

Summary Report for Rookery Bay National Estuarine Research Reserve

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Seagrass Integrated Mapping and Monitoring Program

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General assessment: Approximately 1,028 acres of seagrass have been mapped using sidescan sonar in the Rookery Bay National Estuarine Research Reserve (NERR). The most extensive seagrass bed in the reserve is located on the Cape Romano shoals (680 acres) in the Ten Thousand Islands. Other

areas have patchy beds. Recently, seagrass beds appear to be declining at Cape Romano. Research and monitoring are under way to determine causes of the decline and to determine whether seagrass beds are declining throughout the NERR.

General Status of Seagrasses in Rookery Bay NERR			
Status and stressors	Status	Trend	Assessment, causes
Seagrass acreage	Yellow	Declining	Undetermined cause
Water clarity	Orange	Poor	Sediment resuspension
Natural events	Green	Sporadic; minimal impacts	El Niño, tropical cyclones
Propeller scarring	Yellow		

Geographic extent: Rookery Bay NERR includes coastal waters in Collier County from Gordan Pass, south of Naples, through the Ten Thousand Islands where the reserve borders Everglades National Park. The reserve has also been involved in monitoring efforts in the Cocohatchee River located in the Delnor-Wiggins State Park, north of the reserve. Turbid waters in the reserve and patchiness of the seagrass make mapping of submerged habitat difficult. Therefore, current locations of seagrass beds have not been well identified and need to be assessed.

Mapping and Monitoring Recommendations

- Remap and analyze changes in areas where seagrass was documented in the 1980s by Collier County and in the area near Cape Romano.
- Expand monitoring efforts to include measurement of nutrients, light attenuation, and sediment accumulation rates.

Management and Restoration Recommendations

- Reduce propeller scarring.
- Determine which factors contribute to the seagrass decline.
- Establish a framework for detecting effects of climate change and ocean acidification on coastal marine resources in the region.

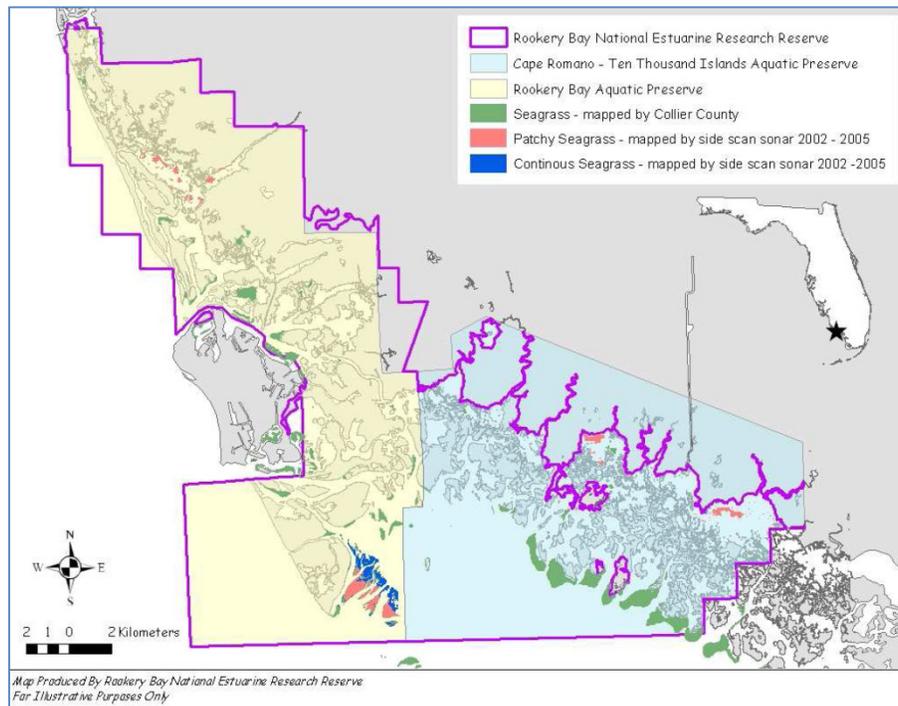


Figure 1 Seagrass cover in Rookery Bay NERR, 2002-2005.

Summary assessment: Recent monitoring assessments suggest that seagrass cover is declining on Cape Romano shoals, the location of the most extensive seagrass beds in Rookery Bay NERR. However, seagrass species do not appear to be changing. Water clarity is highly variable due to changing turbidity from suspended particles. Nutrients and phytoplankton are usually low in Rookery Bay but increase in response to storm runoff. Propeller scarring is localized near Cape Romano, but burial of seagrass beds by sedimentation or shifting sands is of greater concern at Cape Romano, Johnson Bay, and Cocohatchee River.

Seagrass mapping assessment: During 2002–2005, several areas within the reserve were mapped using sidescan sonar. The only area having continuous seagrass was

the Cape Romano seagrass bed (345 acres); the remaining areas all had patchy seagrass (683 acres). Extensive propeller scars were also mapped at Cape Romano. Recently, reserve staff members have observed a decrease in seagrass coverage. Additional sidescan sonar mapping is needed for change analysis.

