcj	GTcjT	GTt	SB	Ssc	TB		r.T	c.E	c.E (%)
_OW	95	0	0	0	0	6	0	0	0	0	0	0	0		101	0.06	5.94
_Pf	0	578	0	3	0	44	12	0	0	1	0	0	0		638	0.09	9.40
BLbs	0	0	44	4	0	0	0	0	0	0	6	0	2		56	0.21	21.43
BLmix	1	0	0	197	7	4	0	7	0	0	0	0	2		218	0.10	9.63
BLpv	0	0	1	3	51	1	0	1	0	0	0	2	0		59	0.14	13.56
FLno	4	50	0	21	9	1060	0	6	1	0	0	0	0		1151	0.08	7.91
FLu	0	2	0	0	0	0	68	0	0	0	0	0	0		70	0.03	2.86
GTcj	0	0	0	9	7	5	0	520	24	11	0	3	0		579	0.10	10.19
GTcjT	0	0	0	0	1	0	0	7	70	2	0	0	0		80	0.13	12.50
GTt	0	0	0	0	0	0	0	8	0	82	0	1	0		91	0.10	9.89
SB	0	0	3	0	0	0	0	0	5	0	67	2	3		80	0.16	16.25
Ssc	0	0	1	3	0	0	0	1	0	4	0	92	0		101	0.09	8.91
TB	0	0	1	0	0	0	0	0	0	0	2	0	93		96	0.03	3.13
														3017	3320		
c.T	100	630	50	240	75	1120	80	550	100	100	75	100	100	3320			
o.E	0.05	0.08	0.12	0.18	0.32	0.05	0.15	0.05	0.30	0.18	0.11	0.08	0.07				
o.E(%)	5.00	8.25	12.00	17.92	32.00	5.36	15.00	5.45	30.00	18.00	10.67	8.00	7.00				
acc(%)	95.00	91.75	88.00	82.08	68.00	94.64	85.00	94.55	70.00	82.00	89.33	92.00	93.00				
oa(%)	90.87																
$\hat{K}$	88.69																

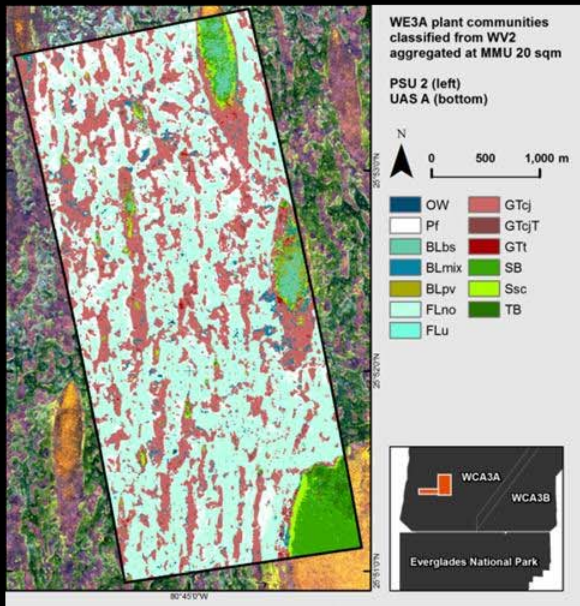


evaluation: overall and class-specific accuracies and Kappa statistic estimates

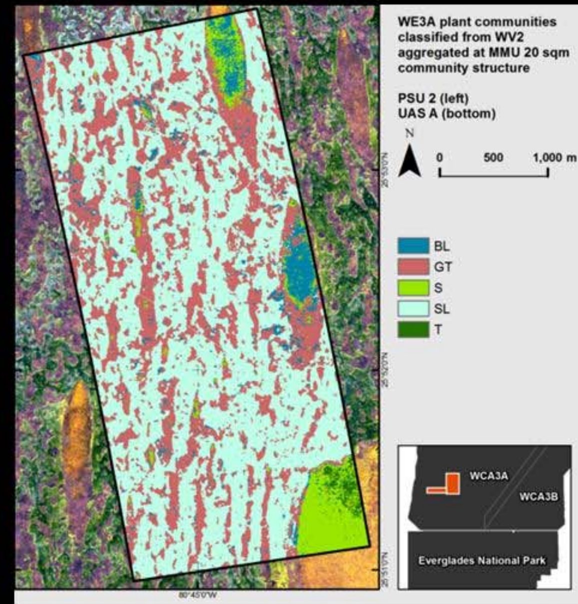


	_OW	_Pf	BLbs	BLmix	BLpv	FLno	FLu	GTcj	GTcjT	GTt	SB	Ssc	TB		r.T	c.E	c.E (%)
_OW	95	0	0	0	0	6	0	0	0	0	0	0	0		101	0.06	5.94
_Pf	0	578	0	3	0	44	12	0	0	1	0	0	0		638	0.09	9.40
BLbs	0	0	44	4	0	0	0	0	0	0	6	0	2		56	0.21	21.43
BLmix	1	0	0	197	7	4	0	7	0	0	0	0	2		218	0.10	9.63
BLpv	0	0	1	3	51	1	0	1	0	0	0	2	0		59	0.14	13.56
FLno	4	50	0	21	9	1060	0	6	1	0	0	0	0		1151	0.08	7.91
FLu	0	2	0	0	0	0	68	0	0	0	0	0	0		70	0.03	2.86
GTcj	0	0	0	9	7	5	0	520	24	11	0	3	0		579	0.10	10.19
GTcjT	0	0	0	0	1	0	0	7	70	2	0	0	0		80	0.13	12.50
GTt	0	0	0	0	0	0	0	8	0	82	0	1	0		91	0.10	9.89
SB	0	0	3	0	0	0	0	0	5	0	67	2	3		80	0.16	16.25
Ssc	0	0	1	3	0	0	0	1	0	4	0	92	0		101	0.09	8.91
TB	0	0	1	0	0	0	0	0	0	0	2	0	93		96	0.03	3.13
														3017	3320		
c.T	100	630	50	240	75	1120	80	550	100	100	75	100	100	3320			
o.E	0.05	0.08	0.12	0.18	0.32	0.05	0.15	0.05	0.30	0.18	0.11	0.08	0.07				
o.E(%)	5.00	8.25	12.00	17.92	32.00	5.36	15.00	5.45	30.00	18.00	10.67	8.00	7.00				
acc(%)	95.00	91.75	88.00	82.08	68.00	94.64	85.00	94.55	70.00	82.00	89.33	92.00	93.00				
oa(%)	90.87																
K̂	88.69																

