



# Long-term monitoring of seagrasses using a WV-2 satellite image, historical aerial photography and field data

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Photos by: JP Zegarra

# Objective

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- The main goal of this study is to determine long-term changes in seagrass habitat cover at Caja de Muertos Island Nature Reserve (CMINR).
  - Generate a more accurate and current seagrass benthic map of CMINR.
  - Reconstruct the historic distribution of seagrass around CMINR.



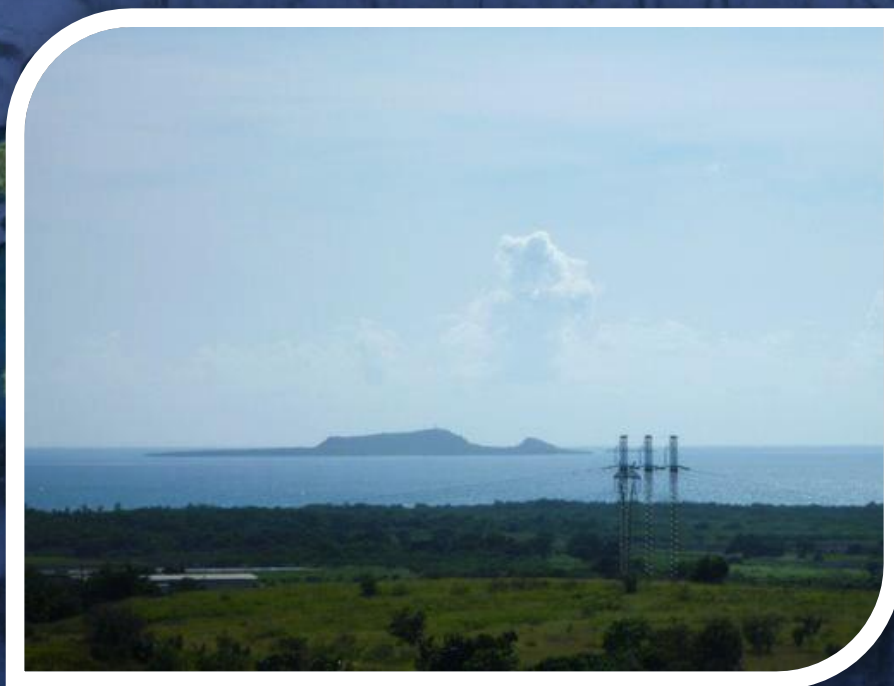


Image Landsat  
Data LDEO-Columbia, NSF, NOAA  
Data SIO, NOAA, U.S. Navy, NGA, GEBCO

Google earth

[Tour Guide](#)

Imagery Date: 4/9/2013 18°01'46.22" N 66°24'25.30" W elev 570 ft eye alt 196.73 mi

Imagery Date: 4/9/2013 lat 39.605292° lon -103.883650° elev 5140 ft eye alt 2488.78 mi

# Study Area



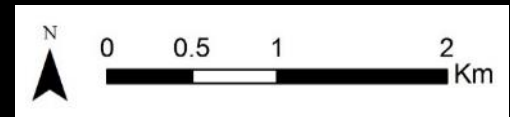
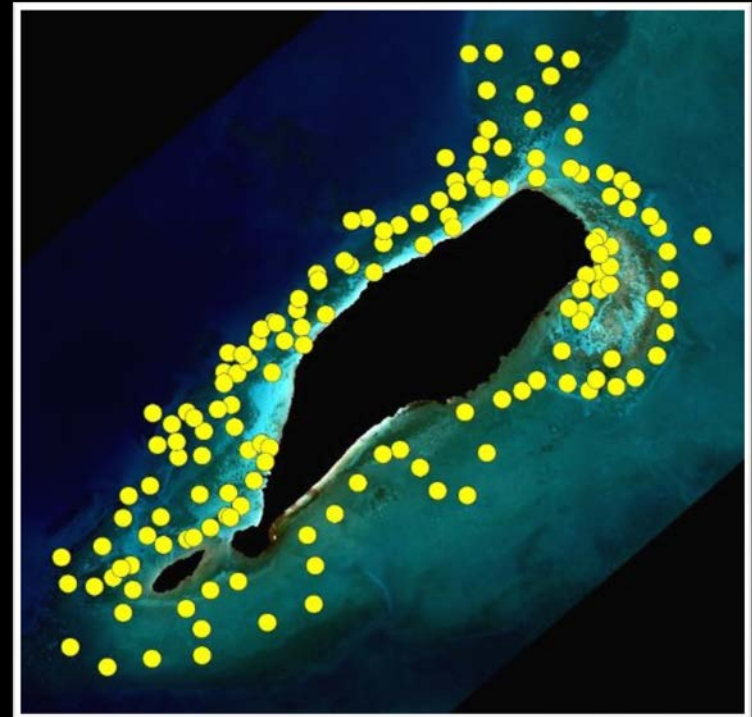
Esri, DeLorme, GEBCO, NOAA  
Geographic, DeLorme, HERE, G



