

ROOKERY BAY NATIONAL ESTUARINE RESEARCH RESERVE

DRAFT MANAGEMENT PLAN



JUNE 2022

Division of State Lands/Acquisition and Restoration Council Requirements

Acquisition and Restoration Council Management Plan Compliance Checklist

The table below summarizes where each requirement of the Acquisition and Restoration Council can be found in the Rookery Bay Reserve management plan.

Land Management Plan Compliance Checklist

This checklist is required for state-owned conservation lands over 160 acres.

Section A: Acquisition Information Items

Item #	Requirement	Statute/Rule	Page Numbers and/or Appendix
1	The common name of the property.	18-2.018 & 18-2.021	Ex. Sum.
2	The land acquisition program, if any, under which the property was acquired.	18-2.018 & 18-2.021	p. 2
3	Degree of title interest held by the Board, including reservations and encumbrances such as leases.	18-2.021	p. 2, 6-11
4	The legal description and acreage of the property.	18-2.018 & 18-2.021	Ex. Sum
5	A map showing the approximate location and boundaries of the property, and the location of any structures or improvements to the property.	18-2.018 & 18-2.021	p. 15, 147
6	An assessment as to whether the property, or any portion, should be declared surplus. <i>Provide Information regarding assessment and analysis in the plan, and provide corresponding map.</i>	18-2.021	p. 13
7	Identification of other parcels of land within or immediately adjacent to the property that should be purchased because they are essential to management of the property. <i>Please clearly indicate parcels on a map.</i>	18-2.021	p. 122 - 26
8	Identification of adjacent land uses that conflict with the planned use of the property, if any.	18-2.021	p. 21
9	A statement of the purpose for which the lands were acquired, the projected use or uses as defined in 253.034 and the statutory authority for such use or uses.	259.032(10)	p. 6-7
10	Proximity of property to other significant State, local or federal land or water resources.	18-2.021	p. 20

Section B: Use Items

Item #	Requirement	Statute/Rule	Page Numbers and/or Appendix
11	The designated single use or multiple use management for the property, including use by other managing entities.	18-2.018 & 18-2.021	p. 6
12	A description of past and existing uses, including any unauthorized uses of the property.	18-2.018 & 18-2.021	p. 12-15, 36, 82-89
13	A description of alternative or multiple uses of the property considered by the lessee and a statement detailing why such uses were not adopted.	18-2.018	N/A
14	A description of the management responsibilities of each entity involved in the property's management and how such responsibilities will be coordinated.	18-2.018	p. 6-11, 64-89
15	Include a provision that requires that the managing agency consult with the Division of Historical Resources, Department of State before taking actions that may adversely affect archeological or historical resources.	18-2.021	p. 72, 73, App. E.2
16	Analysis/description of other managing agencies and private land managers, if any, which could facilitate the restoration or management of the land.	18-2.021	p. 39-43
17	A determination of the public uses and public access that would be consistent with the purposes for which the lands were acquired.	259.032(10)	p. 82-89
18	A finding regarding whether each planned use complies with the 1981 State Lands Management Plan, particularly whether such uses represent "balanced public utilization," specific agency statutory authority and any other legislative or executive directives that constrain the use of such property.	18-2.021	p. 6-11
19	Letter of compliance from the local government stating that the LMP is in compliance with the Local Government Comprehensive Plan.	BOT requirement	App. E.3
20	An assessment of the impact of planned uses on the renewable and non-renewable resources of the property, including soil and water resources, and a detailed description of the specific actions that will be taken to protect, enhance and conserve these resources and to compensate/mitigate damage caused by such uses, including a description of how the manager plans to control and prevent soil erosion and soil or water contamination.	18-2.018 & 18-2.021	p. 18-27, 64-89

21	*For managed areas larger than 1,000 acres, an analysis of the multiple-use potential of the property which shall include the potential of the property to generate revenues to enhance the management of the property provided that no lease, easement, or license for such revenue-generating use shall be entered into if the granting of such lease, easement or license would adversely affect the tax exemption of the interest on any revenue bonds issued to fund the acquisition of the affected lands from gross income for federal income tax purposes, pursuant to Internal Revenue Service regulations.	18-2.021 & 253.036	N/A
22	If the lead managing agency determines that timber resource management is not in conflict with the primary management objectives of the managed area, a component or section, prepared by a qualified professional forester, that assesses the feasibility of managing timber resources pursuant to section 253.036, F.S.	18-021	N/A
23	A statement regarding incompatible use in reference to Ch. 253.034(10).	253.034(10)	p. 82-89

* The following taken from 253.034(10) is not a land management plan requirement; however, it should be considered when developing a land management plan: The following additional uses of conservation lands acquired pursuant to the Florida Forever program and other state-funded conservation land purchase programs shall be authorized, upon a finding by the Board of Trustees, if they meet the criteria specified in paragraphs (a)-(e): water resource development projects, water supply development projects, storm-water management projects, linear facilities and sustainable agriculture and forestry. Such additional uses are authorized where: (a) Not inconsistent with the management plan for such lands; (b) Compatible with the natural ecosystem and resource values of such lands; (c) The proposed use is appropriately located on such lands and where due consideration is given to the use of other available lands; (d) The using entity reasonably compensates the titleholder for such use based upon an appropriate measure of value; and (e) The use is consistent with the public interest.

Section C: Public Involvement Items

Item #	Requirement	Statute/Rule	Page Numbers and/or Appendix
24	A statement concerning the extent of public involvement and local government participation in the development of the plan, if any.	18-2.021	App. C
25	The management prospectus required pursuant to paragraph (9)(d) shall be available to the public for a period of 30 days prior to the public hearing.	259.032(10)	N/A
26	LMPs and LMP updates for parcels over 160 acres shall be developed with input from an advisory group who must conduct at least one public hearing within the county in which the parcel or project is located. <i>Include the advisory group members and their affiliations, as well as the date and location of the advisory group meeting.</i>	259.032(10)	App. C.1
27	Summary of comments and concerns expressed by the advisory group for parcels over 160 acres	18-2.021	App. C.1.3

28	During plan development, at least one public hearing shall be held in each affected county. Notice of such public hearing shall be posted on the parcel or project designated for management, advertised in a paper of general circulation, and announced at a scheduled meeting of the local governing body before the actual public hearing. <i>Include a copy of each County's advertisements and announcements (meeting minutes will suffice to indicate an announcement) in the management plan.</i>	253.034(5) & 259.032(10)	App. C.2
29	The manager shall consider the findings and recommendations of the land management review team in finalizing the required 10-year update of its management plan. <i>Include manager's replies to the team's findings and recommendations.</i>	259.036	N/A
30	Summary of comments and concerns expressed by the management review team, if required by Section 259.036, F.S.	18-2.021	N/A
31	If manager is not in agreement with the management review team's findings and recommendations in finalizing the required 10-year update of its management plan, the managing agency should explain why they disagree with the findings or recommendations.	259.036	N/A

Section D: Natural Resources

Item #	Requirement	Statute/Rule	Page Numbers and/or Appendix
32	Location and description of known and reasonably identifiable renewable and non-renewable resources of the property regarding soil types. <i>Use brief descriptions and include USDA maps when available.</i>	18-2.021	p. 23-25
33	Insert FNAI based natural community maps when available.	ARC consensus	p. 30
34	Location and description of known and reasonably identifiable renewable and non-renewable resources of the property regarding outstanding native landscapes containing relatively unaltered flora, fauna and geological conditions.	18-2.021	Ex. Sum
35	Location and description of known and reasonably identifiable renewable and non-renewable resources of the property regarding unique natural features and/or resources including but not limited to virgin timber stands, scenic vistas, natural rivers and streams, coral reefs, natural springs, caverns and large sinkholes.	18-2.018 & 18-2.021	p. 28-34, 37-39
36	Location and description of known and reasonably identifiable renewable and non-renewable resources of the property regarding beaches and dunes.	18-2.021	p. 18-23
37	Location and description of known and reasonably identifiable renewable and non-renewable	18-2.018 & 18-2.021	p. 23

	resources of the property regarding mineral resources, such as oil, gas and phosphate, etc.		
38	Location and description of known and reasonably identifiable renewable and non-renewable resources of the property regarding fish and wildlife, both game and non-game, and their habitat.	18-2.018 & 18-2.021	p. 28-35, App. B.3.1
39	Location and description of known and reasonably identifiable renewable and non-renewable resources of the property regarding State and Federally listed endangered or threatened species and their habitat.	18-2.021	p. 28-35, App. B.3.2
40	The identification or resources on the property that are listed in the Natural Areas Inventory. <i>Include letter from FNAI or consultant where appropriate.</i>	18-2.021	p. 28-34
41	Specific description of how the managing agency plans to identify, locate, protect and preserve or otherwise use fragile, nonrenewable natural and cultural resources.	259.032(10)	p. 28-36, 71-78, App. E.2
42	Habitat Restoration and Improvement	259.032(10) & 253.034(5)	
42-A.	Describe management needs, problems and a desired outcome and the key management activities necessary to achieve the enhancement, protection and preservation of restored habitats and enhance the natural, historical and archeological resources and their values for which the lands were acquired.	259.032(10) & 253.034(5)	p. 28-36, 71-78
42-B.	Provide a detailed description of both short (2-year planning period) and long-term (10-year planning period) management goals, and a priority schedule based on the purposes for which the lands were acquired and include a timeline for completion.	259.032(10) & 253.034(5)	App. D.1
42-C.	The associated measurable objectives to achieve the goals.	259.032(10) & 253.034(5)	p. 76-78, App. D.1
42-D.	The related activities that are to be performed to meet the land management objectives and their associated measures. <i>Include fire management plans - they can be in plan body or an appendix.</i>	259.032(10) & 253.034(5)	p. 76-78, App. D.1
42-E.	A detailed expense and manpower budget in order to provide a management tool that facilitates development of performance measures, including recommendations for cost-effective methods of accomplishing those activities.	259.032(10) & 253.034(5)	App. D.1
43	***Quantitative data description of the land regarding an inventory of forest and other natural resources and associated acreage. <i>See footnote.</i>	253.034(5)	Ex. Sum
44	Sustainable Forest Management, including implementation of prescribed fire management	18-2.021, 253.034(5) & 259.032(10)	
44-A.	Management needs, problems and a desired outcome (see requirement for # 42-A).	18-2.021, 253.034(5) & 259.032(10)	App. B.6