	SL	BL	GT	S	T		r.t	c.E	c.E (%)
SL	1922	36	16	0	0		1974	0.03	2.63
BL	4	300	8	9	4		325	0.08	7.69
GT	4	22	714	3	0		743	0.04	3.90
S	0	6	12	160	3		181	0.12	11.60
T	0	1	0	3	93		97	0.04	4.12
						3189	3320		
c.T	1930	365	750	175	100	3320			
o.E	0.00	0.18	0.05	0.09	0.07				
o.E(%)	0.41	17.81	4.80	8.57	7.00				
acc(%)	99.59	82.19	95.20	91.43	93.00				
oa(%)	96.05								
K̂	93.30								



evaluation: overall and class-specific accuracies and Kappa statistic estimates



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_Pf	0	578	0	3	0	44	12	0	0	1	0	0	0		638	0.09	9.40
BLbs	0	0	44	4	0	0	0	0	0	0	6	0	2		56	0.21	21.43
BLmix	1	0	0	197	7	4	0	7	0	0	0	0	2		218	0.10	9.63
BLpv	0	0	1	3	51	1	0	1	0	0	0	2	0		59	0.14	13.56
FLno	4	50	0	21	9	1060	0	6	1	0	0	0	0		1151	0.08	7.91
FLu	0	2	0	0	0	0	68	0	0	0	0	0	0		70	0.03	2.86
GTcj	0	0	0	9	7	5	0	520	24	11	0	3	0		579	0.10	10.19
GTcjT	0	0	0	0	1	0	0	7	70	2	0	0	0		80	0.13	12.50
GTt	0	0	0	0	0	0	0	8	0	82	0	1	0		91	0.10	9.89
SB	0	0	3	0	0	0	0	0	5	0	67	2	3		80	0.16	16.25
Ssc	0	0	1	3	0	0	0	1	0	4	0	92	0		101	0.09	8.91
TB	0	0	1	0	0	0	0	0	0	0	2	0	93		96	0.03	3.13
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c.T	100	630	50	240	75	1120	80	550	100	100	75	100	100	3320			
o.E	0.05	0.08	0.12	0.18	0.32	0.05	0.15	0.05	0.30	0.18	0.11	0.08	0.07				
o.E(%)	5.00	8.25	12.00	17.92	32.00	5.36	15.00	5.45	30.00	18.00	10.67	8.00	7.00				
acc(%)	95.00	91.75	88.00	82.08	68.00	94.64	85.00	94.55	70.00	82.00	89.33	92.00	93.00				
oa(%)	90.87																
K̂	88.69																

	SL	BL	GT	S	T		r.t	c.E	c.E (%)
SL	1922	36	16	0	0		1974	0.03	2.63
BL	4	300	8	9	4		325	0.08	7.69
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T	0	1	0	3	93		97	0.04	4.12
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c.T	1930	365	750	175	100	3320			
o.E	0.00	0.18	0.05	0.09	0.07				
o.E(%)	0.41	17.81	4.80	8.57	7.00				
acc(%)	99.59	82.19	95.20	91.43	93.00				
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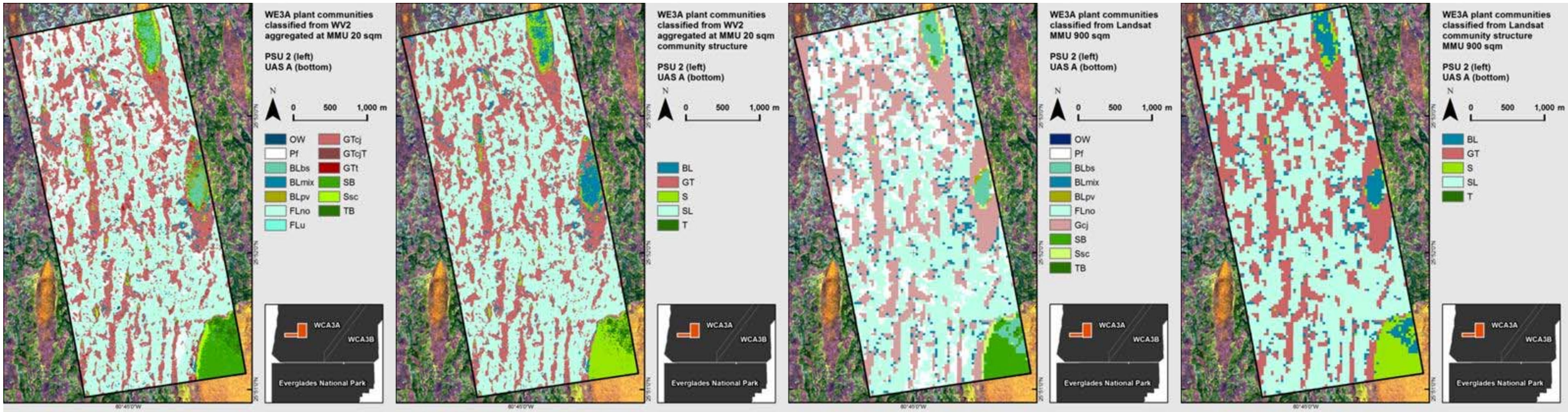
aggregation

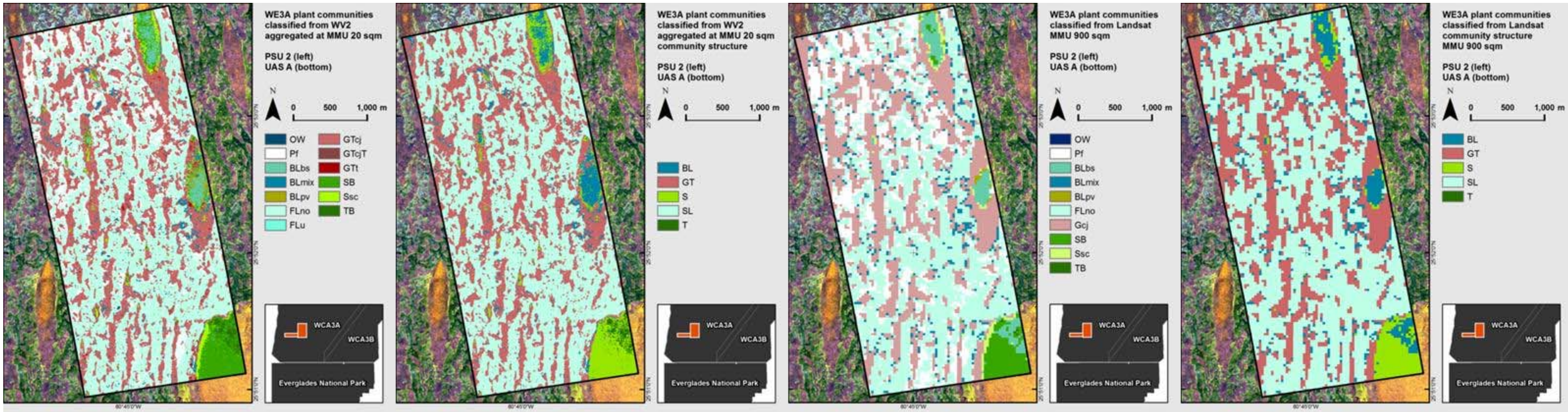
	SL	BL	GT	S	T		r.t	c.E	c.E (%)
SL	1919	33	8	0	0		1960	0.02	2.09
BL	6	307	8	8	4		333	0.08	7.81
GT	5	17	724	4	0		750	0.03	3.47
S	0	7	10	161	3		181	0.11	11.05
T	0	1	0	2	93		96	0.03	3.13
						3204	3320		
c.T	1930	365	750	175	100	3320			
o.E	0.01	0.16	0.03	0.08	0.07				
o.E(%)	0.57	15.89	3.47	8.00	7.00				
acc(%)	99.43	84.11	96.53	92.00	93.00				
oa(%)	96.51								
K̂	94.09								



