Identifying changes in aquatic habitats

Aquatic habitats are the foundation of a healthy estuary

Aquatic habitats, such as seagrass beds, algae, hard bottom and oyster reefs, are the foundation of a healthy estuary because they provide essential habitat for fish and other marine life. These habitats can be affected by altered freshwater inflows from stormwater runoff, poor water quality, and excessive turbidity. Therefore, documenting habitat changes is an important assessment tool for understanding estuarine health and making management recommendations to address water quality, quantity and timing issues. The Rookery Bay National Estuarine Research Reserve hired Scheda Ecological Associates and Taylor Engineering to interpret 2014 aerial photos of the entire Reserve to identify habitats below the water. This data was compared to historical aerial photos that were interpreted for habitat signatures with the goal of identifying habitat changes over an 85-year timeframe in the Rookery Bay estuary.

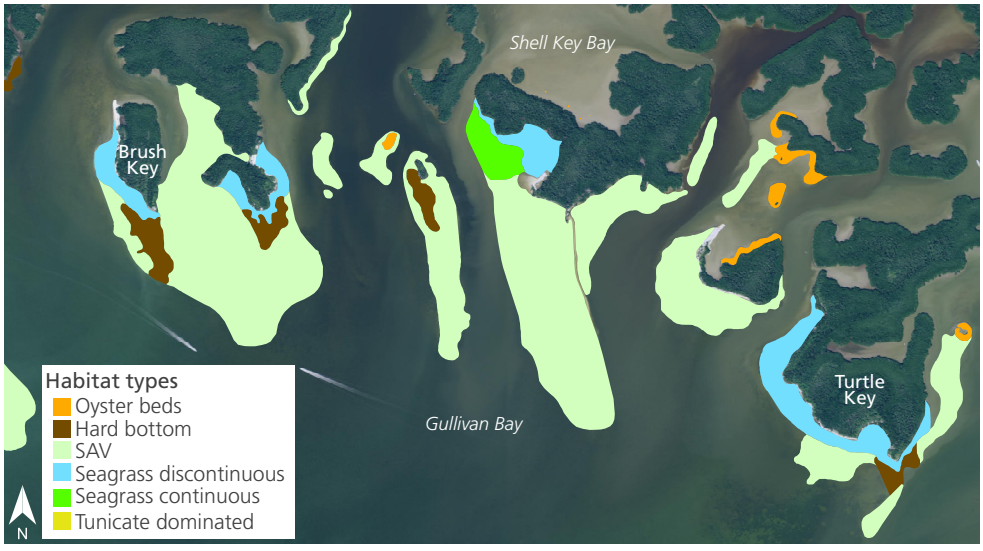
Mapping below-water habitats

A common approach to identifying historic conditions within a natural system is to analyze historic aerial imagery for below-water, or benthic, habitat signatures such as seagrass beds, algae, hard bottom and oyster reefs. High resolution aerial images were analyzed and photo interpreted signatures were identified and mapped for the aquatic areas within the Rookery Bay Reserve.

Submerged aquatic vegetation loss in Rookery Bay

A trend analysis was conducted by comparing historic aerial images to current habitat maps and tallying acreages of submerged aquatic vegetation (SAV). SAV is typically comprised of seagrasses and algae. Most of Florida's open water estuaries have shown significant declines in seagrass populations since the 1950s. The 2014 aerial assessment represents current conditions in the Rookery Bay estuary for six habitat categories. In addition to overall acreages lost, there were several areas within the study site that showed specific changes:

- The area directly downstream and within Henderson Creek showed SAV in the historic conditions map, but these were absent in the 2014 map. Oyster beds were the primary benthic habitat detected within Henderson Creek.
- In Hall Bay, SAV and seagrass beds were mapped from the 2014 aerials, but they were not as prevalent in the historic aerial images.



Rookery Bay Reserve

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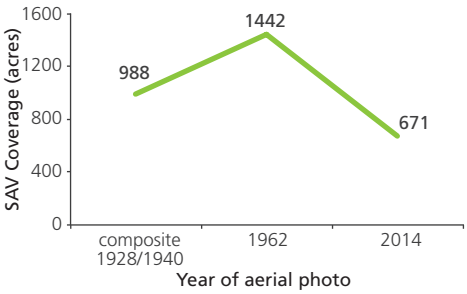
Top: Oyster reefs provide habitat for fish and other species and filter water throughout the estuary. Bottom: During the photo interpretation phase, researchers surveyed benthic habitats using a mask and snorkel, recorded their data, and video-taped underwater conditions.



Left: Results from mapping below-water habitats in the Ten Thousand Islands revealed six different habitat types present. Above: Submerged aquatic vegetation (SAV) trend analysis results confirmed that SAV populations increased in Rookery Bay in 1962, and have had a decreasing trend since.

Management recommendations

Based on the best-available science, the following recommendations will support the restoration and continued health of the Rookery Bay watershed and estuary:

Conduct comprehensive mapping of submerged habitats in the Rookery Bay Reserve, including species identification and on-going monitoring, to determine if management recommendations are effective in restoring lost habitats.

Conduct a trend analysis for the Ten Thousand Islands area based on historic photo interpretation and compare it to the 2014 benthic habitat maps to complete a habitat trend analysis for the entire Rookery Bay Reserve.

Establish comprehensive monitoring and mapping efforts at the 10 watershed discharge points and the corresponding downstream open water estuary sites to evaluate the success of restoration projects.

Address altered flow distributions by correcting inflow overages and deficits by sub-basin. The general trend was excessive flows to the west of Collier Boulevard and deficits to the east.

Restore hydroperiods within the southern Belle Meade flow-way to historic conditions by mitigating the draw-down and draining effects of nearby canals (Collier Boulevard/ Henderson Creek Canal and I-75 Canals).

Complete a salinity model for the estuary and couple it with the Rookery Bay watershed model to develop a comprehensive and predictive upstream/downstream management tool to evaluate restoration efforts and capital improvement projects.

Update and maintain the local scale model and salinity model on a regular basis so that it can be used as a management tool.

Increase comprehensive and inclusive watershed planning and prioritization in the region to better accomplish cost-effective management goals, including the implementation of these recommendations.

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Top to bottom: Mapping of submerged habitats in Rookery Bay Reserve; addressing altered freshwater flows via restoration projects; stakeholder participation and education on altered flows and subsequent restoration activities.

40%

The Rookery Bay Reserve manages approximately 40% of the Collier County coastline.

Restoring the Rookery Bay Estuary Project

The Restoring the Rookery Bay Estuary Project focused on collaborative watershed management through hydrologic, ecologic, and social science research, education, and partnerships. Guided by a diverse stakeholder group, the effort was coordinated by the Rookery Bay National Estuarine Research Reserve in Naples, Florida, and resulted in a wide range of management recommendations.

Funding for this project was provided to the Rookery Bay National Estuarine Research Reserve in 2012–2015 by the National Estuarine Research Reserve System's (NERRS) Science Collaborative which is a cooperative agreement between the National Oceanic and Atmospheric Administration (NOAA) and the University of New Hampshire under NOAA grant NA09NOS4190153.

For more information, visit www.rookerybay.org/restoreRB
Rookery Bay National Estuarine Research Reserve
Naples, Florida
(239) 530-5940

Science communication, design, and layout:
Tabitha Stadler, Renee Wilson, Florida Department of Environmental Protection
Caroline Donovan, Brianne Walsh, UMCES Integration & Application Network

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University of New Hampshire

Rookery Bay National Estuarine Research Reserve

Scheda Ecological Associates

Taylor Engineering, Inc.

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