

**Supplementary : Accuracy assessments (confusion matrices) for classifications of small unmanned aerial system (sUAS) and National Agriculture Imagery Program (NAIP) imagery**

Table S1 Accuracy assessment for manual classification of sUAS imagery. Overall accuracy was 89%.

Classified data	Reference data from ground surveys						Row total	User's accuracy
	AO	BB	F	G	TS	CR		
Land cover classes								
Autumn olive (AO)	20	0	0	0	0	0	20	100%
Blackberry (BB)	0	62	0	0	0	0	62	100%
Forbs (F)	1	0	118	0	2	26	147	80%
Grasses (G)	0	0	0	152	0	0	152	100%
Trees/shrubs (TS)	0	5	20	0	17	0	42	40%
Common reed (CR)	0	0	0	0	0	78	78	100%
Column total	21	67	138	152	19	104	501	
Producer's accuracy	95%	93%	86%	100%	89%	75%		

Table S2 Accuracy assessment for manual classification of National Agriculture Imagery Program imagery. Overall accuracy was 76%.

Classified data	Reference data from ground surveys						Row total	User's accuracy
	AO	BB	F	G	TS	CR		
Land cover classes								
Autumn olive (AO)	14	0	0	0	1	0	15	93%
Blackberry (BB)	1	66	1	0	0	0	68	97
Forbs (F)	1	0	67	0	2	0	70	96%
Grasses (G)	1	1	70	152	0	37	261	58%
Trees/shrubs (TS)	4	0	0	0	16	0	20	80%
Common reed (CR)	0	0	0	0	0	67	67	100%
Column total	21	67	138	152	19	104	501	
Producer's accuracy	67%	99%	49%	100%	84%	64%		

Table S3 Accuracy assessment for random forest classification of 1.58-cm sUAS imagery with a canopy height model. Overall accuracy was 69%.

Classified data	Reference data from ground surveys						Row total	User's accuracy
	AO	BB	F	G	TS	CR		
Land cover classes								
Autumn olive (AO)	4	3	0	0	0	0	7	57%
Blackberry (BB)	2	49	6	15	1	5	78	63%
Forbs (F)	7	7	113	31	3	19	180	63%
Grasses (G)	0	0	9	97	0	5	111	87%
Trees/shrubs (TS)	3	1	3	0	13	4	24	54%
Common reed (CR)	5	7	7	9	2	71	101	70%
Column total	21	67	138	152	19	104	501	
Producer's accuracy	19%	73%	82%	64%	68%	68%		

Table S4 Accuracy assessment for random forest classification of 1.58-cm sUAS imagery without a canopy height model. Overall accuracy was 60%.

Classified data	Reference data from ground surveys						Row total	User's accuracy
	AO	BB	F	G	TS	CR		
Land cover classes								
Autumn olive (AO)	6	2	0	5	0	1	14	43%
Blackberry (BB)	3	49	3	16	2	11	84	58%
Forbs (F)	3	8	87	20	2	21	141	62%
Grasses (G)	1	0	7	85	0	1	94	90%
Trees/shrubs (TS)	0	2	27	0	8	3	40	20%
Common reed (CR)	8	6	14	26	7	67	128	52%
Column total	21	67	138	152	19	104	501	
Producer's accuracy	29%	73%	63%	56%	42%	64%		

Table S5 Accuracy assessment for random forest classification of 5-cm sUAS imagery with a canopy height model. Overall accuracy was 63%.

Classified data	Reference data from ground surveys						Row total	User's accuracy
	AO	BB	F	G	TS	CR		
Land cover classes								
Autumn olive (AO)	4	3	0	0	0	0	7	57%
Blackberry (BB)	5	40	1	9	0	6	61	66%
Forbs (F)	5	9	111	47	4	26	202	55%
Grasses (G)	2	1	10	93	0	5	111	84%
Trees/shrubs (TS)	2	6	3	0	12	12	35	34%
Common reed (CR)	3	8	13	3	3	55	85	65%
Column total	21	67	138	152	19	104	501	



Autumn olive (AO)	5	0	0	0	0	0	5	100%
Blackberry (BB)	5	52	4	1	1	10	73	71%
Forbs (F)	3	4	78	3	3	28	119	66%
Grasses (G)	1	1	8	104	1	6	121	86%
Trees/shrubs (TS)	0	5	40	0	12	3	60	20%
Common reed (CR)	7	5	8	44	2	57	123	46%
Column total	21	67	138	152	19	104	501	
Producer's accuracy	24%	78%	57%	68%	63%	55%		

Table S9 Accuracy assessment for random forest classification of 60-cm sUAS imagery with a canopy height model.

Overall accuracy was 56%.