models				accuracy				model based overall accuracy by variable set					
roi	img	clf	predLevel	oaMod	kaMod	oaDes	kaDes	wet	dry	bi	wetTxt	dryTxt	biTxt
WE3A	wv2	cTree	comClass	87.68	84.76	-	-	81.27	63.64	84.10	84.91	69.55	87.68
WE3A	wv2	cTree	comStruc	94.61	90.81	-	-	90.96	85.24	93.16	91.60	89.34	94.61
WE3A	wv2	rndFor	comClass	90.87	88.69	-	-	81.36	64.67	86.99	86.66	73.10	90.87
WE3A	wv2	rndFor	comStruc	96.05	93.30	88.89	85.56	91.27	86.81	94.04	93.77	90.51	96.05
WE3A	wv2	rndFor	classAggStruc	96.51	94.09	-	-	-	-	-	-	-	-
WE3A	ls	rndFor	comClass	93.07	91.22	73.56	61.06	90.10	79.46	93.07	-	-	-
WE3A	ls	rndFor	classAggStruc	96.29	94.70	85.13	73.48	-	-	-	-	-	-

evaluation: overall and class-specific accuracies and Kappa statistic estimates

1) model-based - cross-validated results (oaMod; kaMod)



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WE3A	wv2	rndFor	classAggStruc	96.51	94.09	-	-	-	-	-	-	-	-
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WE3A	ls	rndFor	classAggStruc	96.29	94.70	85.13	73.48	-	-	-	-	-	-

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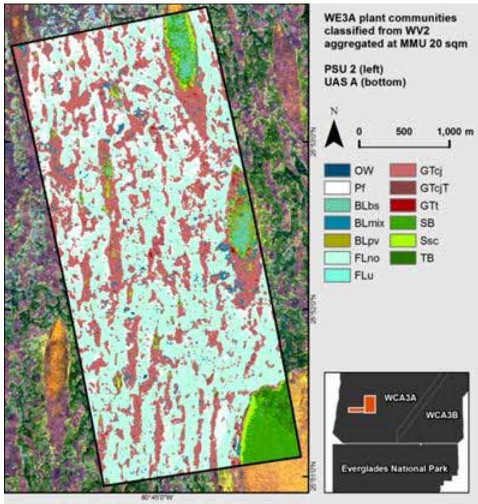

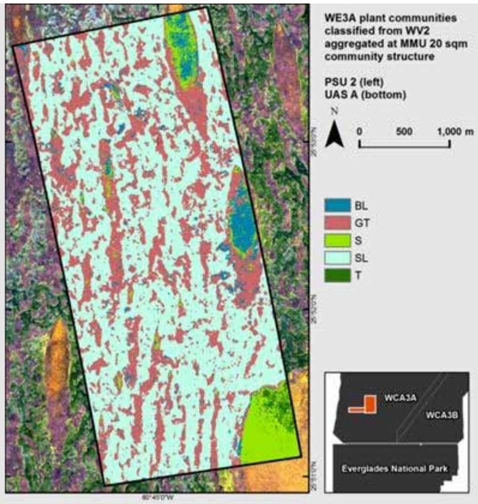

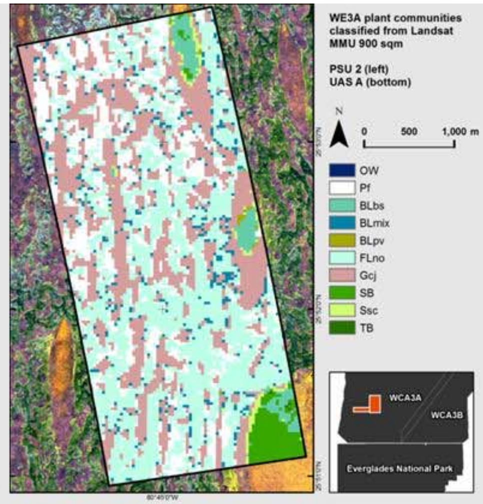

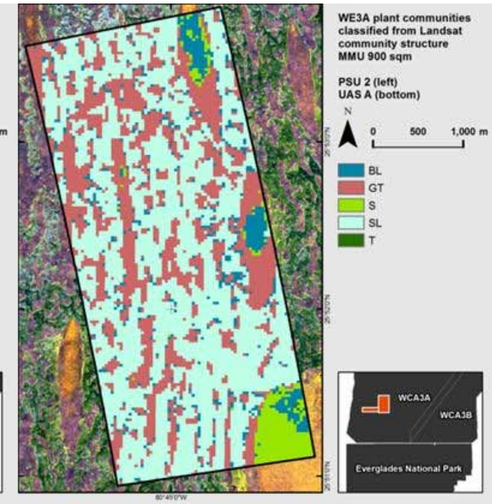

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WE3A	wv2	rndFor	classAggStruc	96.51	94.09	-	-	-	-	-	-	-	-
WE3A	ls	rndFor	comClass	93.07	91.22	73.56	61.06	90.10	79.46	93.07	-	-	-
WE3A	ls	rndFor	classAggStruc	96.29	94.70	85.13	73.48	-	-	-	-	-	-