44-B.	Detailed description of both short and long-term management goals (see requirement for # 42-B).	18-2.021, 253.034(5) & 259.032(10)	p. 110; App. B.6
44-C.	Measurable objectives (see requirement for #42-C).	18-2.021, 253.034(5) & 259.032(10)	p. 110
44-D.	Related activities (see requirement for #42-D).	18-2.021, 253.034(5) & 259.032(10)	N/A
44-E.	Budgets (see requirement for #42-E).	18-2.021, 253.034(5) & 259.032(10)	App. D.1
45	Imperiled species, habitat maintenance, enhancement, restoration or population restoration	259.032(10) & 253.034(5)	
45-A.	Management needs, problems and a desired outcome (see requirement for # 42-A).	259.032(10) & 253.034(5)	p. 34-35, 67-78, 81-89
45-B.	Detailed description of both short and long-term management goals (see requirement for # 42-B).	259.032(10) & 253.034(5)	p. 75-78, 81-89, App. D.1
45-C.	Measurable objectives (see requirement for #42-C).	259.032(10) & 253.034(5)	p. 75-78, 81-89, App. D.1
45-D.	Related activities (see requirement for #42-D).	259.032(10) & 253.034(5)	p. 75-78, 81-89, App. D.1, App. D.4
45-E.	Budgets (see requirement for #42-E).	259.032(10) & 253.034(5)	App. D.1
46	***Quantitative data description of the land regarding an inventory of exotic and invasive plants and associated acreage. <i>See footnote.</i>	253.034(5)	App. B.3.3
47	Place the Arthropod Control Plan in an appendix. If one does not exist, provide a statement as to what arrangement exists between the local mosquito control district and the management unit.	BOT requirement via lease language	App. B.4
48	Exotic and invasive species maintenance and control	259.032(10) & 253.034(5)	
48-A.	Management needs, problems and a desired outcome (see requirement for # 42-A).	259.032(10) & 253.034(5)	p. 35-36, 75, 82, App. D.1
48-B.	Detailed description of both short and long-term management goals (see requirement for # 42-B).	259.032(10) & 253.034(5)	p. 75, 82, App. D.1
48-C.	Measurable objectives (see requirement for #42-C).	259.032(10) & 253.034(5)	p. 75, 82, App. D.1
48-D.	Related activities (see requirement for #42-D).	259.032(10) & 253.034(5)	p. 75, 82, App. D.1
48-E.	Budgets (see requirement for #42-E).	259.032(10) & 253.034(5)	App. D.1

Section E: Water Resources

Item #	Requirement	Statute/Rule	Page Numbers and/or Appendix
49	A statement as to whether the property is within and/or adjacent to an aquatic preserve or a designated area of critical state concern or an area under study for such designation. <i>If yes, provide a list of the appropriate managing agencies that have been notified of the proposed plan.</i>	18-2.018 & 18-2.021	p. 1-4
50	Location and description of known and reasonably identifiable renewable and non-renewable resources of the property regarding water resources, including water classification for each water body and the identification of any such water body that is designated as an Outstanding Florida Water under Rule 62-302.700, F.A.C.	18-2.021	Ex. Sum, p. 1-4, 27
51	Location and description of known and reasonably identifiable renewable and non-renewable resources of the property regarding swamps, marshes and other wetlands.	18-2.021	p. 29-31
52	***Quantitative description of the land regarding an inventory of hydrological features and associated acreage. <i>See footnote.</i>	253.034(5)	Ex. Sum, p.32
53	Hydrological Preservation and Restoration	259.032(10) & 253.034(5)	
53-A.	Management needs, problems and a desired outcome (see requirement for # 42-A).	259.032(10) & 253.034(5)	p. 64-89, App. D.1
53-B.	Detailed description of both short and long-term management goals (see requirement for # 42-B).	259.032(10) & 253.034(5)	p. 64-89, App. D.1
53-C.	Measurable objectives (see requirement for #42-C).	259.032(10) & 253.034(5)	p. 64-89, App. D.1
53-D.	Related activities (see requirement for #42-D).	259.032(10) & 253.034(5)	p. 64-89, App. D.1, App. D.4
53-E.	Budgets (see requirement for #42-E).	259.032(10) & 253.034(5)	App. D.1

Section F: Historical, Archaeological and Cultural Resources

Item #	Requirement	Statute/Rule	Page Numbers and/or Appendix
54	**Location and description of known and reasonably identifiable renewable and non-renewable resources of the property regarding archeological and historical resources. <i>Include maps of all cultural resources except Native American sites, unless such sites are major points of interest that are open to public visitation.</i>	18-2.018, 18-2.021 & per DHR's request	Ex. Sum, p. 36, App. B.5
55	***Quantitative data description of the land regarding an inventory of significant land, cultural or historical features and associated acreage.	253.034(5)	Ex. Sum, p. 36, App. B.5
56	A description of actions the agency plans to take to locate and identify unknown resources such as surveys of unknown archeological and historical resources.	18-2.021	p. 78, App. D.1, App. E.2

57	Cultural and Historical Resources	259.032(10) & 253.034(5)	
57-A.	Management needs, problems and a desired outcome (see requirement for # 42-A).	259.032(10) & 253.034(5)	p. 78, App. D.1, App. E.2
57-B.	Detailed description of both short and long-term management goals (see requirement for # 42-B).	259.032(10) & 253.034(5)	p. 78, App. D.1, App. E.2
57-C.	Measurable objectives (see requirement for #42-C).	259.032(10) & 253.034(5)	p. 78, App. D.1, App. E.2
57-D.	Related activities (see requirement for #42-D).	259.032(10) & 253.034(5)	p. 78, App. D.1, App. E.2
57-E.	Budgets (see requirement for #42-E).	259.032(10) & 253.034(5)	App. D.1

** While maps of Native American sites should not be included in the body of the management plan, the DSL urges each managing agency to provide such information to the Division of Historical Resources for inclusion in their proprietary database. This information should be available for access to new managers to assist them in developing, implementing and coordinating their management activities.

Section G: Facilities (Infrastructure, Access, Recreation)

Item #	Requirement	Statute/Rule	Page Numbers and/or Appendix
58	***Quantitative data description of the land regarding an inventory of infrastructure and associated acreage. <i>See footnote.</i>	253.034(5)	p. 92-93
59	Capital Facilities and Infrastructure	259.032(10) & 253.034(5)	
59-A.	Management needs, problems and a desired outcome (see requirement for # 42-A).	259.032(10) & 253.034(5)	p. 92-93, App. D.1
59-B.	Detailed description of both short and long-term management goals (see requirement for # 42-B).	259.032(10) & 253.034(5)	App. D.1
59-C.	Measurable objectives (see requirement for #42-C).	259.032(10) & 253.034(5)	App. D.1
59-D.	Related activities (see requirement for #42-D).	259.032(10) & 253.034(5)	App. D.1
59-E.	Budgets (see requirement for #42-E).	259.032(10) & 253.034(5)	App. D.1
60	*** Quantitative data description of the land regarding an inventory of recreational facilities and associated acreage.	253.034(5)	p. 39-43, 82-89
61	Public Access and Recreational Opportunities	259.032(10) & 253.034(5)	
61-A.	Management needs, problems and a desired outcome (see requirement for # 42-A).	259.032(10) & 253.034(5)	p. 86-89, App. D.1
61-B.	Detailed description of both short and long-term management goals (see requirement for # 42-B).	259.032(10) & 253.034(5)	p. 86-89, App. D.1
61-C.	Measurable objectives (see requirement for #42-C).	259.032(10) & 253.034(5)	p. 86-89, App. D.1
61-D.	Related activities (see requirement for #42-D).	259.032(10) & 253.034(5)	p. 86-89, App. D.1, D.4
61-E.	Budgets (see requirement for #42-E).	259.032(10) & 253.034(5)	App. D.1

Section H: Other/ Managing Agency Tools

Item #	Requirement	Statute/Rule	Page Numbers and/or Appendix
62	Place this LMP Compliance Checklist at the front of the plan.	ARC and managing agency consensus	Front & App. E.1
63	Place the Executive Summary at the front of the LMP. Include a physical description of the land.	ARC and 253.034(5)	Ex. Sum
64	If this LMP is a 10-year update, note the accomplishments since the drafting of the last LMP set forth in an organized (categories or bullets) format.	ARC consensus	App. D.3
65	Key management activities necessary to achieve the desired outcomes regarding other appropriate resource management.	259.032(10)	p.64-89
66	Summary budget for the scheduled land management activities of the LMP including any potential fees anticipated from public or private entities for projects to offset adverse impacts to imperiled species or such habitat, which fees shall be used to restore, manage, enhance, repopulate, or acquire imperiled species habitat for lands that have or are anticipated to have imperiled species or such habitat onsite. The summary budget shall be prepared in such a manner that it facilitates computing an aggregate of land management costs for all state-managed lands using the categories described in s. 259.037(3) which are resource management, administration, support, capital improvements, recreation visitor services, law enforcement activities.	253.034(5)	App. D.1
67	Cost estimate for conducting other management activities which would enhance the natural resource value or public recreation value for which the lands were acquired, include recommendations for cost-effective methods in accomplishing those activities.	259.032(10)	App. D.1
68	A statement of gross income generated, net income and expenses.	18-2.018	N/A

*** The referenced inventories shall be of such detail that objective measures and benchmarks can be established for each tract of land and monitored during the lifetime of the plan. All quantitative data collected shall be aggregated, standardized, collected, and presented in an electronic format to allow for uniform management reporting and analysis. The information collected by the DEP pursuant to s. 253.0325(2) shall be available to the land manager and his or her assignee.

EXECUTIVE SUMMARY



Red mangrove in background with black mangrove pneumatophores in foreground

EXECUTIVE SUMMARY

Rookery Bay National Estuarine Research Reserve Management Plan

Plan Purpose and Scope

This Rookery Bay National Estuarine Research Reserve Management Plan is a strategic document that describes natural and cultural resources within the Reserve and identifies priority goals, objectives, and strategies used to adequately protect and manage these resources. This management plan covers the period 2022 through 2027. Rookery Bay Reserve represents a cooperative partnership between the Florida Department of Environmental Protection (DEP) and the National Oceanic and Atmospheric Administration (NOAA) along with other federal, state, and local partners. This allows the Reserve to conduct and facilitate ongoing research and monitoring, educate the public, increase public awareness and individual stewardship, conduct resource management, manage public use, and train local decision-makers. Table ES-1 provides a summary of management information for Rookery Bay Reserve. No changes to the boundaries of the Reserve have taken place since the last management plan.

This management plan revises and supersedes the previous (2012–2017) management plan for Rookery Bay Reserve as well as the two aquatic preserves (Cape Romano-Ten Thousand Islands Aquatic Preserve and Rookery Bay Aquatic Preserve) that are located completely within the boundaries of the Reserve. All management actions described in this plan targeting and addressing the needs for any submerged natural resources serve the combined management needs of Rookery Bay Reserve and the two aquatic preserves. This plan addresses all local, state, and federal requirements for the two aquatic preserves and Rookery Bay Reserve.

The mission of Rookery Bay Reserve is to *serve southwest Florida as a trusted resource for science-based information fostering connected human and ecological communities*. The vision of the Reserve is that *communities in southwest Florida value nature and prosper in concert with healthy estuaries*.

Reserve Context

Rookery Bay Reserve is managed by a cooperative agreement between NOAA and Florida DEP's Office of Resilience and Coastal Protection, which serves as the lead state agency for the Reserve. The Reserve spans approximately 110,000 acres (445.2 km²) on Florida's Gulf coast south of Naples. The Reserve covers approximately 40 percent of the Collier County coastline, from Gordon Pass in Naples southward to the northwestern boundary of Everglades National Park. Major habitats of the Reserve are summarized in Table ES-1 below. Most of these habitats are submerged, such as coastal wetlands and mangroves, including an excellent example of subtropical mangrove forested estuary. The coastal ecosystem within the Reserve has national and international significance as the western edge of the Everglades ecosystem, yet it is located adjacent to one of the fastest developing coastal areas in the United States. Habitats within the Reserve provide essential feeding and nesting grounds for a diverse assemblage of coastal and marine wildlife, including over 150 species of birds, 400 species of plants, and 228 species of fishes.

Significant land acquisition efforts funded by state and federal grants took place from the 1970s through the mid-2000s, but since that time such funding has decreased. The ability to acquire more land has decreased further by residential developments that continue to be constructed in areas surrounding the Reserve. While Rookery Bay Reserve is not currently seeking a boundary addition, it continues to support efforts to acquire inholdings and strategic parcels as well as accept land donations whenever available.