Classified data	Reference data from ground surveys						Row total	User's accuracy
	AO	BB	F	G	TS	CR		
Land cover classes								
Autumn olive (AO)	2	2	0	0	0	0	4	50%
Blackberry (BB)	4	38	3	3	0	5	53	72%
Forbs (F)	4	8	103	42	6	31	194	53%
Grasses (G)	5	1	23	78	0	9	116	67%
Trees/shrubs (TS)	3	5	4	5	8	6	31	26%
Common reed (CR)	3	13	5	24	5	53	103	51%
Column total	21	67	138	152	19	104	501	
Producer's accuracy	10%	57%	75%	51%	42%	51%		

Table S10 Accuracy assessment for random forest classification of 60-cm sUAS imagery without a canopy height model. Overall accuracy was 59%.

Classified data	Reference data from ground surveys						Row total	User's accuracy
	AO	BB	F	G	TS	CR		
Land cover classes								
Autumn olive (AO)	5	2	0	0	0	13	20	25%
Blackberry (BB)	8	52	1	2	3	14	80	65%
Forbs (F)	5	2	82	4	5	25	123	67%
Grasses (G)	0	1	19	101	0	6	127	80%
Trees/shrubs (TS)	0	7	24	0	9	0	40	23%
Common reed (CR)	3	3	12	45	2	46	111	41%
Column total	21	67	138	152	19	104	501	
Producer's accuracy	24%	78%	59%	66%	47%	44%		

Table S11 Accuracy assessment for random forest classification of National Agriculture Imagery Program imagery with a canopy height model and segmented using near-infrared, red, and green blue bands. Overall accuracy was 43%.

Classified data	Reference data from ground surveys						Row total	User's accuracy
	AO	BB	F	G	TS	CR		
Land cover classes								
Autumn olive (AO)	3	0	0	0	1	14	18	17%
Blackberry (BB)	0	11	3	0	0	0	14	79%
Forbs (F)	5	0	95	63	2	30	195	49%
Grasses (G)	0	0	10	62	0	8	80	78%
Trees/shrubs (TS)	8	56	20	10	12	19	125	10%
Common reed (CR)	5	0	10	17	4	33	69	48%
Column total	21	67	138	152	19	104	501	
Producer's accuracy	14%	16%	69%	41%	63%	32%		

Table S12 Accuracy assessment for random forest classification of National Agriculture Imagery Program imagery without a canopy height model and segmented using near-infrared, red, and green bands. Overall accuracy was 47%.

Classified data	Reference data from ground surveys						Row total	User's accuracy
	AO	BB	F	G	TS	CR		
Land cover classes								
Autumn olive (AO)	2	0	0	0	0	0	2	100%
Blackberry (BB)	0	12	13	0	0	0	25	48%
Forbs (F)	13	0	113	73	6	57	262	43%
Grasses (G)	0	0	12	79	0	24	115	69%
Trees/shrubs (TS)	2	55	0	0	9	3	67	13%
Common reed (CR)	4	0	0	0	4	22	30	73%
Column total	21	67	138	152	19	104	501	
Producer's accuracy	10%	18%	82%	52%	47%	21%		

Table S13 Accuracy assessment for random forest classification of National Agriculture Imagery Program imagery with a canopy height model and segmented using red, green, and blue bands. Overall accuracy was 49%.

Classified data	Reference data from ground surveys						Row total	User's accuracy
	AO	BB	F	G	TS	CR		
Land cover classes								
Autumn olive (AO)	5	0	0	0	0	0	5	100%
Blackberry (BB)	3	23	0	0	1	1	27	82%

Forbs (F)	2	11	110	75	6	48	252	44%
Grasses (G)	0	0	18	65	0	24	107	61%
Trees/shrubs (TS)	4	32	0	0	9	0	45	20%
Common reed (CR)	7	1	10	12	3	31	64	48%
Column total	21	67	138	152	19	104	501	
Producer's accuracy	24%	34%	80%	43%	47%	30%		

Table S14 Accuracy assessment for random forest classification of National Agriculture Imagery Program imagery without a canopy height model and segmented using red, green, and blue bands. Overall accuracy was 31%.

Classified data	Reference data from ground surveys						Row total	User's accuracy
	AO	BB	F	G	TS	CR		
Land cover classes								
Autumn olive (AO)	7	0	9	2	0	0	18	39%
Blackberry (BB)	4	1	0	0	0	0	5	20%
Forbs (F)	0	7	41	13	5	3	69	59%
Grasses (G)	0	0	0	13	0	0	13	100%
Trees/shrubs (TS)	2	59	30	8	10	19	128	8%
Common reed (CR)	8	0	58	116	4	82	268	31%
Column total	21	67	138	152	19	104	501	
Producer's accuracy	33%	1%	30%	9%	53%	79%		