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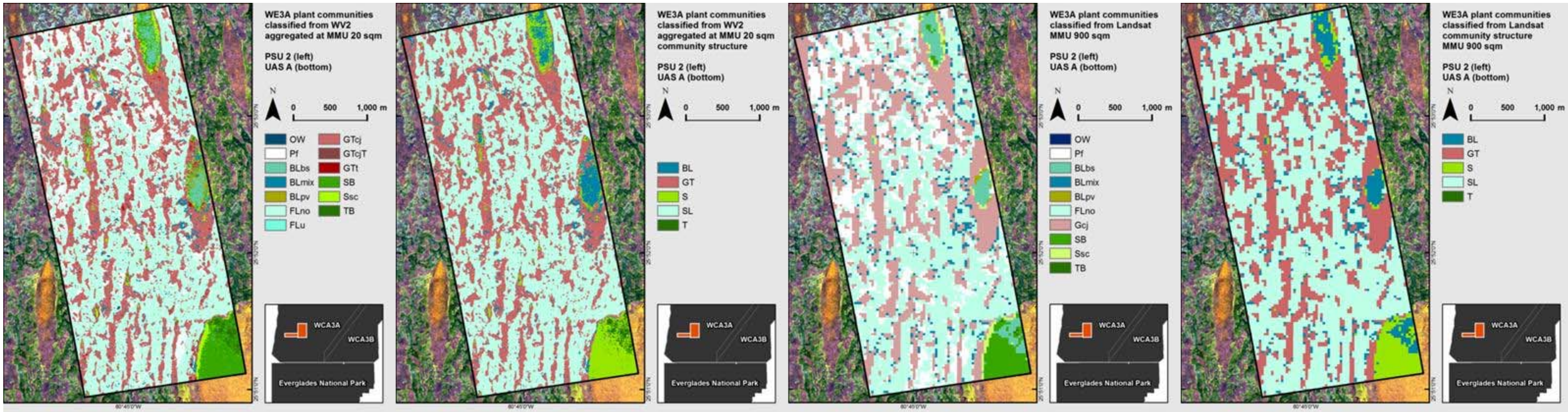
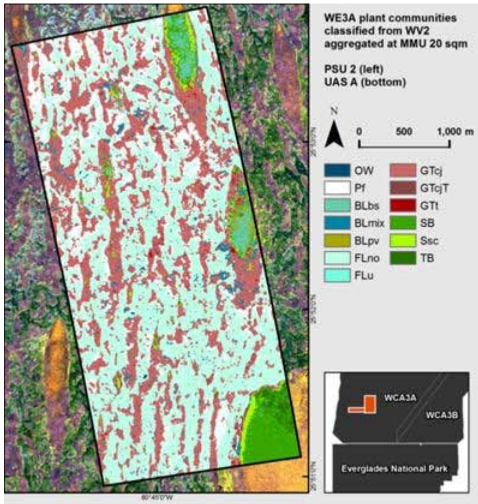
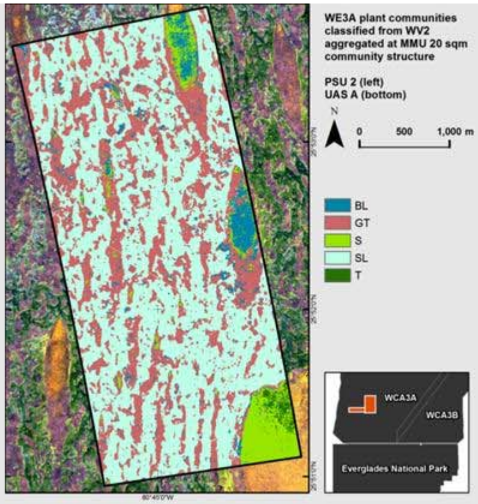


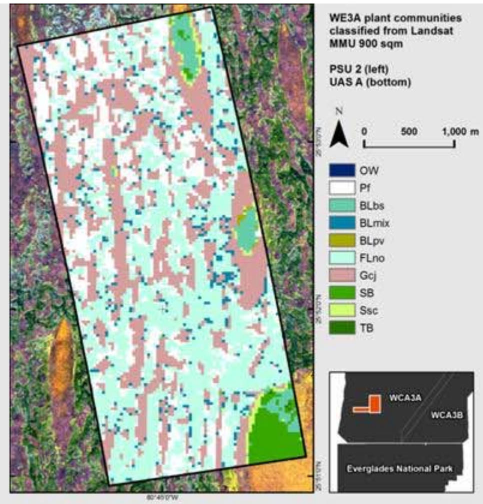
models				accuracy				model based overall accuracy by variable set					
roi	img	clf	predLevel	oaMod	kaMod	oaDes	kaDes	wet	dry	bi	wetTxt	dryTxt	biTxt
WE3A	wv2	cTree	comClass	87.68	84.76	-	-	81.27	63.64	84.10	84.91	69.55	87.68
WE3A	wv2	cTree	comStruc	94.61	90.81	-	-	90.96	85.24	93.16	91.60	89.34	94.61
WE3A	wv2	rndFor	comClass	90.87	88.69	-	-	81.36	64.67	86.99	86.66	73.10	90.87
WE3A	wv2	rndFor	comStruc	96.05	93.30	88.89	85.56	91.27	86.81	94.04	93.77	90.51	96.05
WE3A	wv2	rndFor	classAggStruc	96.51	94.09	-	-	-	-	-	-	-	-
WE3A	ls	rndFor	comClass	93.07	91.22	73.56	61.06	90.10	79.46	93.07	-	-	-
WE3A	ls	rndFor	classAggStruc	96.29	94.70	85.13	73.48	-	-	-	-	-	-

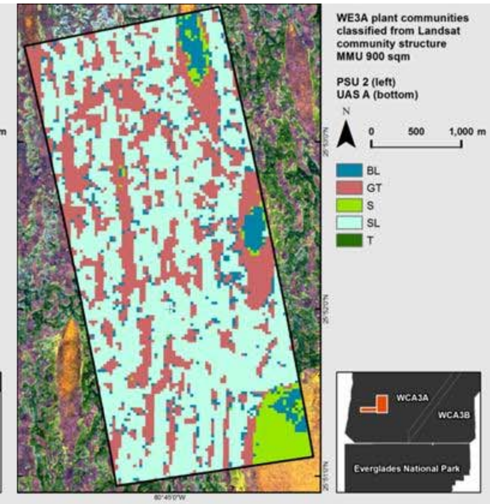
evaluation: overall and class-specific accuracies and Kappa statistic estimates

1) model-based - cross-validated results (oaMod; kaMod)