# Field work



- Sampled area was determined based on 3 criteria:
  - Depth limit of *Thalassia testudinum*
  - Distance from shore
  - Seagrass detection limit of historic photos
- Sampling sites
  - 155 sites for calibration and validation
- Equipment
  - On-board submersible HD video camera
  - Boat depth sounder
  - Trimble Juno 3D Series



WorldView-2



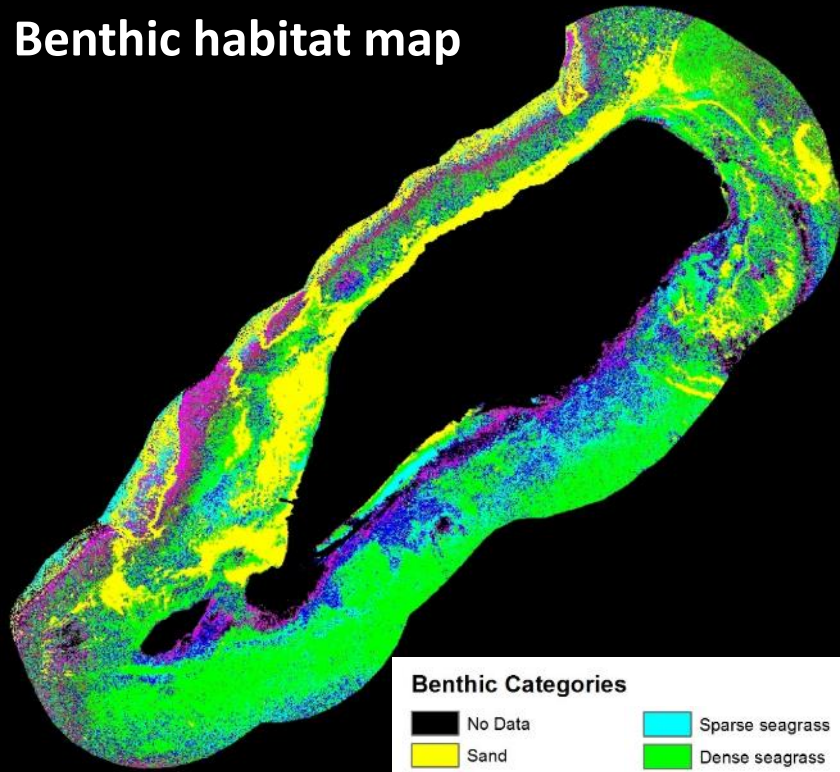
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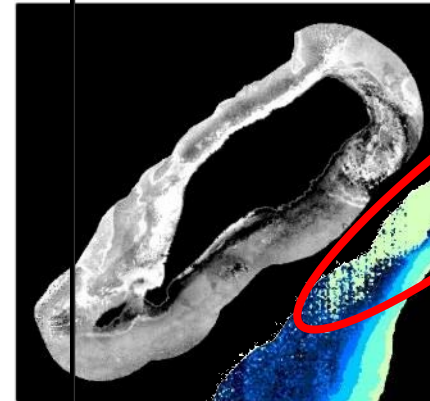
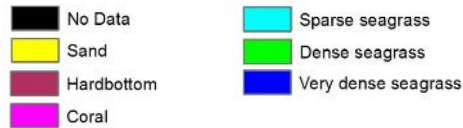
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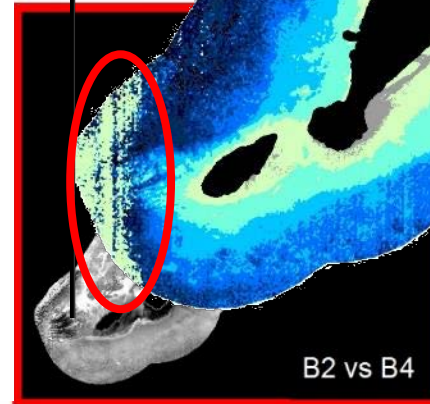
# Benthic habitat map