Monitoring assessment: Seagrass beds near Cape Romano are declining and impacted by propeller scarring. Turtlegrass (*Thalassia testudinum*), shoalgrass (*Halodule wrightii*), and stargrass (*Halophila engelmannii*) were the dominant species at the Cape Romano and Johnson Bay sites. Manateegrass (*Syringodium filiforme*) and paddlegrass (*Halophila decipiens*) also occurred at low levels at Cape Romano and Johnson Bay. Shoalgrass was the only seagrass

Seagrass Status and Potential Stressors in Rookery Bay NERR			
Status indicators	Status	Trend	Assessment, causes
Seagrass cover	Yellow	Declining	Losses, 2007–2009
Seagrass meadow texture	Yellow	Sparse	
Seagrass species composition	Green	Stable	
Overall seagrass trends	Yellow	Declining?	Unknown extent
Seagrass stressors	Intensity	Impact	Explanation
Water clarity	Orange	Poor	High turbidity
Nutrients	Green	Relative low	Affected by runoff, storms
Phytoplankton	Green		
Natural events	Yellow	Minimal impact	Hurricane Wilma, 2005
Propeller scarring	Yellow	Localized	Cape Romano
Sedimentation/shifting sand	Yellow	Localized	Ongoing

Table 1 Seagrass acreage in Rookery Bay Aquatic Preserve, 2003–2005.

	Henderson Creek	Hall Bay	Rookery Bay	Cape Romano
Patchy	41	31	95	335
Continuous	0	0	0	345
All seagrass	41	31	95	680
	Pumpkin Bay	FakaUnion Bay	Fakahatchee Bay	Total
Patchy	80	0	101	683
Continuous	0	0	0	345
All seagrass	80	0	101	1,028

species observed at the Cocohatchee River site, and seagrass in Cocohatchee River is declining. Channel markers were installed in 2008 by Collier County Coastal Zone Management in an effort to minimize

boating impacts. A sand bar in Johnson Bay is shifting, to the detriment of seagrass coverage. The City of Naples monitors seagrass beds in three locations in Naples

Bay. These beds consist of sparse patches of shoalgrass, paddlegrass, and stargrass.

Mapping methods, data, and imagery:

Sidescan sonar data were collected and interpreted by Stan Locker of the University of South Florida, College of Marine Science, during 2002 through 2005. In 2003, aerial photography of coastal southwest Florida was collected at 1:24,000 scale by the South Florida Water Management District and georeferenced by reserve staff. In 2005, aerial photography of the Cape Romano shoals was collected by U.S. Imaging Inc. (Bartow, FL) at 1:24,000 scale and georeferenced by reserve staff. This effort was in conjunction with the collection of sidescan sonar data in order to compare the accuracy of the two seagrass mapping techniques.

Monitoring methods and data: Several areas within the reserve have been monitored annually or quarterly using a fixed-transect modified Braun–Blanquet methodology. Johnson Bay was monitored from 2001 to 2009, Cape Romano from 1998 to 2005, 2010 and 2011; and Cocohatchee River from 2001 to 2003, 2005, and from 2007 to the present. Plans are under way to continue monitoring at Cape Romano. Sites were assessed every 5 m along fixed transects, using a modified Braun–Blanquet method. In Naples Bay, seagrass beds have been monitored along five transects in spring and fall since 2006; measurements include water depth, seagrass species, abundance (Braun–Blanquet), blade length, total percentage cover, epiphyte density, sediment type, shoot density, light attenuation, and water quality parameters.

Pertinent Reports and Scientific Publications

LOCKER, S. D. 2005. Establishing baseline benthic habitat coverages in Faka Union and Fakahatchee bays for present and future environmental studies. Final Report to South Florida Water Management District, Big Cypress Basin Board, Contract No. DG40614, College of Marine Science, University of South Florida, St. Petersburg, Florida. 60 p.

LOCKER, S. D. 2006. Mapping submerged aquatic vegetation using sidescan sonar, Cape Romano shoals, Florida. Final Report, College of Marine Science, University of South Florida, St. Petersburg, Florida. 18 p.

LOCKER, S. D., and A. K. WRIGHT. 2003. Benthic habitat mapping for habitat suitability modeling in Rookery Bay National Estuarine Research Reserve. Final Report, College of Marine Science, University of South Florida, St. Petersburg, Florida. 84 p.

ROOKERY BAY NATIONAL ESTUARINE RESEARCH RESERVE. 2014. Identifying changes in aquatic habitats. Naples, Florida. http://ian.umces.edu/pdfs/ian_newsletter_470.pdf. Accessed April 2016.

SHERIDAN, P. 1997. Benthos of adjacent mangrove, seagrass and non-vegetated habitats in Rookery Bay, Florida, U.S.A. *Estuarine, Coastal and Shelf Science* 44: 455–469.

SHIRLEY, M. A., S. D. LOCKER, and J. L. SCHMID. 2006. A comparison of side scan sonar and aerial photography for submerged aquatic vegetation mapping. Final Report, Rookery Bay National Estuarine Research Reserve, Naples, Florida. 20 p.

General References and Additional Information

Rookery Bay National Estuarine Research Reserve:
<https://rookerybay.org/learn/research/mapping-monitoring/178-learn/research/mapping-monitoring/642-seagrass.html>. Accessed April 2016.

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