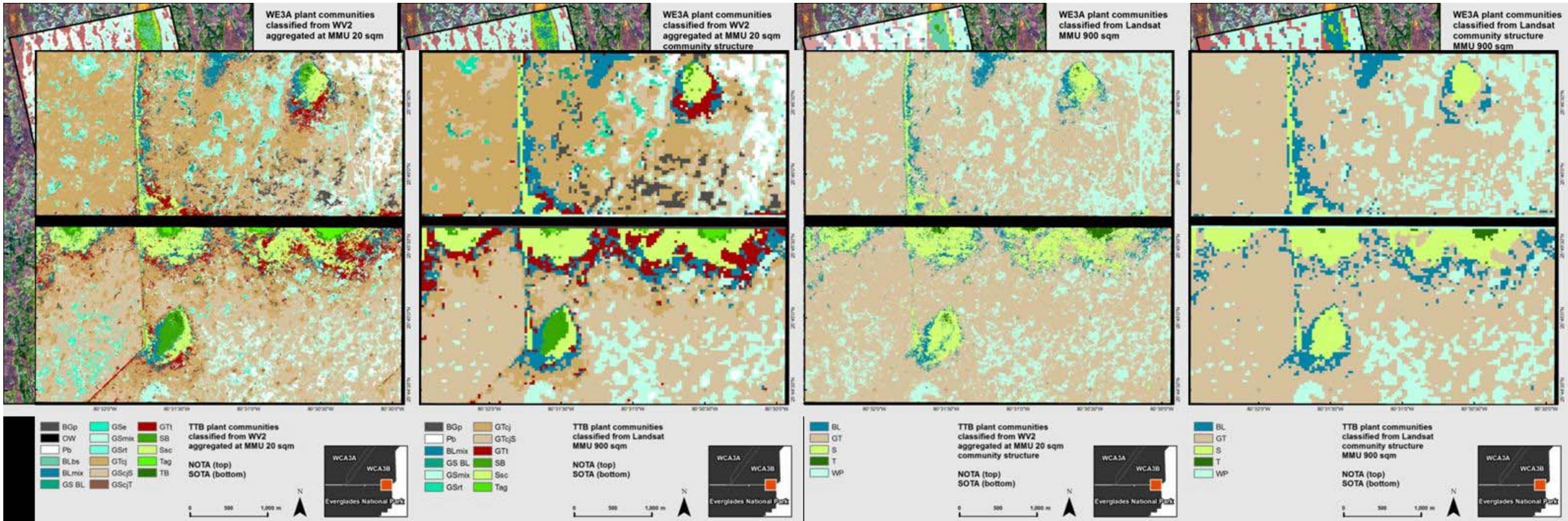




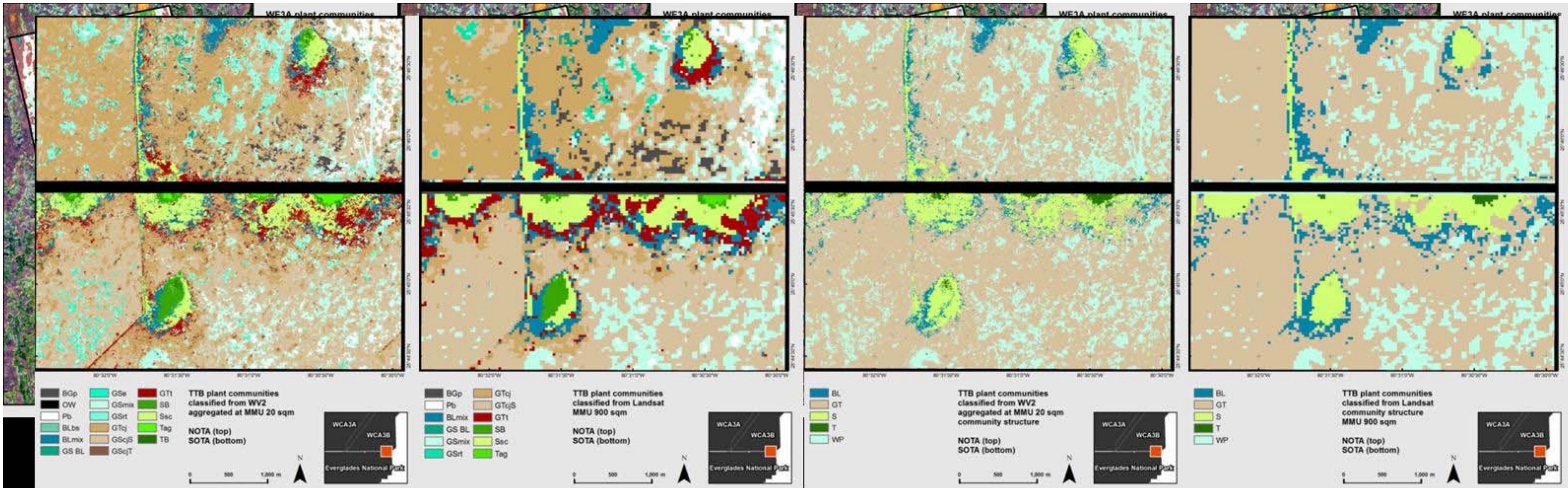
models				accuracy				model based overall accuracy by variable set					
roi	img	clf	predLevel	oaMod	kaMod	oaDes	kaDes	wet	dry	bi	wetTxt	dryTxt	biTxt
WE3A	wv2	cTree	comClass	87.68	84.76	-	-	81.27	63.64	84.10	84.91	69.55	87.68
WE3A	wv2	cTree	comStruc	94.61	90.81	-	-	90.96	85.24	93.16	91.60	89.34	94.61
WE3A	wv2	rndFor	comClass	90.87	88.69	-	-	81.36	64.67	86.99	86.66	73.10	90.87
WE3A	wv2	rndFor	comStruc	96.05	93.30	88.89	85.56	91.27	86.81	94.04	93.77	90.51	96.05
WE3A	wv2	rndFor	classAggStruc	96.51	94.09	-	-	-	-	-	-	-	-
WE3A	ls	rndFor	comClass	93.07	91.22	73.56	61.06	90.10	79.46	93.07	-	-	-
WE3A	ls	rndFor	classAggStruc	96.29	94.70	85.13	73.48	-	-	-	-	-	-

evaluation: overall and class-specific accuracies and Kappa statistic estimates

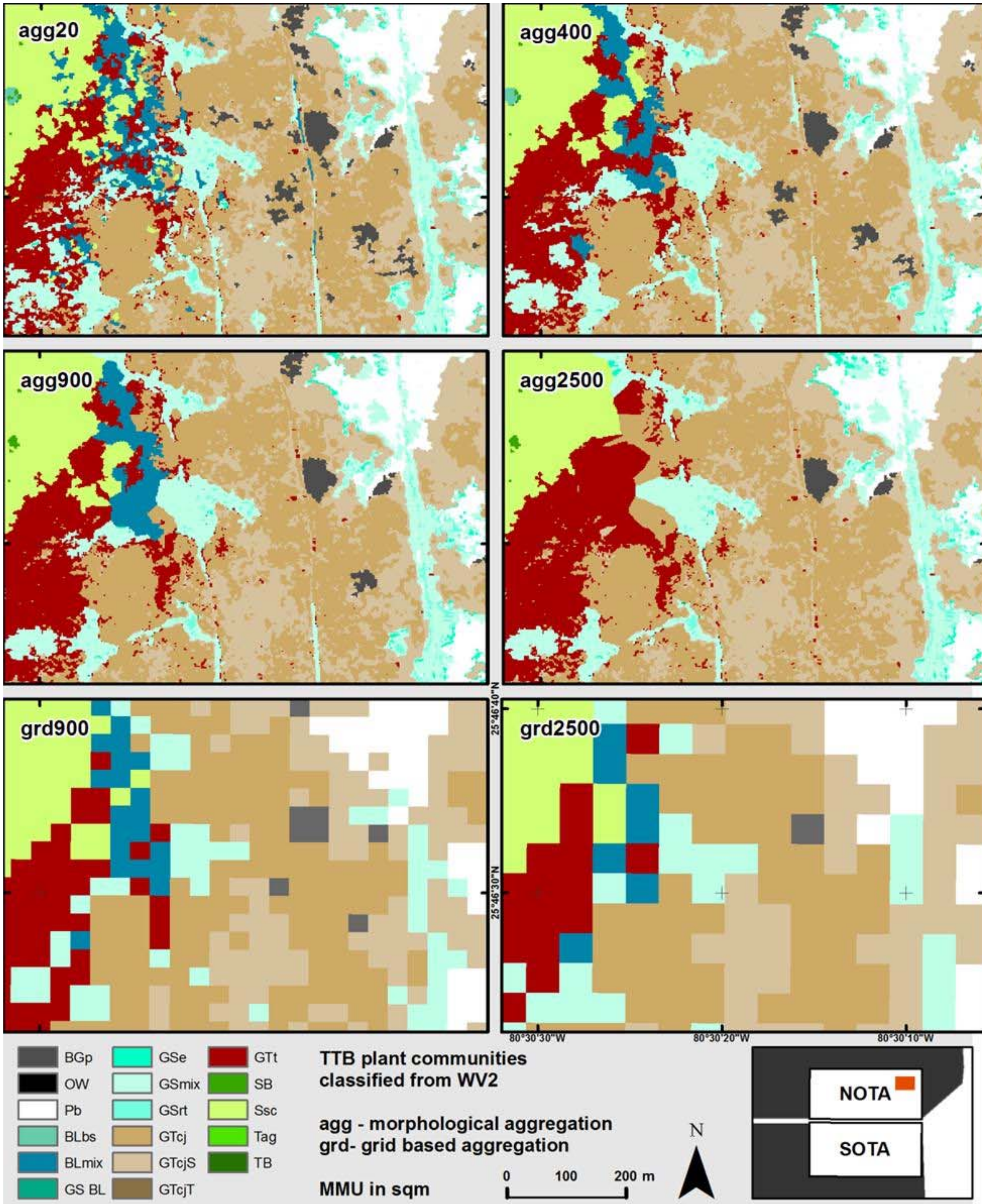
1) model-based - cross-validated results (oaMod; kaMod)
2) design-based - post-classification stratified random samples (oaDes; kaDes)