Included within Rookery Bay Reserve are portions of the Ten Thousand Islands National Wildlife Refuge, which are managed under an agreement between Florida DEP and the U.S. Fish and Wildlife Service (USFWS). Additionally, Florida DEP leases approximately 3,700 acres (15.0 km²) of wetlands and submerged lands in the heart of the Reserve from National Audubon Society, and these areas are managed as part of the Reserve.

The economic value of sustaining the environmental health of Rookery Bay Reserve is significant to southwest Florida and is of great importance to the state as a whole. Tourism, sport fishing, and boating are among the most important industries in southwest Florida. Each injects millions of dollars in the Florida economy annually, and each is inextricably linked to the long-term protection and conservation of the coastal ecosystem within the Reserve. The Friends of Rookery Bay (FORB), a non-profit volunteer community-based organization, was established over 30 years ago in recognition of these values and to support the Reserve's mission.

Lead agency: Florida DEP's Office of Resilience and Coastal Protection (RCP)

Name of property: Rookery Bay National Estuarine Research Reserve

Location: Collier County, Florida

Total acreage: Approximately 110,000 acres (445.2 km²)

Area under Florida DEP's RCP lease: 37,344 upland acres (151.1 km²)

TABLE ES-1: SUMMARY OF MANAGEMENT INFORMATION FOR ROOKERY BAY NATIONAL ESTUARINE RESEARCH RESERVE

The table below is of the total acres under RCP Management Units by the Florida Cooperative Land Cover Map habitat types (GIS-derived)

Cooperative Land Cover Map Habitat	Acres Managed by RCP
Beach Dune	111
Coastal Berm	249
Cultural - Terrestrial	2594
Cypress	50
Dry Flatwoods	557
Estuarine	72659
Invasive/Exotic Plants	30
Mangrove Swamp	31064
Maritime Hammock	391
Marshes	164
Mesic Hammock	30
Mixed Hardwood - Coniferous Swamps	54
Other Coniferous Wetlands	620
Other Hardwood Wetlands	33
Prairies and Bogs	214
Salt Marsh	455
Sand Beach (Dry)	228
Scrub	44
Shell Mound	179
Spoil Area	154
Successional Hardwood Forest	123
Total	110,000

Lease/management agreement number: 3819

Designated use: Single use for conservation and preservation

Number of legislative or executive directives that constrain the use of the property: None

Management responsibilities: Florida DEP's RCP lead manager

Designation: National Estuarine Research Reserve (NERR)

Sublease(s): None

Encumbrances: There are reverter clauses on some parcels

Type of acquisition: Conservation and recreation lands, environmentally endangered lands, donations

Unique features: Ten Thousand Islands and Rookery Bay estuaries are the westernmost extent of the Everglades ecosystem. Habitats include extensive pristine mangrove-forested wetlands, undeveloped barrier islands, and some of the last remaining intact tropical hardwood hammocks and coastal scrub habitats in southwest Florida.

Archaeological/historical sites: Numerous prehistoric midden and historic sites

Management Needs

Ecosystems goal: Habitats and species within the Reserve exhibit long-term integrity, function, and biodiversity.

Human connections goal: Connections among people and resources in the Reserve are understood and enhanced.

Resilience goal: Strong science-to-management connections ensure that ecosystems and communities across the Gulf of Mexico are resilient and adaptable to environmental changes and episodic events.

Outreach goal: Value of the coastal environment drives informed stewardship actions.

Public use: Recreational boating, fishing, hiking, birding, camping, eco-tourism

Acquisition needs: Approximately 1,500 acres (6.1 km²)

Surplus lands: None

Public involvement: See Appendix C

Rookery Bay NERR Managed Areas (GIS-derived data)

Agency Breakdown	Area
Rookery Bay Aquatic Preserve:	58,076 acres (235.0 km ²)
Cape Romano-Ten Thousand Islands Aquatic Preserve (CRTTIAP):	51,470 acres (208.3 km ²) (includes 16,490 acres [66.7 km ²] managed by USFWS)
Uplands under RCP lease:	37,344 acres (151.1 km ²)
U.S. Fish and Wildlife Service (USFWS)	16,490 acres (66.7 km ²) (overlaps with Cape Romano-Ten Thousand Islands Aquatic Preserve)

Coastal Management Issues & Reserve Goals

Rookery Bay Reserve's priority coastal management issues align with those addressed by the 2017–2022 NERR System strategic plan: environmental change, water quality, and habitat protection. In southwest Florida environmental change, including sea level rise and increased storminess, are of concern for both natural and human communities. The Reserve is in a unique position to address these issues through the connection to NOAA's established programs that focus on climate change, as well as the focus from the State of Florida to enhance coastal resilience. Water quality has long been a focus of work in the Reserve and is an important topic to local stakeholders in southwest Florida. The Reserve's watershed is a mosaic of inland and coastal water bodies, along with groundwater, that collectively form the watershed which drains into the Gulf of Mexico. Parts of the Reserve's watershed include increasingly urbanized areas that can lead to impacts to water quality. The long history of water quality monitoring and education about

the importance of a healthy watershed to many audiences enables the Reserve to be a leader in addressing water quality issues in the region. Additionally, the Reserve's habitat protection effort is a key component of coastal resilience to environmental change and water quality issues. The stewardship and research sectors of the Reserve are an ideal partnership to test and assess innovative land management actions to protect and restore coastal habitats. Through these actions, the Reserve addresses habitat protection issues and provides an example of land stewardship to other land managers in the region.

Reserve Programs Overview

The work of Rookery Bay Reserve staff is integrated across eight main departments consisting of the four core NERR sectors of research, stewardship, education, and coastal training combined with the departments of visitor services, communications, facilities, and administration. While each department has its own niche, most work is collaborative between two or more departments. The integrated approach at the Reserve facilitates adaptive management to accomplish the missions of the Reserve, Florida DEP, and NOAA as well as meeting the needs of the Reserve's stakeholders and partners. This management plan is framed by a strategic plan with four goals focused on ecosystems, human connections, resilience, and engagement. The individual program chapters within the management plan are guided by the strategic plan, creating a collaborative approach to achieve all four goals, which are based upon key objectives and strategies that address relevant issues. Such issues involve watershed management, protecting ecological functions, listed species and habitat management, ecosystem values, establishing science-to-management linkages, increasing community awareness and involvement, and promoting informed coastal decisions.

As of 2022, Rookery Bay Reserve has 30 full-time employees serving in coastal management, research, education, administration, facilities, and training roles that directly support the goals and strategies outlined in this management plan. In 2016, the Reserve entered a partnership with Florida International University (FIU), resulting in nine full-time staff (of the 30 Reserve staff) now employed by FIU. Additionally, the Reserve provides office space and logistical support to a full-time biologist for Audubon Florida, which enhances the partnership with Audubon Florida and Audubon of the Western Everglades.

In addition to the long-term protection and management of 110,000 acres (445.2 km²) of valuable coastal habitats, the Reserve has a unique role in southwest Florida by serving as a living laboratory. In this role, the Reserve facilitates science that informs decision-making and provides a platform for environmental education and outreach. To accomplish this function, the Reserve works with many strategic partners such as Collier County, City of Marco Island, City of Naples, USFWS, South Florida Water Management District, Florida Park Service, Florida Forest Service, National Park Service, FIU, Florida Gulf Coast University, Conservancy of Southwest Florida, Audubon Florida, and Mote Marine Laboratory. These partnerships are vital to the Reserve to help accomplish its mission goals.

Table of Contents

Executive Summary	ES-1
Plan Purpose & Scope	ES-2
Reserve Context	ES-2
Coastal Management Issues & Reserve Goals	ES-4
Reserve Programs Overview	ES-5
Chapter 1. Introduction to the System	1
Chapter 2. Background of Rookery Bay National Estuarine Research Reserve	4
Reserve Mission	5
History and Local Management of the Rookery Bay National Estuarine Research Reserve	5
State Management Authority	6
State Statutory Authority	8
Administrative Rules of the Florida Administrative Code	9
Federal Management Authorities	11
Citizen Support Organization	12
Allowable/Unallowable Uses	12
Core Area of the Rookery Bay National Estuarine Research Reserve	16
Buffer Zones of the Rookery Bay National Estuarine Research Reserve	16
Adjacent Land Use	19
Climate Change and Other Sources of Environmental Stress	22
Climate Change (Reserve Sensitivity and Vulnerability)	23
Episodic Events	24
Watershed Alteration	25
Chapter 3. Strategic Plan	26
Priority Coastal Management Issues and Reserve Niche	31
Strategic Plan	32
Chapter 4. Natural, Social and Cultural Resources	41
Geomorphology	41
Geology	44
Minerals	45
Soils	45
Hydrology	46
Climate and Weather	49
Habitat Types	51
Vegetation Classification	Error! Bookmark not defined.
Native Species	53
Listed Species	54
Invasive Non-native Species	54
Problem Species	54
Population Demographics	55
Jobs and Employment Drivers	55

Ecosystem Services	56
Archaeological and Cultural Resources.....	58
Chapter 5. Research and Monitoring.....	61
Research and Monitoring Program Context	62
Research and Monitoring Program Capacity	65
Research and Monitoring Program Delivery.....	66
Research and Monitoring Program Future Needs and Opportunities.....	71
Program Evaluation.....	77
Chapter 6. Education Program.....	78
Education Program Context	79
Education Program Capacity	80
Education Program Delivery	80
Future Needs and Opportunities for the Education Department.....	81
Education-Related Objectives and Actions	81
Chapter 7. Coastal Training Program	84
Coastal Training Program (CTP) Context	85
Coastal Training Program Capacity	86
Coastal Training Program Delivery.....	86
Coastal Training Future Needs and Opportunities	87
Training-Related Objectives and Actions	87
Chapter 8. Volunteer Program.....	92
Objectives and Strategies	93
Volunteer Positions	93
Volunteer Recruitment	94
Volunteer Training	94
Evaluating Volunteers	94
Rewarding Volunteer Involvement.....	95
Volunteer Program-Related Objectives and Actions	95
Chapter 9. Communications Program.....	97
Communications Program Context.....	98
Communications Program Capacity.....	98
Communications Program Delivery	98
Communications Program Future Needs and Opportunities	99
Communications Program Related Objectives and Actions	99
Chapter 10. Resource Protection Plan (Stewardship Plan).....	102
Surveillance and Enforcement	102
State Management Authority	103
Resource Protection Challenges	104
Resource Protection Objectives and Actions.....	109
Monitoring and Evaluation Plan Strategies	118
Public Access and Visitor Experience Opportunities	120
Public Access Challenges.....	120

Public Access Objectives and Actions	121
Land Acquisition Plan	122
Priority Areas Acquisition Strategy	122
Preferred Methods for Establishing State Control	125
Fair Market Value Estimates	125
Estimated Acquisition Timeline	126
Prescribed Fire Plan	126
Invasive Species Control Plan.....	127
Impacts of Activities & Monitoring and Evaluation Strategies	138
Restoration Plan.....	139
Prioritization Process and Criteria	139
Priority Restoration Projects	139
Restoration Projects.....	140
Chapter 11. Facilities Plan and Construction	144
Existing Facilities	145
Facility Challenges and Gaps.....	147
Planned Facilities	149
Chapter 12. Administrative Plan	152
Background	152
Staffing	153
Administration	156
Research.....	156
Education	156
Visitor Services	157
Stewardship	157
Communications	157
Facilities.....	157
Coastal Training Program.....	157
Team OCEAN	Error! Bookmark not defined.
Anticipated Needs.....	157