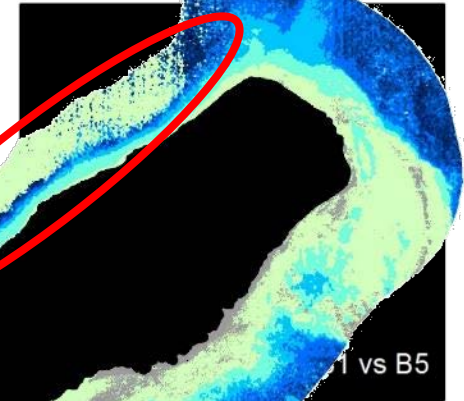
## Benthic Categories



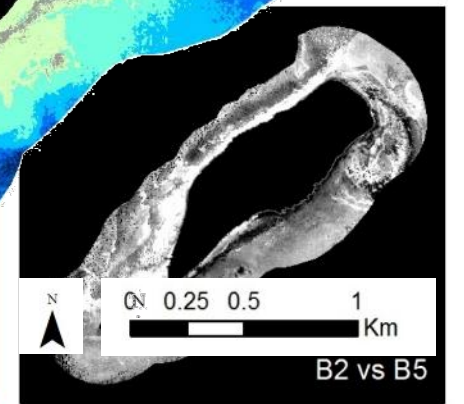
B1 vs B5



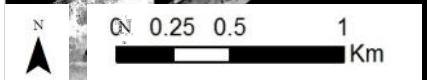
B2 vs B4



B1 vs B5



B2 vs B5



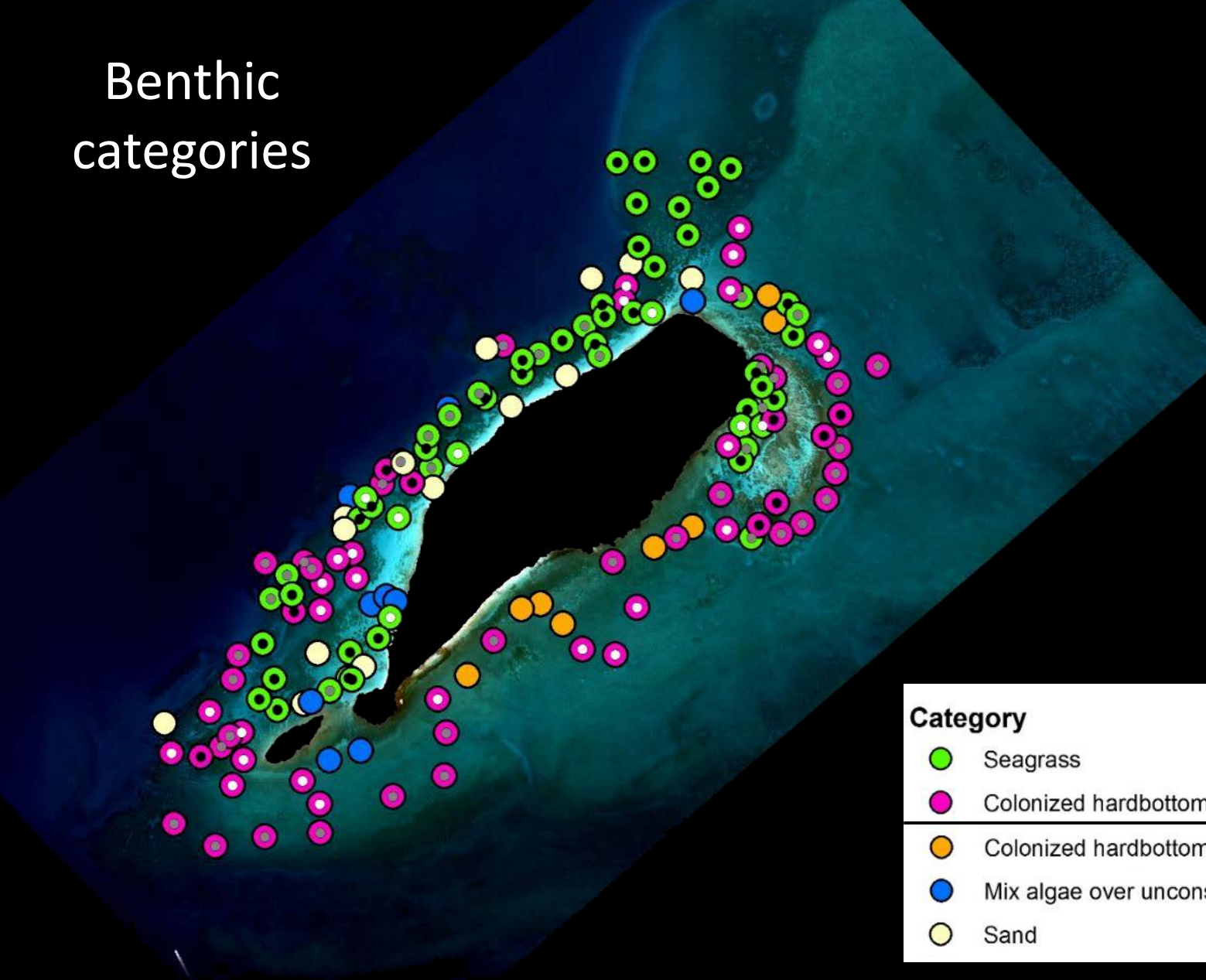
## Truth data

		Truth data							
Benthic class		Sand	Hardbottom	Coral	Sparse seagrass	Dense seagrass	Very dense seagrass	Classification overall	Producer accuracy
Classifier results	Sand	8			1			9	88.89%
	Hardbottom			4	1		1	6	0.00%
	Coral			1			1	2	50.00%
	Sparse seagrass				4			4	100.00%
	Dense seagrass	3	2		2	3		10	30.00%
	Very dense seagrass					4	2	6	33.33%
	Truth overall	11	2	5	8	7	4	37	
User accuracy		72.73%	0.00%	20.00%	50.00%	42.86%	50.00%		