models				accuracy				model based overall accuracy by variable set					
roi	img	clf	predLevel	oaMod	kaMod	oaDes	kaDes	wet	dry	bi	wetTxt	dryTxt	biTxt
WE3A	wv2	cTree	comClass	87.68	84.76	-	-	81.27	63.64	84.10	84.91	69.55	87.68
WE3A	wv2	cTree	comStruc	94.61	90.81	-	-	90.96	85.24	93.16	91.60	89.34	94.61
WE3A	wv2	rndFor	comClass	90.87	88.69	-	-	81.36	64.67	86.99	86.66	73.10	90.87
WE3A	wv2	rndFor	comStruc	96.05	93.30	88.89	85.56	91.27	86.81	94.04	93.77	90.51	96.05
WE3A	wv2	rndFor	classAggStruc	96.51	94.09	-	-	-	-	-	-	-	-
WE3A	ls	rndFor	comClass	93.07	91.22	73.56	61.06	90.10	79.46	93.07	-	-	-
WE3A	ls	rndFor	classAggStruc	96.29	94.70	85.13	73.48	-	-	-	-	-	-
TTB	wv2	cTree	comClass	79.70	77.13	-	-	68.43	65.36	76.63	73.42	72.38	79.70
TTB	wv2	cTree	comStruc	91.33	86.72	-	-	85.36	84.49	89.41	88.47	85.43	91.33
TTB	wv2	rndFor	comClass	85.77	85.65	-	-	72.68	66.95	81.52	79.63	74.10	85.77
TTB	wv2	rndFor	comStruc	94.10	90.86	91.99	89.34	85.97	85.60	91.70	90.52	88.94	94.10
TTB	wv2	rndFor	classAggStruc	94.60	91.72	-	-	-	-	-	-	-	-
TTB	ls	rndFor	comClass	93.98	93.04	68.90	68.90	78.83	90.15	93.98	-	-	-
TTB	ls	rndFor	classAggStruc	98.16	97.41	82.53	62.42	-	-	-	-	-	-