List of Tables

Table ES-1.	Summary of Management Information for Rookery Bay National Estuarine Research Reserve	ES-3
Table 1.	Strategic Plan Overview for Rookery Bay National Estuarine Research Reserve.....	33
Table 2.	Rookery Bay Reserve’s Water Quality Monitoring Stations.....	68

List of Figures

Figure 1.	National Estuarine Research Reserve System Map.....	3
Figure 2.	Federal and State Management Structures for Rookery Bay National Estuarine Research Reserve	6
Figure 3.	Location and Boundaries of Rookery Bay National Estuarine Research Reserve	15
Figure 4.	The Core Area and Buffer Zones of Rookery Bay National Estuarine Research Reserve	17
Figure 5.	Drainage Basins of Rookery Bay National Estuarine Research Reserve.....	18
Figure 6.	Public Lands in and around Rookery Bay National Estuarine Research Reserve	20
Figure 7.	Florida Land Use Cover and Forms Classification System (FLUCCS) in and around Rookery Bay National Estuarine Research Reserve.....	21
Figure 8.	Designated Areas of Critical State Concern in and around Rookery Bay National Estuarine Research Reserve	22
Figure 9.	Sea Level Rise Trend along Florida’s Coastline Based on NOAA (2018) Data	23
Figure 10.	Geomorphology in and around Rookery Bay National Estuarine Research Reserve.....	43
Figure 11.	Marine Terraces in and around Rookery Bay National Estuarine Research Reserve.....	43
Figure 12.	Major Soil Series of Rookery Bay National Estuarine Research Reserve	46
Figure 13.	Hydrology of Rookery Bay National Estuarine Research Reserve by Drainage Basin	48
Figure 14.	Water Depths Recording during Hurricane Irma in September 2017 at Rookery Bay National Estuarine Research Reserve.....	50
Figure 15.	The Tracks of Major Hurricanes that have Impacted Rookery Bay National Estuarine Research Reserve	51
Figure 16.	Cooperative Land Cover Habitat at Rookery Bay National Estuarine Research Reserve	52
Figure 17.	Submerged Benthic Habitat at Rookery Bay National Estuarine Research Reserve	53
Figure 18.	Conceptual Model of Ecosystem Services at Rookery Bay National Estuarine Research Reserve	57
Figure 19.	General Locations of Cultural Resources of Rookery Bay National Estuarine Research Reserve	60
Figure 20.	Water Quality Station Locations at Rookery Bay National Estuarine Research Reserve	67
Figure 21.	Map of Future (2012–2025) Land Use in Collier County, Florida.....	106
Figure 22.	Map of the Picayune Strand Restoration Project Northeast of Rookery Bay Reserve	107
Figure 23.	Map of Belle Meade North of Rookery Bay Reserve.....	108
Figure 24.	Public Access Locations within Rookery Bay National Estuarine Research Reserve.....	120
Figure 25.	Proposed Future Land Acquisition areas in and around Rookery Bay National Estuarine Research Reserve	125
Figure 26.	Priority Coastal Upland Areas of Rookery Bay National Estuarine Research Reserve	133

Figure 27. Priority Coastal Upland Habitats of Rookery Bay National Estuarine Research Reserve	134
Figure 28. Resource Management Zones of Rookery Bay National Estuarine Research Reserve	138
Figure 29. Areas Planned for Habitat Restoration at Rookery Bay National Estuarine Research Reserve	143
Figure 30. Facility Locations at Rookery Bay National Estuarine Research Reserve	147
Figure 31. Organizational Framework and Staff Funding Sources at Rookery Bay National Estuarine Research Reserve	155

List of Appendices

ID	Name
A.1	Executive Summary (ARC Table Format)
A.2	15 Code of Federal Regulations Part 921 (National Estuarine Research Reserve System)
A.3	Acquisition and Restoration Council - Conceptual State Lands Management Plan
A.4	Aquatic Preserve Resolution
A.5	Florida Statutes
A.6	Florida Administrative Code, Chapters 18-20 through 18-23 and Chapter 62-302
A.7	Management Agreements
A.7.1	Memorandums of Understanding and Memorandums of Agreement
A.7.2	Memorandum of Understanding Between NOAA and Florida DEP Management of NERRs
A.8	Trustees Lease Agreement and Related Documents
B.1	Acronym List
B.2	Glossary of Terms
B.3	References
B.4	Species Lists
B.4.1	Endangered and Threatened Species List
B.4.2	List of Invasive Non-native Animal Species
B.4.3	List of Invasive Plant Species
B.4.4	List of Nuisance and Early Detection and Rapid Response (EDRR) Species
B.5	Drone Policy
B.6	Prescribed Fire Management Plan
B.7	Recorded Managed Archaeological Sites
B.8	Nuisance and Invasive Species Control Plan
B.9	Florida Cooperative Land Cover Classifications
C.1	Rookery Bay Advisory Council
C.1.1	List of Members and Their Affiliations
C.2	Public Meetings
C.2.1	Advertisements in Local Newspaper
C.2.2	Florida Administrative Register Notices
C.2.3	Advertisement Flyers
C.2.4	Summary of the Online Public Meeting
C.2.5	Summary of the In-Person Public Meeting
C.2.6	Summary of Public Comments and Responses
C.3	Federal Review of this Management Plan
C.3.1	Federal Review and Public Commenting of this Management Plan
C.3.2	Federal Register Notice
D.1	Current Goals, Objectives and Strategies Table
D.2	Budget Summary Table
D.3	Major Accomplishments Since the Approval of the Previous Plan
E.1	Acquisition and Restoration Council Management Plan Compliance Checklist
E.2	Letter of Compliance of the Management Plan with the Local Government (Pending) Comprehensive Plan

- E.3 Management Prospectus
- E.4 Management Procedures for Archaeological and Historical Sites and Properties on State-Owned or Controlled Lands
- E.5 Analysis of Contracting Potential
- E.6 Land Management Review Team Recommendations
- E.7 Timber Management Analysis
- E.8 NOAA Evaluation of Rookery Bay Reserve Management, 2011–2019

CHAPTER 1. INTRODUCTION TO THE SYSTEM



Aerial view of Rookery Bay

Introduction to the National Estuarine Research Reserve System

The National Estuarine Research Reserve System is a network of 30 protected estuarine areas that represent different biogeographic regions and estuarine types within the United States [Figure 1]. Reserves are protected for long-term research, monitoring, education, and coastal stewardship. The Reserve System, created by the [Coastal Zone Management Act of 1972](#), currently protects over one million acres (4,047 km²) of estuarine lands and waters. The system is managed in accordance with federal regulations at [15 CFR Part 921](#).

Each reserve has unique boundaries based on the nature of its ecosystem. The boundaries include the land and water areas needed to protect an intact ecological unit. Reserves classify their land and water areas as either core areas or buffer zones. These classifications determine the level of protection and the types of activities allowed within each area or zone. Each reserve develops the programming most appropriate for its location while also delivering required system-wide programs focused on research and monitoring, education, training, and stewardship.

The Reserve System is a partnership program between the National Oceanic and Atmospheric Administration (NOAA) and the coastal states. NOAA provides funding, national guidance, and technical assistance for reserve operations and system-wide programs, facilities construction and land acquisition, graduate fellowships, and collaborative science projects. The state partner manages the reserve on a daily basis and works collaboratively with local and regional partners. NOAA also leads projects that integrate data or support decision-making at the national level.

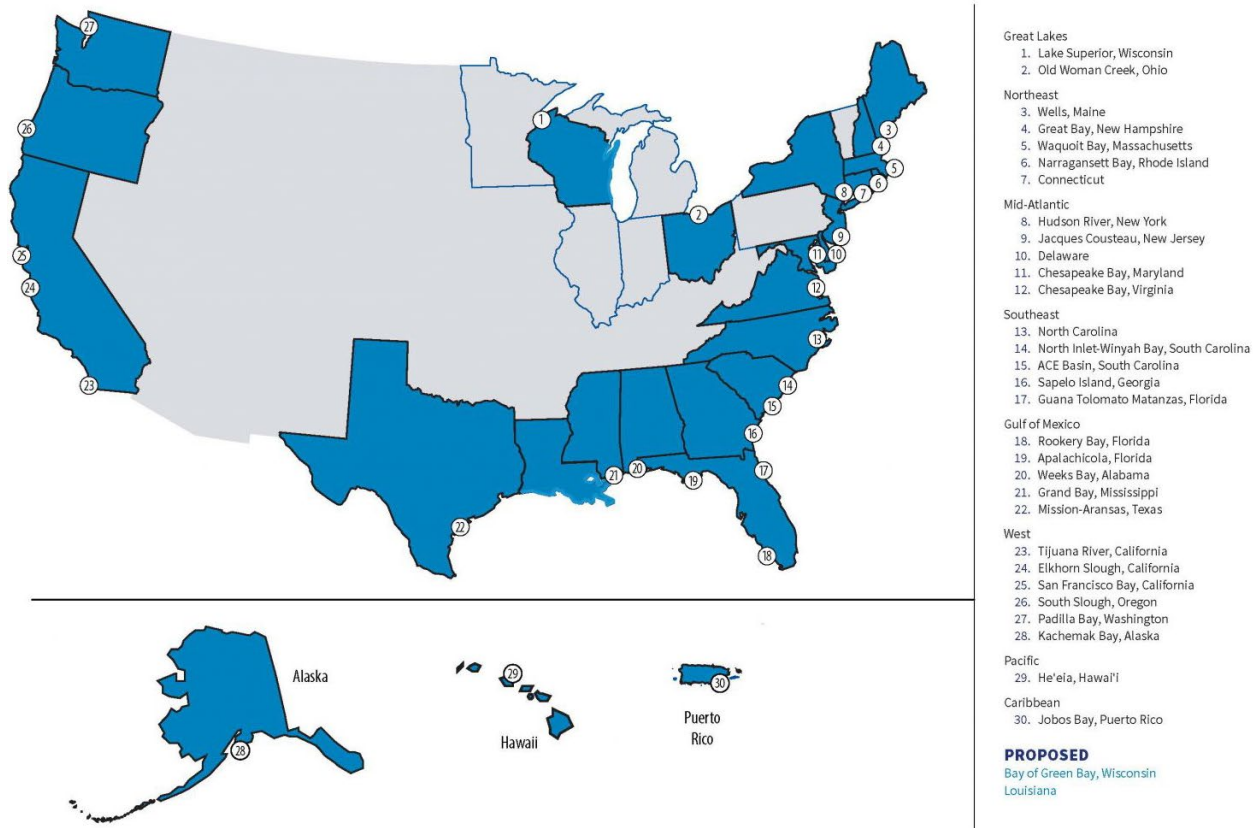


FIGURE 1: NATIONAL ESTUARINE RESEARCH RESERVE SYSTEM MAP

Each reserve is required to develop a management plan that contains the goals, objectives, and strategies for that reserve. Management plans are updated every five years and must be approved by NOAA. These plans enable the reserves and NOAA to track progress and realize opportunities for growth. Each plan describes how the reserve will carry out its foundational research, education, and training programs. Each plan also outlines administration, resource protection, public access, land acquisition, and facility plans, as well as restoration and resource manipulation plans if applicable. The plans also incorporate strategies designed to help the reserve contribute to the system's national goals. NOAA periodically evaluates reserves for compliance with federal requirements and their approved management plan.

The most recent strategic plan for the National Estuarine Research Reserve System can be found at <https://coast.noaa.gov/data/docs/nerrs/StrategicPlan.pdf>. It describes the following goals for the system.

