Supplemental Data 1

We conducted an ISI Web of Science search with TOPIC = ‘seagrass* AND aerial photo* AND map OR classif*’ for the dates 1970-2014. Articles accepted for inclusion in the summary table were English language primary literature describing semi-automated or automated seagrass classification techniques utilizing the spectral information from aerial photographs. Studies where spectral information was used only for image enhancement purposes prior to visual interpretation of aerial photographs were excluded (i.e., density slicing, contrast stretching).

Citation	**Location**	**Target seagrass species**	**Aerial Photo Format**	**Image Resolution (m)**	**Classification Method**	**Software**	**Depth Range or Max (m)**	**Overall Thematic Accuracy**
Agostini et al., 2003	Urbinu Lagoon, Corsica, France	*Cymodocea nodosa*, *Zostera noltii*, *Ruppia cirrhosa*	true color analogue (digitalized)	2	PCA transform followed by supervised (hypercube)	MULTISCOPE (Matra Cap Systems)	0 - 15	"scale of reliability" (71-82% reliable)
Andrade & Ferreira, 2011	Sado Estuary, Portugal	*Zostera marina*, *Z. noltii*	digital true color, oblique	0.5	unsupervised (Isocluster and Kmeans)	IDRISI		Seasonal: 86-100%; Avg: 94%
Ball et al., 2014	Port Phillip Bay, Australia	*Zostera nigricaulis*, *Z. muelleri*	B&W and true color analogue (digitally scanned)	0.3	PCA transform (color only) followed by unsupervised		7	50-100%
Beanish et al., 2002	South Sound, Grand Cayman	*Thalassia testudinum*	B&W and true color analogue (digitally scanned)	0.6	unsupervised (ISODATA)		20	90%
Chauvaud et al., 1998	Bay of Robert, Martinique, French West Indies	*Thalassia testudinum*	true color analogue (digitally scanned)	4.3	PCA transform followed by unsupervised (clustering) and supervised (maximum probability)	PCIMAGE	20	94%
Cuevas-Jimenez et al., 2002	Akumal Bay, Quintana Roo, Mexico	*Thalassia testudinum*, *Syringodium filiforme*	true color analogue (digitally scanned)	0.4	unsupervised (clustering) , supervised (maximum likelihood, minimum distance, parallelepiped)	IDRISI	4	total error: 0.695 (ML), 0.682 (PP), 0.309 (MD)
Fernandez et al., 2006	Urbinu Lagoon, Corsica, France	*Cymodocea nodosa*	true color analogue (digitally scanned)	2	PCA transform followed by supervised (hypercube)	MULTISCOPE (Matra Cap Systems)	0-5	"scale of reliability" (79, 822% reliable)
Fletcher et al., 2009	Redfish Bay, Texas, USA	*Thalassia testudinum*	true color analogue (digitized)	0.3048	color space transformation, threshold models	ERDAS	0.2-0.6	84-97.6%
Frederiksen et al., 2004	Vejle fjord, Amader, Samsø, Denmark	*Zostera marina*	true color analogue (digitized)	0.32-0.79 (resampled to 1)	maximum likelihood estimation	CHIPS for Windows	3	90-93%
Fyfe et al., 1999	Otago Harbor, Southern New Zealand	*Zostera novazelandica*	true color analogue (digitally	1.5	hierarchical supervised			90%

			scanned)					
Garrido et al., 2013	Urbino lagoon, Corsica, France	*Cymodocea nodosa*	true color	not specified	PCA supervised (generalized hypercube), pixel thresholding	MULTISCOPE (Matra Cap Systems)	5	
Green & Lopez, 2007	Gulf Coast, Texas, USA	collective SAV	true color and near-IR digital	1	object-oriented			74%, 90%
Hernández-Cruz et al., 2006	Bahia Salina del Sur, Isla Vieques, Puerto Rico	*Thalassia testudinum*, *Syringodium filiforme*	B&W and true color analogue (digitally scanned)	1	unsupervised (k-means)			
Holmes et al., 2007	Owen Anchorage, Perth, Western Australia	*Amphibolis griffithii*, *A. antarctica*, *Posidonia australis*, *P. sinuosa*, *P. coriacea*	not specified	0.25 (resampled to 2m)	unsupervised (ISODATA), supervised (spectral angle mapper), textural analysis	ERDAS Imagine, MultiSpec	< 10	created species probability threshold maps
Kendall et al., 2004	Buck Island Channel, St. Croix, USVI	*Syringodium filiforme*, *Thalassia testudinum*	true color analogue (digitally scanned)	2.2	unsupervised (ISODATA)		15	
Kendrick et al., 2002	Cockburn Sound, Western Australia	collective SAV	true color analogue (digitally scanned)	2	Spann–Wilson segmentation	Xite	10	.
Lathrop et al., 2006	Barnegat Bay-Little Egg Harbor, New Jersey, USA	*Zostera marina*	true color digital	1	multiscale image segmentation/object-oriented classification	eCognition v.3	2	68%, 83%
Leriche et al., 2004	Port of Marseilles, France	*Posidonia oceanica*	true color analogue (digitally scanned)		feature extraction	ArcView v3.2 (Image Analysis extension)	10	"reliability index" range: 3 - 50 (scale: 0 - 50)
Pasqualini et al., 1997	Corsica, France	*Posidonia oceanica*, *Zostera noltii*, *Cymodocea nodosa*	true color analogue (digitally scanned)	1 - 5	PCA transform followed by supervised (hypercube)	MULTISCOPE (Matra Cap Systems)	20	"scale of reliability" (62-92% reliable)
Pasqualini et al., 1998	Corsica, France	*Posidonia oceanica*	true color analogue (digitally scanned)	5	PCA transform followed by supervised (hypercube)	MULTISCOPE (Matra Cap Systems)	0-50	92%
Pasqualini et al., 1999	Corsica, France	*Posidonia oceanica*	true color analogue (digitally scanned)	2	PCA transform followed by supervised (hypercube)	MULTISCOPE (Matra Cap Systems)	0-20	.
Pasqualini et al., 2001	Corsica, France	*Posidonia oceanica*	true color analogue, false-color IR, and B&W (digitally scanned)	1	PCA followed by supervised (hypercube), pixel thresholding (B&W photos)	MULTISCOPE (Matra Cap Systems)		.