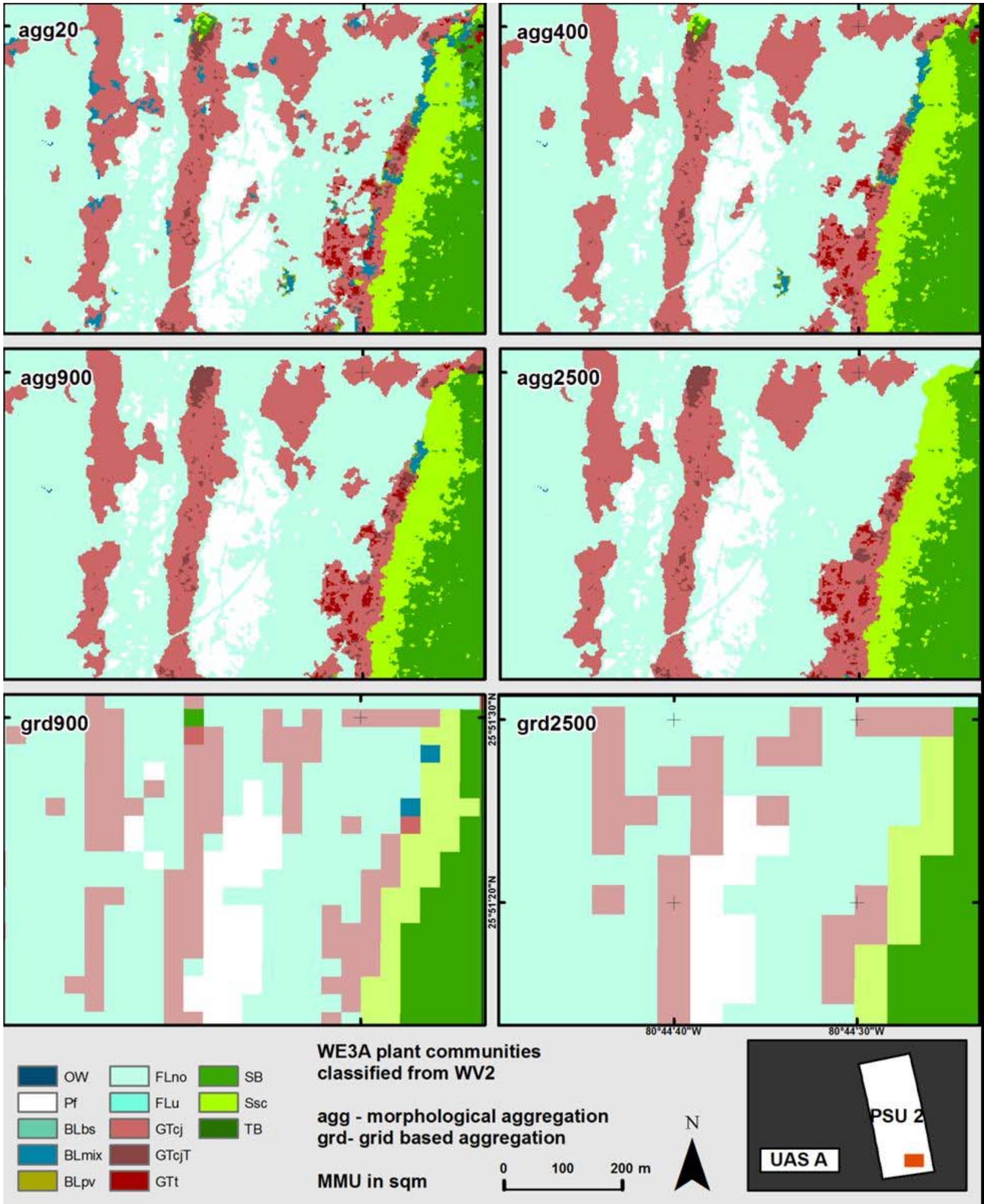
models				accuracy				model based overall accuracy by variable set					
roi	img	clf	predLevel	oaMod	kaMod	oaDes	kaDes	wet	dry	bi	wetTxt	dryTxt	biTxt
WE3A	wv2	cTree	comClass	87.68	84.76	-	-	81.27	63.64	84.10	84.91	69.55	87.68
WE3A	wv2	cTree	comStruc	94.61	90.81	-	-	90.96	85.24	93.16	91.60	89.34	94.61
WE3A	wv2	rndFor	comClass	90.87	88.69	-	-	81.36	64.67	86.99	86.66	73.10	90.87
WE3A	wv2	rndFor	comStruc	96.05	93.30	88.89	85.56	91.27	86.81	94.04	93.77	90.51	96.05
WE3A	wv2	rndFor	classAggStruc	96.51	94.09	-	-	-	-	-	-	-	-
WE3A	ls	rndFor	comClass	93.07	91.22	73.56	61.06	90.10	79.46	93.07	-	-	-
WE3A	ls	rndFor	classAggStruc	96.29	94.70	85.13	73.48	-	-	-	-	-	-
TTB	wv2	cTree	comClass	79.70	77.13	-	-	68.43	65.36	76.63	73.42	72.38	79.70
TTB	wv2	cTree	comStruc	91.33	86.72	-	-	85.36	84.49	89.41	88.47	85.43	91.33
TTB	wv2	rndFor	comClass	85.77	85.65	-	-	72.68	66.95	81.52	79.63	74.10	85.77
TTB	wv2	rndFor	comStruc	94.10	90.86	91.99	89.34	85.97	85.60	91.70	90.52	88.94	94.10
TTB	wv2	rndFor	classAggStruc	94.60	91.72	-	-	-	-	-	-	-	-
TTB	ls	rndFor	comClass	93.98	93.04	68.90	68.90	78.83	90.15	93.98	-	-	-
TTB	ls	rndFor	classAggStruc	98.16	97.41	82.53	62.42	-	-	-	-	-	-
			mean cTree	**88.33**	**84.85**								
			mean rndFor	**91.70**	**89.63**								
	wv2		**mean Class**	**86.00**	**84.06**			**82.16**	**75.34**	**87.19**	**86.12**	**80.42**	**90.01**
			mean Struc	**94.02**	**90.42**								
			mean Agg	**95.55**	**92.90**								
	ls		**mean Class**	**93.52**	**92.13**			**84.47**	**84.80**	**93.52**	**-**	**-**	**-**
			mean Agg	**97.22**	**96.06**								



Results : Scaling

TTB - NOTA

1) grid-based spatial aggregation (grd)
2) morphological spatial aggregation (agg)



Results : Scaling

WE3A - PSU 2

1) grid-based spatial aggregation (grd)
2) morphological spatial aggregation (agg)

Results : Scaling : WE3A

comClass	wv2	mmu20	mmu40	mmu400	mmu900	grd900	ls	mmu2500	grd2500
_OW	0.9	0.9	0.9	0.9	0.9	0.4	0.4	0.9	0.3
_Pf	9.4	9.4	9.4	9.6	9.7	7.2	16.7	10.0	6.0
BLbs	1.3	1.3	1.3	1.4	1.4	1.3	2.4	1.3	1.4
BLmix	3.7	3.3	3.0	1.6	1.2	1.2	5.1	0.9	0.7
BLpv	0.8	0.8	0.8	0.7	0.7	0.6	0.2	0.7	0.6
FLno	46.6	46.6	46.6	47.2	47.6	50.1	39.4	48.8	51.8
FLu	0.0	0.0	0.0	0.0	0.0	-	-	0.0	-
GTcj	31.1	31.5	31.8	32.8	32.7	34.1	32.5	31.7	34.7
GTcjT	1.0	1.0	1.0	1.0	1.0	0.2	-	1.1	0.0
GTt	0.3	0.3	0.3	0.3	0.3	0.1	-	0.3	0.0
SB	2.9	2.9	3.0	3.0	2.9	3.0	2.4	2.9	2.9
Ssc	1.5	1.5	1.5	1.2	1.1	1.3	1.1	0.9	1.1
TB	0.5	0.5	0.5	0.5	0.4	0.5	0.0	0.5	0.5
total	100	100	100	100	100	100	100	100	100
diversity	13	13	13	13	13	12	10	13	12

comStruc	wv2	mmu20	mmu40	mmu400	mmu900	grd900	ls	mmu2500	grd2500
BL	5.9	5.4	5.1	3.7	3.2	3.2	7.7	2.9	3.0
GT	32.3	32.7	33.0	34.0	34.0	32.7	32.5	33.0	31.7
S	4.4	4.4	4.4	4.2	4.1	4.2	3.4	3.8	3.8
SL	56.8	56.9	56.9	57.6	58.2	59.4	56.4	59.8	61.1
T	0.5	0.5	0.5	0.5	0.4	0.5	0.0	0.5	0.4
total	100	100	100	100	100	100	100	100	100
diversity	5	5	5	5	5	5	5	5	5

Results Scaling WE3A

comClass	wv2	mmu20	mmu40	mmu400	mmu900	grd900	ls	mmu2500	grd2500
_OW	0.9	0.9	0.9	0.9	0.9	0.4	0.4	0.9	0.3
_Pf	9.4	9.4	9.4	9.6	9.7	7.2	16.7	10.0	6.0
BLbs	1.3	1.3	1.3	1.4	1.4	1.3	2.4	1.3	1.4
BLmix	3.7	3.3	3.0	1.6	1.2	1.2	5.1	0.9	0.7
BLpv	0.8	0.8	0.8	0.7	0.7	0.6	0.2	0.7	0.6
FLno	46.6	46.6	46.6	47.2	47.6	50.1	39.4	48.8	51.8
FLu	0.0	0.0	0.0	0.0	0.0	-	-	0.0	-
GTcj	31.1	31.5	31.8	32.8	32.7	34.1	32.5	31.7	34.7
GTcjT	1.0	1.0	1.0	1.0	1.0	0.2	-	1.1	0.0
GTt	0.3	0.3	0.3	0.3	0.3	0.1	-	0.3	0.0
SB	2.9	2.9	3.0	3.0	2.9	3.0	2.4	2.9	2.9
Ssc	1.5	1.5	1.5	1.2	1.1	1.3	1.1	0.9	1.1
TB	0.5	0.5	0.5	0.5	0.4	0.5	0.0	0.5	0.5
total	100	100	100	100	100	100	100	100	100
diversity	13	13	13	13	13	12	10	13	12