1. **Protecting Places:** Enhance and inspire stewardship, protection, and management of estuaries and their watersheds in coastal communities through place-based approaches.
2. **Applying Science:** Improve the scientific understanding of estuaries and their watersheds through the development and application of reserve research, data, and tools.
3. **Educating Communities:** Advance environmental appreciation and scientific literacy, allowing for science-based decisions that positively affect estuaries, watersheds, and coastal communities.

CHAPTER 2.

BACKGROUND OF ROOKERY BAY NATIONAL ESTUARINE RESEARCH RESERVE



National Estuaries Day, a family-friendly educational event at Rookery Bay Reserve

Reserve Mission

The mission of Rookery Bay Reserve is to *serve southwest Florida as a trusted resource for science-based information fostering connected human and ecological communities.*

History and Local Management of the Rookery Bay National Estuarine Research Reserve

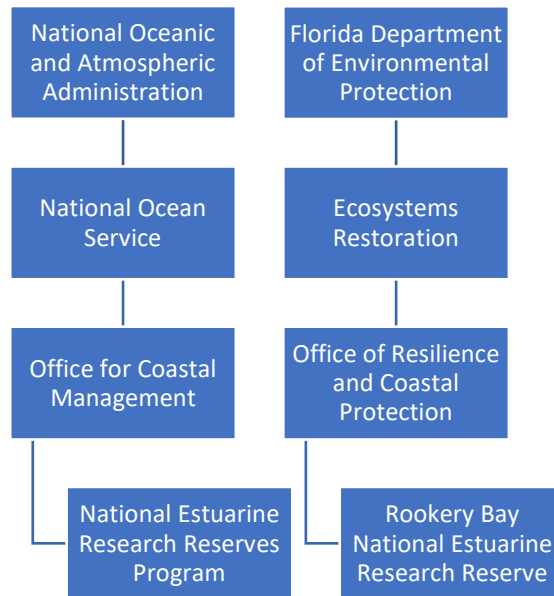
Efforts to preserve the Rookery Bay estuary were initiated in 1964, when developmental pressures were directed toward this relatively undisturbed estuary. A proposed road would have allowed access to the area and facilitated residential development. However, local opposition resulted in a site recommendation for preservation. Instrumental in this action were the newly founded Collier County Conservancy, now Conservancy of Southwest Florida (CSF), along with the National Audubon Society (NAS) and The Nature Conservancy (TNC). From 1964 through 1974, over 3,700 acres (15 km²) of lands associated with Rookery Bay were acquired, primarily through the efforts of these three organizations. The title for most of these wetlands was vested in NAS and the area was designated as an Audubon Wildlife Sanctuary.

To provide adequate protection for the Rookery Bay ecosystem and establish a long-term source of operational funds, CSF, NAS, and TNC requested that the State of Florida apply to the National Oceanic and Atmospheric Administration (NOAA) for Rookery Bay Reserve to attain a National Estuarine Research Reserve (NERR) status. As a condition of the designation process, these parties signed an agreement with the state government in 1977 to lease NAS's holdings around Rookery Bay to the State of Florida for 99 years (Appendix A.8). An Environmental Impact Statement was finalized in 1977 that included plans for initial operation and acquisition (NOAA 1977).

Rookery Bay Reserve was formally designated in 1978 as a NERR in accordance with Section 315 of the Coastal Zone Management Act. A three-member Reserve Management Board composed of representatives of Florida Department of Environmental Protection (DEP), CSF, and NAS provides for periodic review of issues and site management as outlined in the lease agreement in Appendix A.8. For details on the Management Board, refer to Appendix A.7.

Since the 1978 designation of Rookery Bay Reserve, Florida DEP has constructed and operates an on-site headquarters facility, a two-story visitor center, research laboratories, two field research stations and dormitories, two boat docks, a maintenance facility, and fleet support facilities.

The current state and federal management structures for Rookery Bay Reserve are outlined in Figure 2 below.



**FIGURE 2: FEDERAL AND STATE MANAGEMENT STRUCTURES FOR
ROOKERY BAY NATIONAL ESTUARINE RESEARCH RESERVE**

State Management Authority

The laws supporting aquatic preserve management are the direct result of the public’s awareness of, and interest in, protecting Florida’s aquatic environment. The extensive dredge-and-fill activities of the late 1960s spawned this widespread public concern. In 1966, the Internal Improvement Trust Fund (the Trustees) created Florida’s first aquatic preserve, Estero Bay Aquatic Preserve in Lee County.

In 1967, the Florida Legislature passed the Randall Act (Chapter 67-393, Laws of Florida), which established procedures regulating previously unrestricted dredge-and-fill activities on state-owned submerged lands. That same year, the legislature provided the statutory authority (Section 253.03, Florida Statute [F.S.]) for the Trustees to exercise proprietary control over state-owned lands. Also, in 1967, government focus on protecting Florida’s productive water bodies from degradation due to development led the Trustees to establish a moratorium on the sale of submerged lands to private interests. An Interagency Advisory Committee was created to develop strategies for the protection and management of state-owned submerged lands.

In 1968, the Florida Constitution was revised to declare in Article II, Section 7, the state’s policy of conserving and protecting natural resources and areas of scenic beauty. This constitutional provision also established the authority for the Florida Legislature to enact measures for the abatement of air and water pollution. Later in 1968, the Interagency Advisory Committee issued a report recommending the establishment of 26 aquatic preserves.

The Trustees acted on this recommendation in 1969 by establishing 16 aquatic preserves and adopting a resolution for a statewide system of such preserves. In 1975, the Florida Legislature passed the Florida Aquatic Preserve Act (Act) that was enacted as Chapter 75-172, Laws of Florida, and later became Chapter 258, Part II, F.S. This Act codified the already existing aquatic preserves and established standards and

criteria for activities within those preserves. Additional aquatic preserves were individually adopted through 1989.

Originally adopted by the Trustees in 1981, the Conceptual State Lands Management Plan also provides essential guidance concerning the management of sovereign submerged lands and aquatic preserves and their important resources, including unique natural features, seagrasses, endangered species, and archaeological and historical resources. Management plans generated by Florida DEP's Office of Resilience and Coastal Protection (RCP) are consistent with the Conceptual State Lands Management Plan.

Through delegation of authority from the Trustees, RCP has proprietary authority to manage the sovereign submerged lands, the water column, spoil islands (which are merely deposits on sovereign submerged lands), and some of the natural islands and select coastal uplands to which the Trustees hold title.

Florida has two NERR sites in addition to Rookery Bay Reserve: Apalachicola NERR in Franklin, Gulf, and Calhoun counties and Guana-Tolomato Matanzas NERR in St. Johns and Flagler counties. These and other NERRs across the United States include state-owned uplands in addition to sovereign submerged lands. Florida's first acquisition program was established in 1963 as the Land Acquisition Trust Fund, which funded the Outdoor Recreation and Conservation Program to purchase parks and other recreational areas. The Environmentally Endangered Lands program was created in 1972.

In 1979, the current Division of State Lands was created within the Florida Department of Natural Resources, a predecessor agency to Florida DEP. The same year, the Florida Legislature substantially amended Chapter 253, F.S., pertaining to the use and management of state lands and created the Conservation and Recreation Lands (CARL) program to replace the Environmentally Endangered Lands program. CARL and its successors were eventually codified in Chapter 259, F.S. The year 1981 saw the establishment of the Save Our Coast program, which augmented the Land Acquisition Trust Fund to focus on coastline purchases. The CARL program eventually subsumed the responsibilities of both Save Our Coast program and Land Acquisition Trust Fund.

The Preservation 2000 program commenced in 1990 to fund the CARL program and other acquisition initiatives. Preservation 2000 was intended as a 10-year program and was succeeded by the Florida Forever program. Florida Forever continues to provide for the evaluation of land for acquisition and inclusion within the boundaries of Florida's three NERRs.

Enforcement of state statutes and rules relating to criminal violations and non-criminal infractions rests with Florida Fish and Wildlife Conservation Commission's (FWC's) Division of Law Enforcement and with local law enforcement agencies. Enforcement of administrative remedies rests on Florida DEP district offices and water management districts (WMDs).

This plan complies with the Conceptual State Lands Management Plan, adopted March 17, 1981, by the Board of Trustees of the Internal Improvement Trust Fund and represents balanced public utilization, specific agency statutory authority, and other legislative and executive constraints. The Conceptual State Lands Management Plan also provides essential guidance concerning the management of sovereign submerged lands and aquatic preserves and their important resources, including unique natural features, seagrasses, endangered species, and archaeological and historical resources.

RCP has proprietary authority delegated from the Trustees to manage the sovereign submerged lands, the water column, spoil islands (deposits on sovereign submerged lands), and some of the natural islands and select coastal uplands to which the Trustees hold title.

State Statutory Authority

The fundamental laws providing management authority for the aquatic preserves are contained in Chapters 258 and 253, F.S. These statutes establish the proprietary role of the Governor and Cabinet, sitting as Trustees over all sovereign submerged lands. In addition, these statutes empower the Trustees to adopt and enforce rules and regulations for managing all sovereign submerged lands, including aquatic preserves. The Florida Aquatic Preserve Act was enacted by the Florida Legislature in 1975 and is codified in Chapter 258, F.S. (See Appendix A.5 for Florida Statutes).

The legislative intent for establishing aquatic preserves is stated in Section 258.36, F.S.:

It is the intent of the Legislature that the state-owned submerged lands in areas which have exceptional biological, aesthetic, and scientific value, as hereinafter described, be set aside forever as aquatic preserves or sanctuaries for the benefit of future generations.

This statement, along with the other applicable laws, provides a foundation for the management of aquatic preserves. Management will emphasize the preservation of natural conditions and will include only sovereign submerged or state-owned lands that are specifically authorized for inclusion as part of an aquatic preserve.

Management responsibilities for aquatic preserves may be fulfilled directly by the Trustees or by Florida DEP through delegation of authority. Other governmental bodies may also participate in the management of aquatic preserves under appropriate instruments of authority issued by the Trustees. RCP staff serve as the primary managers who implement provisions of the management plans and rules applicable to the aquatic preserves. However, regulations are enacted and enforced primarily by Florida DEP districts, in addition to WMDs and the Division of Aquaculture in the Florida Department of Agriculture and Consumer Services. Together, these agencies grant regulatory permits and are delegated authority by the Trustees to allow proprietary authorizations for certain public and private uses or activities within the aquatic preserves. Staff of these agencies evaluate proposed uses or activities in a given aquatic preserve and assess the possible impacts on natural resources. Project reviews are primarily evaluated in accordance with the criteria in the Act, Chapter 18-20, Florida Administrative Code (F.A.C.), and this management plan. Staff comments, and those of the public, are submitted to the appropriate permitting staff for consideration in their issuance of any delegated authorizations in aquatic preserves or in developing recommendations to be presented to the Trustees. This mechanism provides a basis for the Trustees to evaluate public interest and the merits of any project while also considering potential environmental impacts to the aquatic preserves. Any planned event on sovereign submerged lands requires either a letter of consent, a lease, an easement, or other approval from the Trustees.

The same authorities discussed above for Chapters 258 and 253, F.S., also provide management directives relevant to NERRs. Of critical importance, Section 253.86, F.S., grants RCP the explicit authority to promulgate rules for the management of uplands assigned to its management. Additionally, NERR management must consider Chapter 259, F.S., which authorizes and governs acquisition and use of lands to conserve and protect important habitats, wildlife, water resources, and archaeological sites in accordance with the Land Conservation Act of 1972. Land-managing agencies must prepare management plans in compliance with guidelines established in Chapter 259, F.S. Once again, the Trustees fulfill the

proprietary management overview role for NERRs, with management responsibilities assigned to staff acting as ‘agents’ of the Trustees, pursuant to delegations of authority, management agreements, and other legal mechanisms. Typically, a lease agreement with the Trustees delegates management authority for the uplands assigned to RCP. Leases for Trustees lands within Rookery Bay Reserve are included in Appendix A.8.