Overall Accuracy:  
48.65%

B4 vs B5

# Benthic categories



## Category

Seagrass

Colonized hardbottom

Colonized hardbottom with some seagrass

Mix algae over unconsolidated sediments

Sand

## % Cover

○ 10-40 %

● 40-70 %

● 70-100 %



0

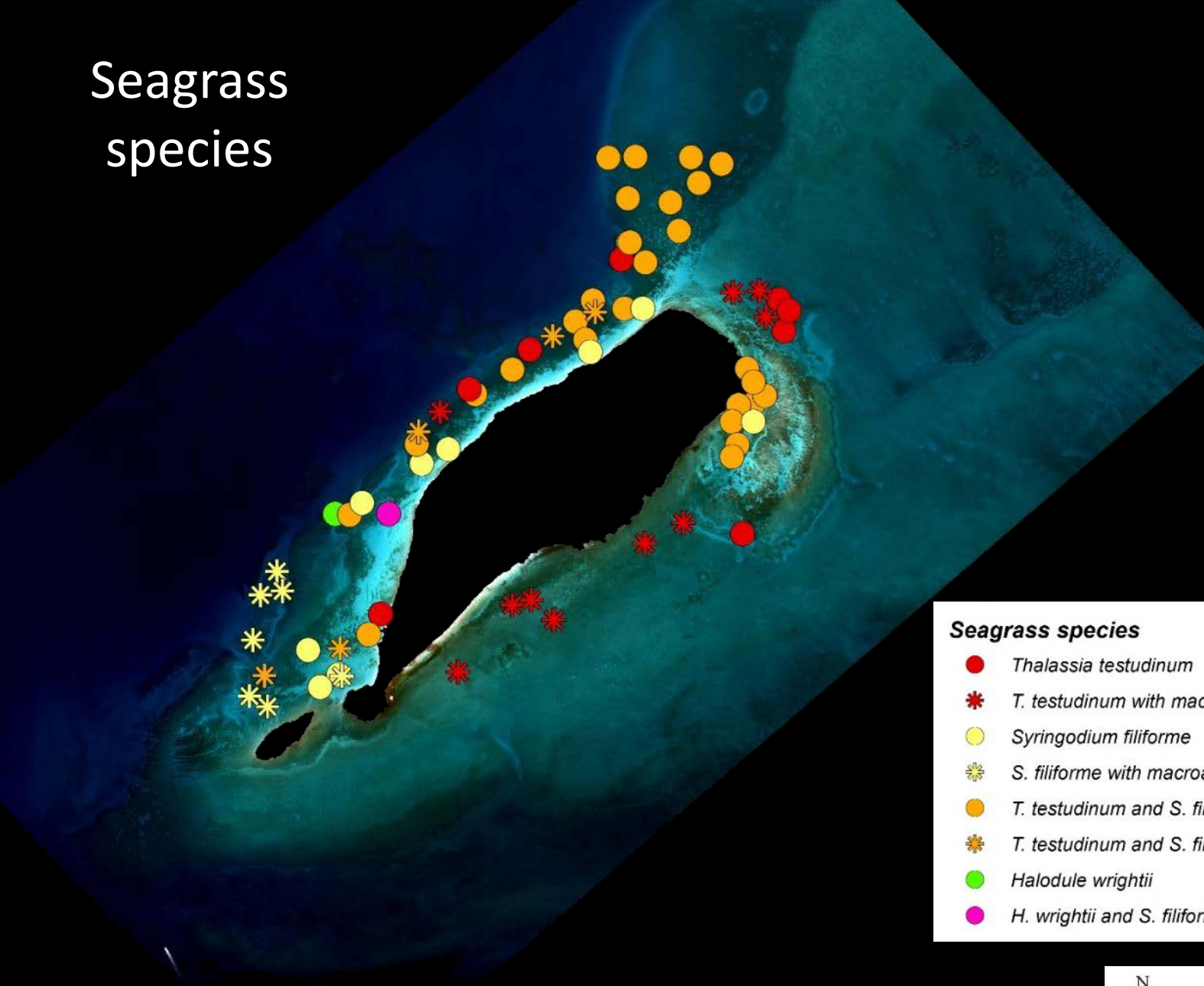
0.5

1

Km



# Seagrass species

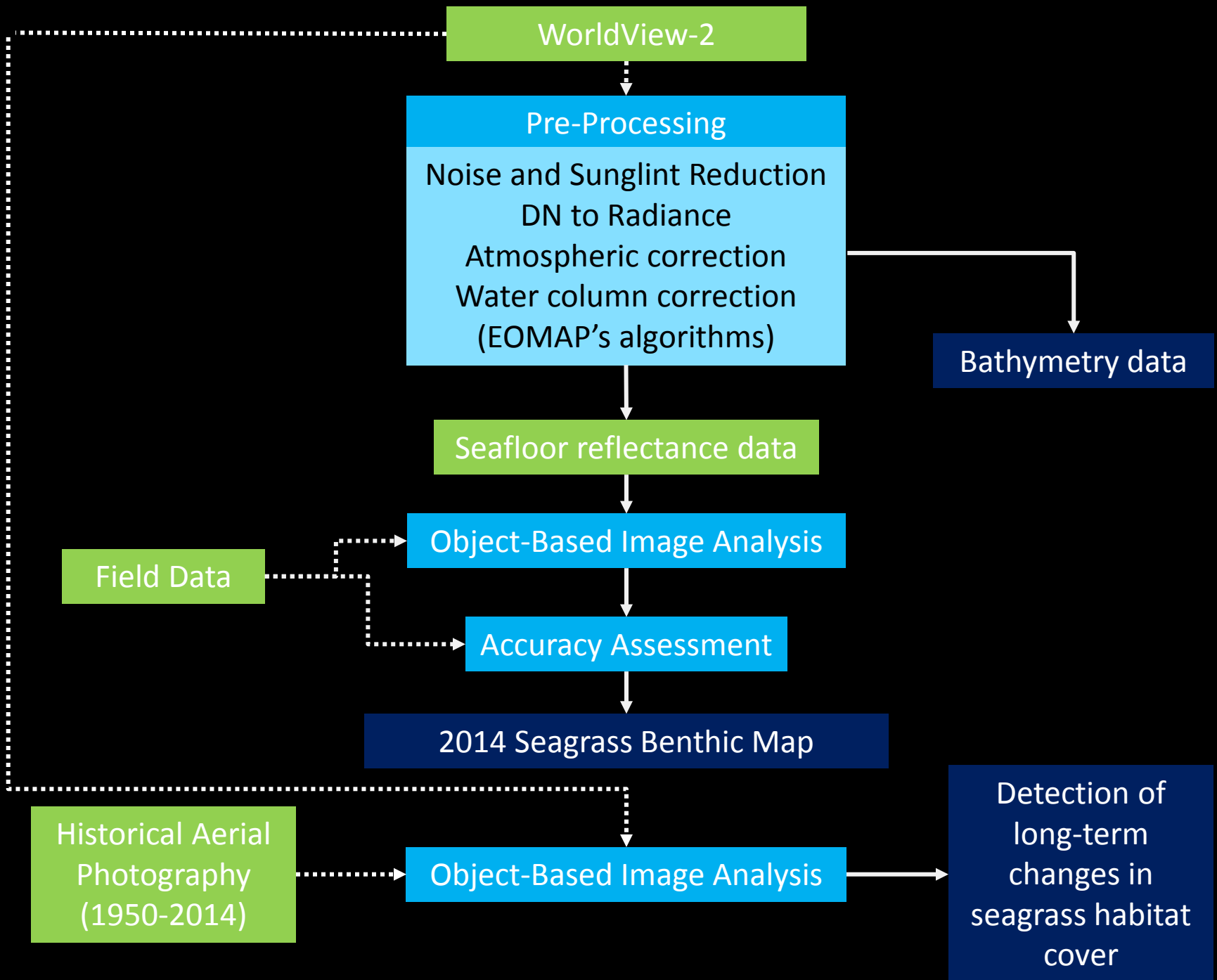


## Seagrass species

- *Thalassia testudinum*
- ★ *T. testudinum* with macroalgae
- *Syringodium filiforme*
- ★ *S. filiforme* with macroalgae
- *T. testudinum* and *S. filiforme*
- ★ *T. testudinum* and *S. filiforme* with macroalgae
- *Halodule wrightii*
- *H. wrightii* and *S. filiforme*



0 0.5 1 Km



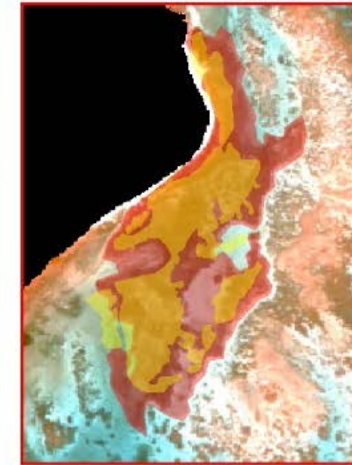


# 1950-2014 Seagrass Cover Change

1950

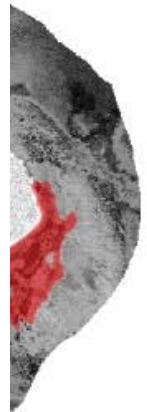
31% increase

Year	Area (m <sup>2</sup> )
1950	598,173
2014	867,731
Change	269,558



## Legend

- 1950 Seagrass Area
- 2014 Seagrass Area



# Acknowledgments

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- This project is supported by NOAA CREST
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