comClass	wv2	mmu20	mmu40	mmu400	mmu900	grd900	ls	mmu2500	grd2500
_OW	0.9	0.0	0.0	0.0	0.0	-55.3	-55.6	0.0	-70.1
_Pf	9.4	0.0	0.0	2.1	3.2	-23.5	77.7	6.4	-36.6
BLbs	1.3	0.0	0.0	7.7	7.7	3.5	84.6	0.0	9.4
BLmix	3.7	-10.8	-18.9	-56.8	-67.6	-68.6	37.8	-75.7	-80.4
BLpv	0.8	0.0	0.0	-12.5	-12.5	-30.5	-75.0	-12.5	-27.3
FLno	46.6	0.0	0.0	1.3	2.1	7.6	-15.5	4.7	11.2
FLu	0.0	0.0	0.0	0.0	0.0	-	-	0.0	-
GTcj	31.1	1.3	2.3	5.5	5.1	9.7	4.5	1.9	11.5
GTcjT	1.0	0.0	0.0	0.0	0.0	-77.7	-	10.0	-96.2
GTt	0.3	0.0	0.0	0.0	0.0	-79.9	-	0.0	-86.8
SB	2.9	0.0	3.4	3.4	0.0	4.5	-17.2	0.0	1.1
Ssc	1.5	0.0	0.0	-20.0	-26.7	-12.0	-26.7	-40.0	-28.3
TB	0.5	0.0	0.0	0.0	-20.0	-6.6	-100.0	0.0	-5.5
total	100	0.0	0.1	0.2	-0.1	0.0	0.2	0.0	0.0
diversity	13	0.0	0.0	0.0	0.0	-7.7	-23.1	0.0	-7.7

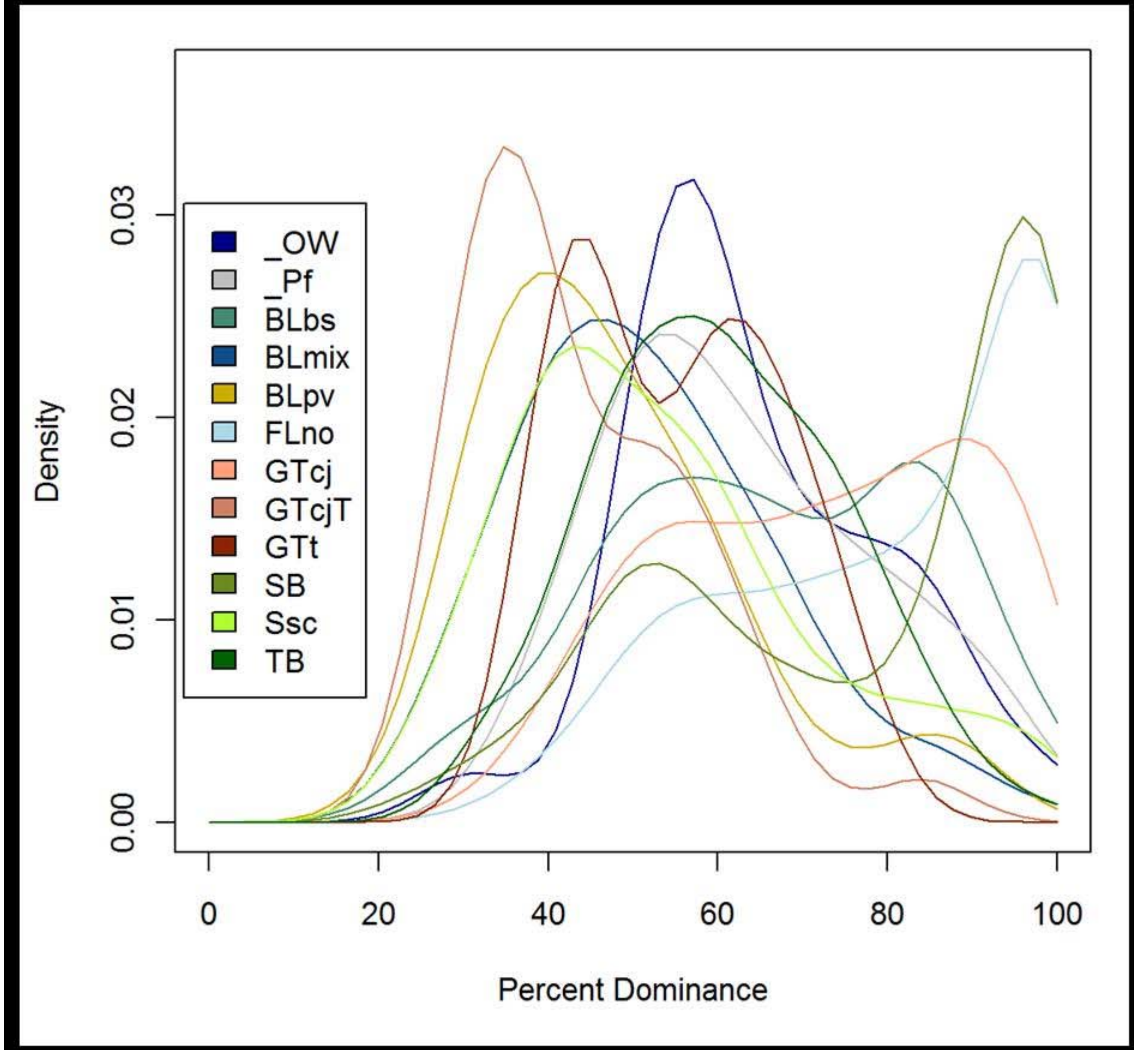
Summary

- WV2 - achieved high levels of detection accuracies for plant communities
- most accurate models: bi-seasonal spectral reflectance + texture
- predicting structural class performed slightly better than community class
- post-classification hierarchical aggregation resulted in significantly better results than classification at structural level
- morphological aggregation preserved general community boundaries at much higher precision than grid-based aggregation methods

  → more reliable assessment of landscape configuration and detection of expansion and contraction of communities

ftp://gisrsftp.fiu.edu/Share/gann/4500058664_synthesisReport.pdf

Current Work



Class distribution for 30x30 m grid when dominant

→ what effects have sampling scale and method on classification of plant communities?

→ how do they affect detection and mapping of communities across spatial scales using RS

- determine how class definitions vary across spatial scales
- determine how definition stability affects mapping consistency

- estimate validity of class descriptors and detection probabilities beyond survey areas as a function of spatial distance