Many provisions of the Florida Statutes that empower non-RCP programs within Florida DEP or other agencies may be important to the management of RCP sites. For example, Chapter 403, F.S., authorizes Florida DEP to create rules concerning the designation of Outstanding Florida Waters, which is a special category of water bodies within the state. Water bodies under this category are worthy of special protection due to their natural attributes. Florida DEP’s authority to designate Outstanding Florida Waters provides aquatic preserves with additional regulatory protection. Chapter 379, F.S., regulates saltwater fisheries and wildlife management and provides enforcement authority and powers for FWC’s Division of Law Enforcement. Chapter 597, F.S., regulates the use of sovereign submerged lands for aquaculture. The Florida Legislature declares in Section 253.68(2)(a), F.S., that aquaculture shall be recognized as a practicable resource management alternative to produce marine aquaculture products, to protect and conserve natural resources, to reduce competition for natural stocks, and to augment and restore natural populations. Section 253.68(b), F.S., adds that it’s the state’s policy to foster aquaculture development when such activity is consistent with state resource management goals, environmental protection, proprietary interests, and the state aquaculture plan. Section 258.42, F.S., provides that aquaculture is in the public interest and that aquaculture leases may be authorized in aquatic preserves. Because NERR boundaries encompass areas directly managed by other state and federal agencies, interested parties should refer to the management plans produced by the relevant agencies for a discussion of their legal authorities. It is outside the scope of this management plan to provide an exhaustive list of every statute having the potential to affect NERR management.

Administrative Rules of the Florida Administrative Code

Chapters 18-18, 18-20, and 18-21, F.A.C., are the three administrative rules directly applicable to the uses allowed in aquatic preserves specifically and sovereign submerged lands generally. These rules are intended to be cumulative, meaning that Chapter 18-21 should be read together with Chapter 18-18 or Chapter 18-20 to determine what activities are permissible within an aquatic preserve. If Chapter 18-18 or Chapter 18-20 are silent on an issue, Chapter 18-21 will control; if a conflict is perceived between the rules, the stricter standards of Chapter 18-18 or Chapter 18-20 supersede those of Chapter 18-21. Because Chapter 18-21 concerns all sovereign submerged lands, it is logical to discuss its provisions first. (See Appendix A.6 for Florida Administrative Codes.)

Originally codified in 1982, Chapter 18-21, F.A.C., is meant to:

...“aid in fulfilling the trust and fiduciary responsibilities of the Board of Trustees of the Internal Improvement Trust Fund for the administration, management and disposition of sovereignty lands; to insure maximum benefit and use of sovereignty lands for all the citizens of Florida; to manage, protect and enhance sovereignty lands so that the public may continue to enjoy traditional uses including, but not limited to, navigation, fishing and swimming; to manage and provide maximum protection for all sovereignty lands, especially those important to public drinking water supply, shellfish harvesting, public recreation, and fish and wildlife propagation and management; to insure that all public and private activities on sovereignty lands which generate revenues or exclude traditional public uses provide just

compensation for such privileges; and to aid in the implementation of the State Lands Management Plan.”

To that end, Chapter 18-21, F.A.C., contains provisions on general management policies, forms of authorization for activities on sovereign submerged lands, and fees applicable for those activities. In the context of this rule, the term ‘activity’ includes the construction of docks, piers, boat ramps, boardwalks, mooring pilings; dredging of channels; filling; removal of logs, sand, silt, clay, gravel, or shell; and the removal or planting of vegetation (Rule 18-21.003, F.A.C.). To be authorized on sovereign submerged lands, activities must be not contrary to the public interest (Rule 18-21.004, F.A.C.).

Chapter 18-21, F.A.C., also sets policies on aquaculture, geophysical testing (using gravity, shock wave, and other geological techniques to obtain data on oil, gas, or other mineral resources), and special events related to boat shows and boat displays. This chapter also addresses spoil islands, preventing their development in most cases, making this chapter particularly important to RCP site management.

Chapters 18-18 and 18-20, F.A.C., apply standards and criteria for activities in aquatic preserves that are stricter than those of Chapter 18-21. Chapter 18-18 is specific to the Biscayne Bay Aquatic Preserve and is more extensively described in that site’s management plan. Chapter 18-20 is applicable to all other aquatic preserves. It further restricts the types of activities for which authorizations may be granted for use of sovereign submerged lands and requires that structures that are authorized be limited to those necessary to conduct water-dependent activities. Moreover, for certain activities to be authorized, *“it must be demonstrated that no other reasonable alternative exists which would allow the proposed activity to be constructed or undertaken outside the preserve”* (Paragraph 18-20.004(1) (g), F.A.C.).

Chapter 18-20, F.A.C., expands on the definition of “public interest” by outlining a balancing test that is to be used to determine whether benefits exceed costs in the evaluation of requests for sale, lease, or transfer of interest of sovereign submerged lands within an aquatic preserve. The rule also provides for the analysis of the cumulative impacts of a request in the context of prior, existing, and pending uses within the aquatic preserve, including both direct and indirect effects.

Chapter 18-20, F.A.C., directs management plans and resource inventories to be developed for every aquatic preserve. Further, the rule provides provisions specific to certain aquatic preserves and indicates the means by which the Trustees can establish new or expand existing aquatic preserves.

Because NERRs manage uplands in addition to sovereign submerged lands within aquatic preserves, they must follow the provisions of Chapters 18-2, 18-23, and 18-24, F.A.C. Chapter 18-2, F.A.C., establishes policies concerning use of uplands owned by the Trustees and managed by state entities. Originally codified in 1996, this rule expands upon the guidelines set forth in the Conceptual State Lands Management Plan (this plan is in Appendix A.3). It requires that uses of the uplands be in the public interest and mandates that direct and indirect impacts and cumulative effects be considered as part of the public interest determination.

Chapter 18-23, F.A.C., supplements Chapter 18-2, F.A.C., by establishing guidelines and criteria specifically for uplands managed by RCP. It limits certain activities on these uplands, such as hunting and admission of pets, *“to conserve, preserve and restore the natural and cultural resources and ensure the safety and enjoyment of visitors”* (Subsection 18-23.007(2), F.A.C.). The rule provides a schedule of fines for violations of these policies, which are considered non-criminal infractions.

Chapter 18-24, F.A.C., delineates procedures specific to the use of monies from the Florida Forever Trust Fund for the acquisition and restoration of uplands. It also prescribes the procedures that are to be followed by the Acquisition and Restoration Council in advising the Trustees in administering the Florida Forever Program.

As with statutes, aquatic preserve management relies on the application of many other Florida DEP rules along with those of other outside agencies. Perhaps most notably, Chapter 62-302, F.A.C., concerns the classification of surface waters, including criteria for Outstanding Florida Waters, a designation that provides for the state's highest level of protection for water quality. All aquatic preserves contain Outstanding Florida Waters designations. No activity may be permitted within Outstanding Florida Waters that degrades ambient water quality unless the activity is determined to be in the public interest.

The listing of the many administrative rules that do not directly address RCP's responsibilities but do affect RCP-managed sites is outside the scope of this management plan. For areas within Rookery Bay Reserve that are directly managed by other agencies, interested parties should refer to the relevant management plans for those areas for a discussion of their applicable rules and regulations.

Federal Management Authorities

The NERR System was created by the Coastal Zone Management Act of 1972, as amended, 16 United States Code Section (USC) 1461, to establish the NERR System. This system is a network of protected areas established to promote informed management of the nation's estuaries and coastal habitats. The NERR System currently consists of 30 reserves in 24 states and territories, protecting over 1.4 million acres (5,666 km²) of estuarine lands and waters.

The mission of the NERR System, as stated in 15 Code of Federal Regulations (CFR) Section 921.1(a) is:

... "the establishment and management, through Federal-state cooperation, of a national system of Estuarine Research Reserves representative of the various regions and estuarine types in the United States. Estuarine Research Reserves are established to provide opportunities for long-term research, education, and interpretation."

The five primary goals of the NERR System are to (15 CFR Section 921.1(b)):

1. Ensure a stable environment for research through long-term protection of NERR resources;
2. Address coastal management issues identified as significant through coordinated estuarine research within the NERR System;
3. Enhance public awareness and understanding of estuarine areas and provide suitable opportunities for public education and interpretation;
4. Promote federal, state, public, and private use of one or more reserves within the NERR System when such entities conduct estuarine research; and
5. Conduct and coordinate estuarine research within the NERR System, gathering and making available information necessary for improved understanding and management of estuarine areas.

Federal regulation 15 CFR 921.50(a) specifies that research funds are to be used to:

- Support management-related research that will enhance scientific understanding of the NERR ecosystem;

- Provide information needed by reserve managers and coastal ecosystem policy makers; and
- Improve public awareness and understanding of estuarine ecosystems and estuarine management issues.

Citizen Support Organization

The Friends of Rookery Bay, Inc. (FORB) is a Citizen Support Organization (CSO) that engages local community volunteers and raises funds to help support ongoing work at Rookery Bay Reserve. It started with a handful of residents who cared about the Rookery Bay estuary. The original steering committee included a science teacher, a college professor, an attorney, and a real estate agent. Today, FORB is about 800 members strong, making it one of the largest CSOs in Florida. It now plays an instrumental role in working directly with Reserve staff to help ensure that resources are available to accomplish Rookery Bay Reserve's important mission. FORB has continued to improve their fundraising abilities and develop and improve partnerships since the creation of this CSO three decades ago. They raise over \$100,000 annually to help match federal and state funds for the Reserve.

FORB helps to recruit and sustain active members from the local communities of Naples and Marco Island. Members are trained volunteers that assist staff with everything from shark-tagging research in the Ten Thousand Islands to maintenance work projects.

FORB is also instrumental in assisting Rookery Bay staff with tasks such as sea turtle monitoring, fish trawling, and teaching elementary and high school programs. They also assist with many tasks at the Environmental Learning Center and the Facilities Department. At the Environmental Learning Center, FORB volunteers maintain inventory for the Palmetto Patch Nature Store, teach young students about estuaries, host special events, and offer guided boat and kayak tours. FORB volunteers help spread Rookery Bay Reserve's message of informed stewardship throughout the community.



Loggerhead sea turtle hatchlings

Allowable/Unallowable Uses

The majority of Rookery Bay Reserve's lands are owned by the State of Florida and are open to the public with some minor exceptions. FWC has designated several areas as Critical Wildlife Areas (CWAs) for the protection of wading birds and shorebirds. The five CWAs in Collier County are ABC Islands, Big Marco Pass, Caxambas Pass, Rookery Islands, and Second Chance. To reduce disturbance of bird populations, these areas may be closed year-round or only seasonally to all public entrances.

Recreational and commercial fishing activities within Rookery Bay Reserve are under the jurisdiction of FWC and are currently allowed in all areas of the Reserve except where prohibited by a CWA or other FWC regulations. Recreational hunting is prohibited in all upland areas of the Reserve, per Chapter 18-23, F.A.C., but may be allowed in open water (i.e., duck hunting) as regulated by FWC and the U.S. Fish and Wildlife Service (USFWS).

Pedestrian access is allowed in all areas of Rookery Bay Reserve. Camping is allowed at designated locations. Off-road vehicles are prohibited throughout the Reserve except for specific research, maintenance, and related activities conducted by Reserve staff and CSF staff.