Pergent-Martini et al., 1995	Bay of Cortiou, France	*Posidonia oceanica*	true color analogue (digitally scanned)	0.25	PCA transform followed by supervised (hypercube)	MULTISCOPE (Matra Cap Systems)	0-30	.
Puhr et al., 2014	Island of Iž, East Adriatic Sea, Zadar Archipelago, Croatia	*Posidonia oceanica*	true color digital	0.15	hierarchical object-oriented classification scheme	Adobe® Photoshop® CS5	3-25	76-97%
Robinson et al., 2001	Shoalwater Bay, Australia	collective SAV	true color analogue (digitally scanned)	17 (resampled to 143m)	supervised maximum likelihood	MultiSpec	.	43.8, 84.3%
Santos et al., 2011	Biscayne Bay, Florida, USA	collective SAV	true color digital	0.3 (resampled to 1m)	object-based supervised	ENVI (feature extraction module)	.	47-81% (user's accuracy)
Young et al., 2010	Yaquina, Umpqua, and Coos estuaries, Oregon, USA	*Zostera marina*	false colour near-IR diapositive prints (digitally scanned)	0.25	band ratio thresholding followed by unsupervised isoclassification	ERDAS ER Mapper	1.5-4.6	83, 89, 97%
Young et al., 2012	Yaquina, Tillamook, and Alsea estuaries, Oregon, USA	*Zostera marina*	false colour near-IR diapositive prints (digitally scanned)	0.25	band ratio thresholding followed by unsupervised isoclassification	ERDAS ER Mapper	1.8-3	86, 97, 100%

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Supplemental Data 2

Seagrass area classified via linear spectral unmixing by pixel proportion for each of the six study sites as well as the percent decrease in seagrass area when compared to the corresponding manually delineated polygon. The area of seagrass classified within each pixel proportion image fraction was calculated by summing the total number of seagrass pixels classified as seagrass within each image fraction and multiplying by the pixel area (here, 0.09 m^2). Area of the corresponding manually digitized polygons was calculated in ArcMap. Bold text denotes the pixel proportion that produced the seagrass site map with highest overall accuracy. Site names are based on proximity to major geographic features. HIB: Harker's Island Bridge; NRH: North River High; MMN: Middle Marsh North; SS: Shackleford Shoal; BR: Bottle Run; HIH: Harker's Island High.

Site	**HIB**		**MMN**		**NRH**		**HIH**		**BR**		**SS**	
	Classified Seagrass Area (m^2)	**Percent Decrease in Area (%)**	**Classified Seagrass Area (m^2)**	**Percent Decrease in Area (%)**	**Classified Seagrass Area (m^2)**	**Percent Decrease in Area (%)**	**Classified Seagrass Area (m^2)**	**Percent Decrease in Area (%)**	**Classified Seagrass Area (m^2)**	**Percent Decrease in Area (%)**	**Classified Seagrass Area (m^2)**	**Percent Decrease in Area (%)**
Manually Delineated Polygon	57,593.6	NA	119,781.1	NA	364,082.5	NA	1,077,027.3	NA	51,398.6	NA	46,003.6	NA
Pixel Proportion												
0	**56,364.4**	**2.1**	106,871.8	10.8	221,336.8	39.2	600,479.6	44.2	23,360.9	54.5	23,801.5	48.3
0.1	54,044.3	6.2	92,038.8	23.2	76,253.3	79.0	**67,228.5**	**93.7**	**5006.9**	**90.2**	16,124.6	64.9
0.2	46,894.6	18.6	**70,306.0**	**41.3**	**30,929.3**	**91.5**	16,699.4	98.4	2804.6	94.5	11,465.2	75.1
0.3	30,645.8	46.8	59,524.0	50.3	19,469.4	94.6	608.2	> 99.9	771.5	98.5	7890.3	82.8
0.4	7460.9	87.0	47,915.9	60.0	14,561.6	96.0	75.4	> 99.9	77.9	99.8	4575.6	90.0
0.5	246.7	99.6	35,669.2	70.2	9647.0	97.3	27.7	> 99.9	8.1	> 99.9	**2751.9**	**94.0**
0.6	15.6	> 99.9	19,626.2	83.6	4628.0	98.7	9.5	> 99.9	2.3	> 99.9	1706.6	96.3
0.7	3.4	> 99.9	3284.2	97.2	1117.6	99.7	2.3	> 99.9	1.4	> 99.9	1256.1	97.3
0.8	1.4	> 99.9	715.4	99.4	223.5	> 99.9	0.6	> 99.9	0.6	> 99.9	951.5	97.9
0.9	0.7	> 99.9	16.9	> 99.9	6.3	> 99.9	0.3	> 99.9	0.5	> 99.9	677.5	98.5
1.0	0.1	> 99.9	0.1	> 99.9	0	> 99.9	0	100	0	100	484.9	98.9