Location and Boundaries

NERR System Program Regulations state that a NERR's boundaries "*encompass an adequate portion of the key land and water areas of the natural system to approximate an ecological unit and to ensure effective conservation*" (15 CFR Section 921.11 (c)(3)). Rookery Bay Reserve's boundaries (Figure 3) provide the basis for long-term protection and preservation of the estuarine ecosystem and include significant physical, chemical, and biological factors that contribute to the diversity of native plants and animals and habitats occurring within the estuary. The Reserve includes resources that attract a broad range of research and educational interests.

In 1985, Florida DEP and CSF developed a land acquisition project boundary to purchase and incorporate privately owned lands from willing sellers adjacent to Rookery Bay Reserve. The Land Acquisition Selection Committee (now the Acquisition and Restoration Council) approved the project boundaries (Figure 3), enabling these lands to be eligible for purchase using CARL program funds. The project's purpose is to protect the Reserve's water quality, preserve habitat for native plants and animals, and provide recreational opportunities to local communities in southwestern Florida. The Rookery Bay CARL program boundaries identified approximately 10,850 acres (43.9 km²) of key land and water areas adjacent to the original, smaller area of Rookery Bay Reserve. All lands from the original Ecological Impact Statement were included in the CARL boundaries. In 1990, the Reserve and community partners initiated an effort to gain local support for the project. Significant state funding was provided through Preservation 2000, enacted by the Florida Legislature in 1990 to provide up to \$300 million annually in bond revenues to purchase environmentally sensitive lands. Additional federal funds to acquire the Reserve lands have been provided by NOAA and USFWS.

The CARL program project boundaries were modified in 1995 to include additional parcels along Henderson Creek. As a result of significant efforts by local, state, and federal partners, the Rookery Bay CARL program project was declared essentially complete by the State of Florida in 1999. Parcels totaling approximately 3,575 acres (14.5 km²) represent privately-owned inholdings and are not within the boundaries of Rookery Bay Reserve. Only the outside perimeter boundaries of the Reserve are depicted on the boundary maps, not the privately owned inholdings.

Florida DEP, supported by the Reserve Management Board, submitted a proposal to NOAA in 2000 to expand Rookery Bay Reserve's boundaries to incorporate adjacent state-owned coastal lands. Approved by NOAA in 2002, the expanded boundaries of the Reserve incorporate key land and water components that total approximately 110,000 acres (445.2 km²) (Figure 3). The Reserve's boundaries include an estuarine system extending from its northern terminus, at Gordon Pass, southward through all the state-owned uplands and submerged lands within the Ten Thousand Islands region.

Florida DEP signed a lease agreement in 1990 with the Board of Trustees of the Internal Improvement Trust Fund that provides management authority for all uplands within Rookery Bay Reserve (see Appendix A.8). Title and authority for management of submerged lands within the Reserve is provided for in Chapter 258, F.S. All lands within the Reserve are essential components of a contiguous estuarine ecosystem and will not be considered as surplus under current and planned management strategies.

The total area of open waters within Rookery Bay Reserve is estimated to be 70,000 acres (283.3 km²), or approximately 64 percent of the Reserve. The remaining 40,000 acres (161.9 km²) are composed primarily of estuarine mangrove wetlands; fresh to brackish water marshes; and upland habitats consisting of pine flatwoods, cabbage palm associations, coastal hammocks and dunes, xeric scrub, cypress sloughs, and prairies.

Approximately 3,772 acres (15.3 km²) within Rookery Bay Reserve are leased to Florida DEP by NAS, TNC, and CSF and are managed by the Reserve. State-owned lands are held in fee simple title by the Board of Trustees of the Internal Improvement Trust Fund. Such lands include 70,000 acres (283.3 km²) of submerged lands and approximately 22,928 acres (92.8 km²) of acquired lands. An additional 13,300 acres (53.8 km²) within the Reserve was acquired by the State of Florida as part of a settlement agreement with the Deltona Corporation.

Florida DEP protects, conserves, and manages Florida's natural resources and enforces the state's environmental laws. It is the lead agency in Florida state government for environmental management and stewardship and commands one of the broadest charges of all the state's agencies, protecting Florida's air, water, and land. Florida's environmental priorities include restoring the Florida Everglades; improving air quality; restoring and protecting the water quality in springs, lakes, rivers, and coastal waters; conserving environmentally sensitive lands; and providing citizens and visitors with recreational opportunities, now and in the future.

The RCP is the unit within Florida DEP that manages more than 4 million acres (16,187 km²) of submerged lands and select coastal uplands. This includes three NERRs, 41 aquatic preserves, the Florida Keys National Marine Sanctuary, and the Coral Reef Conservation Program (CRCP). Significant portions of the 41 aquatic preserves are managed in cooperation with NOAA, funded by the Coastal Zone Management Program.

RCP manages sites in Florida for the conservation and protection of natural and historical resources and resource-based public use that is compatible with the conservation and protection of these lands. RCP is a strong supporter of the NERR System and its approach to coastal ecosystem management.

The aquatic preserves within each of Florida's three designated NERR sites provide additional protection beyond that of the surrounding NERR and may afford a foundation for additional protective zoning in the future. Each of the Florida NERR managers also serves as a regional manager overseeing multiple other aquatic preserves in their region. This management structure advances RCP's ability to manage its sites as a part of the larger statewide system.

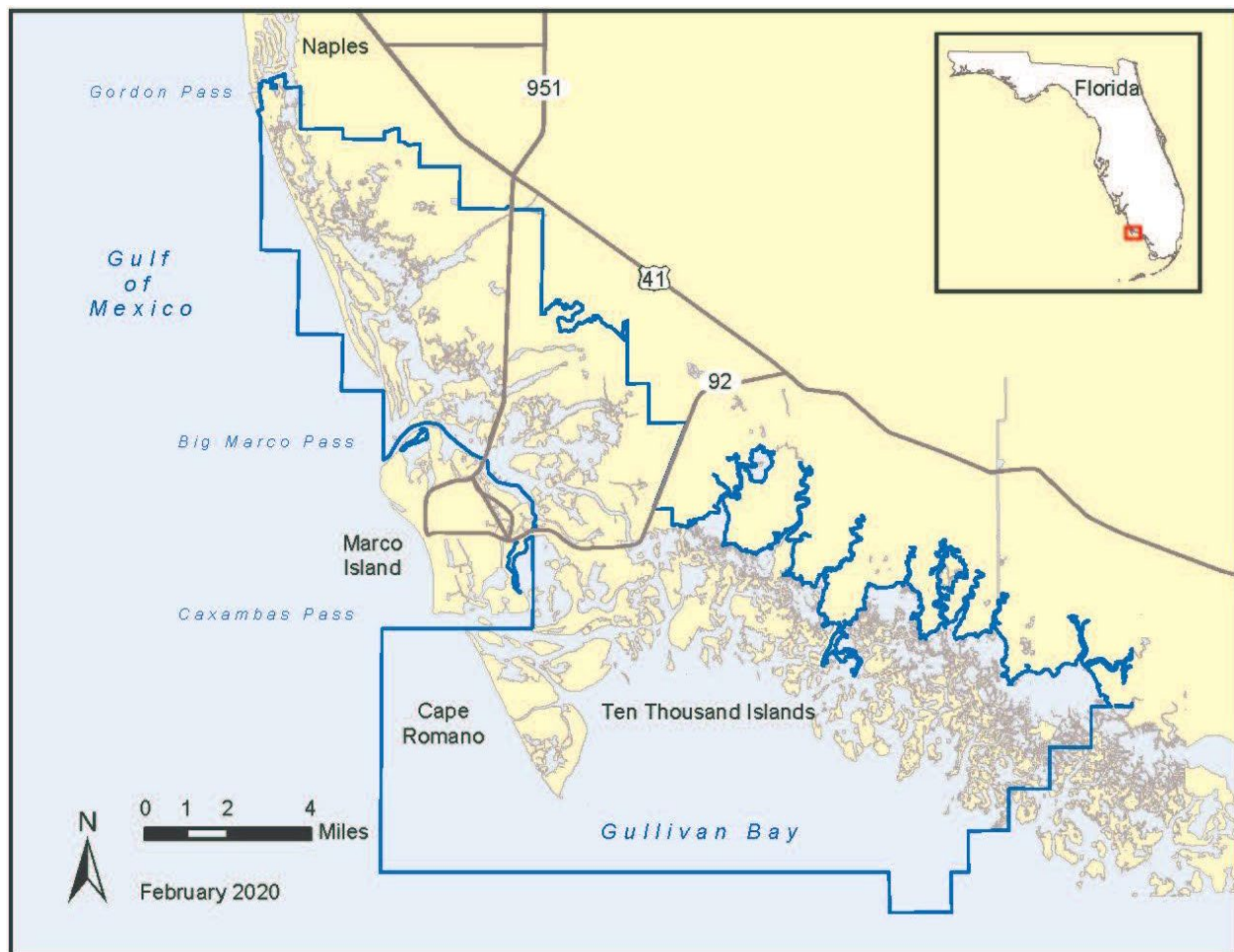


FIGURE 3: LOCATION AND BOUNDARIES OF ROOKERY BAY NATIONAL ESTUARINE RESEARCH RESERVE

Core Areas and Buffer Zones: National Estuarine Research Reserve System Regulations

NERR System regulations outline requirements for “*identifying the ecologically key land and water areas of the Reserve, ranking these areas according to their relative importance, and including a strategy for establishing adequate long-term state control over those areas sufficient to provide protection for Reserve resources to ensure a stable environment for research*” (15 CFR Section 921.13).

The ecological characteristics of an NERR must be defined to establish requirements for effectively managing the entire NERR, especially its most sensitive (“core”) areas. The characteristics to be managed include its “*biological productivity, diversity of flora and fauna, and capacity to attract a broad range of research and educational interests*” (15 CFR Section 921.11(c)(2)). Assurance that the boundaries of Rookery Bay Reserve “*encompass an adequate portion of the key land and water areas of the natural system [is defined] to approximate an ecological unit and to ensure effective conservation*” (15 CFR Section 921.11(c)(3)). Boundaries of the Reserve must encompass the area within which adequate control has been or will be established over human activities. “*Key land and water areas and a buffer zone will likely require significantly different levels of control.*” Key land and water areas are identified as “*that core area within the Reserve that is so vital to the functioning of the estuarine ecosystem that it must be under a level of control sufficient to ensure the long-term viability of the Reserve for research on natural processes*” (15 CFR Section 921.11). Key land and water areas are those ecological units that “*preserve, for research*

purposes, a full range of significant physical, chemical and biological factors contributing to the diversity of fauna and flora and natural processes occurring within the estuary” (15 CFR Section 921.11). The establishment of a specific area to be identified as the ‘core area’ within Rookery Bay Reserve is determined by scientific knowledge of that area and the degree of scientific research occurring within that area.

Core Area of the Rookery Bay National Estuarine Research Reserve

The core area of Rookery Bay Reserve is composed of its estuarine waters and associated mangrove forests, marshes, and uplands associated with the barrier islands, estuaries and bays, and their associated tributaries (see Figure 4). These core components ensure adequate and direct applications of state and federal control and management and provide sufficient protection to ensure the integrity of a stable platform for the continuation of ongoing scientific investigation.

Buffer Zones of the Rookery Bay National Estuarine Research Reserve

The buffer zones of Rookery Bay Reserve consist of the lands located north of and outside the Reserve boundaries (see Figure 4). These buffer zones protect the core area and provide additional protection for estuarine-dependent species, including those that are rare or endangered. When determined appropriate by the State of Florida and approved by NOAA, buffer zones may also include areas necessary for facilities required for research and interpretation. Additionally, conservation areas within these buffer zones are established to help accommodate a reasonably expected shift of the core area resulting from biological, ecological, or climate change and related sea-level rise.

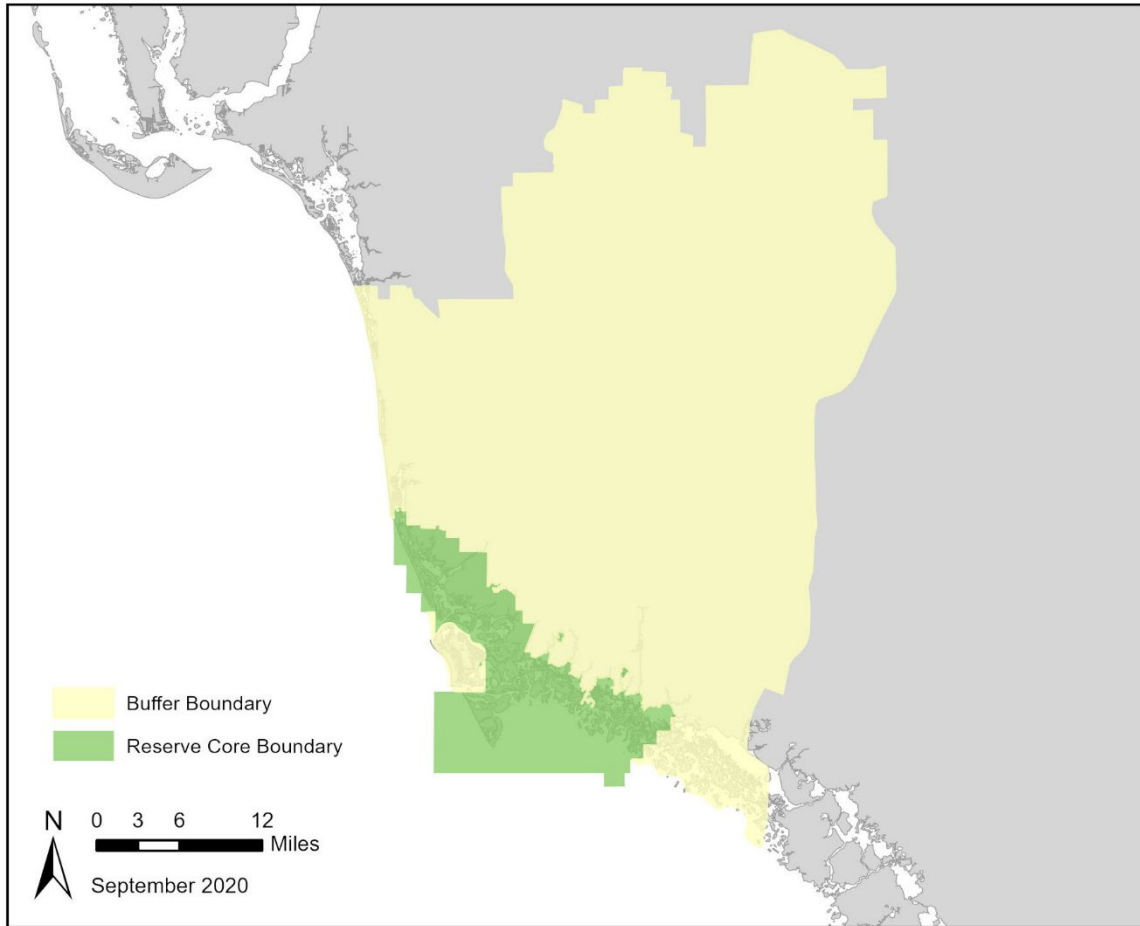


FIGURE 4: THE CORE AREA AND BUFFER ZONES OF ROOKERY BAY NATIONAL ESTUARINE RESEARCH RESERVE

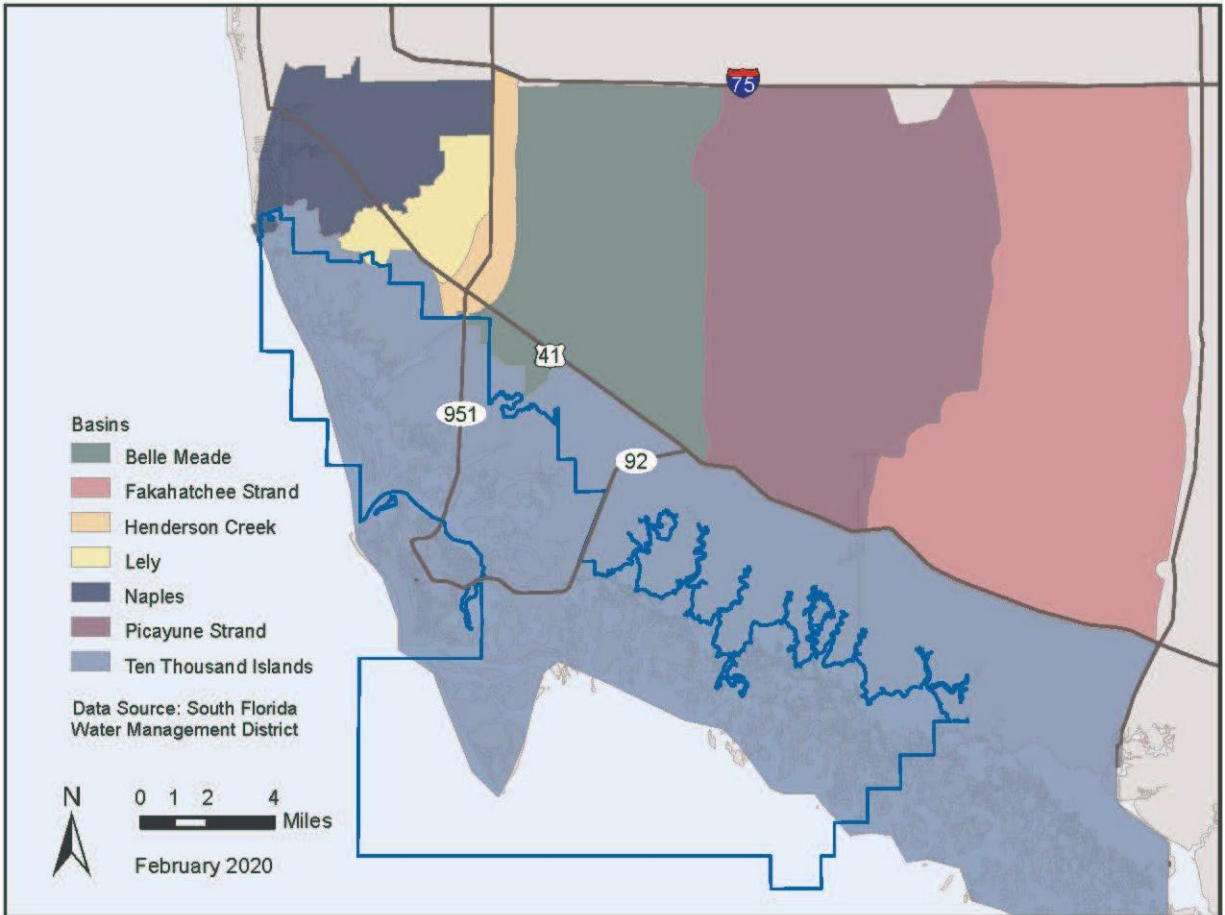


FIGURE 5: DRAINAGE BASINS OF ROOKERY BAY NATIONAL ESTUARINE RESEARCH RESERVE

(The core area consists of the 110,000 acres [445.2 km²] of habitats contained within the boundaries of the Reserve, the blue outline. The buffer zones are those lands adjacent to and north of the boundaries of the Reserve but included in the watershed.)

The historic natural watershed that includes Rookery Bay Reserve's buffer zones and supports the Reserve's core area is defined by both biotic and abiotic aspects including dynamics of natural areas as well as areas anthropogenically altered as a result of housing developments, roadways, canals, weirs, and other water management structures. Located within the Reserve's watershed are multiple basins that provide water crucial to the Reserve (Figure 5). These basins include Belle Meade, Picayune Strand, Naples Bay, Henderson Creek, Fakahatchee Strand, and Lely. All these basins feed into the Ten Thousand Islands watershed, which covers the entire Reserve (Figure 5). The Belle Meade, Picayune Strand, and Fakahatchee Strand basins contain the more pristine inland mosaic complexes of uplands, wetlands, sloughs, and waterways comprising the ecological systems that preserve most of the remaining natural hydrological pathways for the collection, storage, filtration, and conveyance of streamflow and sheetflow into the Reserve. These inland buffer zones surrounding the core area of the Reserve represent over 20,788 acres (84.1 km²) and provide protection to estuarine water quality. In addition to the inland buffer areas, there is Ten Thousand Islands National Wildlife Refuge (NWR). This NWR has 35,000 acres (141.6 km²) of predominately mangrove forest, with its mostly inland estuarine fringe consisting of brackish marsh interspersed with ponds and small coastal hammocks of oak, cabbage palms, and tropical hardwoods.

Adjacent Land Use

Collier County is the second largest county in Florida, covering approximately 2,305 square miles (5,970 km²). Rookery Bay Reserve manages over 40 percent of Collier County's shoreline, and more than 50 percent of this area has been set aside under public or private ownership for conservation purposes. In addition to the Reserve, these areas include the following public conservation lands (see Figure 6 below):

- **Big Cypress National Preserve:** This protected area encompasses approximately 750,000 acres (303.5 km²) in eastern Collier County and is managed by the National Park Service.
- **Everglades National Park:** This park spans over 1.5 million acres (6,070 km²), from the eastern boundary of Reserve in the Ten Thousand Islands to Florida Bay and is managed by the National Park Service. Everglades National Park has become the focal point of the South Florida Ecosystem Restoration Program involving federal, state, and local partners.
- **Ten Thousand Islands NWR and Florida Panther NWR:** These two NWRs total approximately 61,000 acres (247 km²). In 1996, USFWS received title to approximately 35,000 acres (141.6 km²) south of U.S. 41 (Tamiami Trail) to establish the Ten Thousand Islands NWR. The boundaries of this NWR overlap with the Cape Romano-Ten Thousand Islands Aquatic Preserve managed by RCP as part of the Rookery Bay Reserve. A cooperative agreement was established by both agencies to formalize ongoing cooperative management of the area. USFWS also manages the nearby 26,000-acre (105-km²) Florida Panther NWR, which is in the Reserve's watershed.
- **Corkscrew Swamp Sanctuary:** this 13,000-acre (52.6 km²) NAS-managed sanctuary is in northeastern Collier County and represents a nearly pristine cypress wetland ecosystem.
- **Picayune Strand State Forest:** this 78,000-acre (316-km²) forest managed by the Florida Forest Service is the focus of the first and largest forest of the Comprehensive Everglades Restoration Plan. The refined project includes 83 miles (134 km) of plugged canals, 227 miles (365 km) of road removal, and the addition of pumping stations and spreader swales to aid in rehydration of the wetlands. This restoration project will restore natural hydrologic flows to Pumpkin Bay and Faka Union Bay in the Ten Thousand Islands.
- **Fakahatchee Strand Preserve State Park:** This 85,000-acre (344-km²) park protects a relatively intact watershed which drains to the Ten Thousand Islands.
- **Collier-Seminole State Park:** This park encompasses 7,200 acres (29.1 km²) and protects mangrove forests and coastal wetlands that drain into Rookery Bay Reserve.

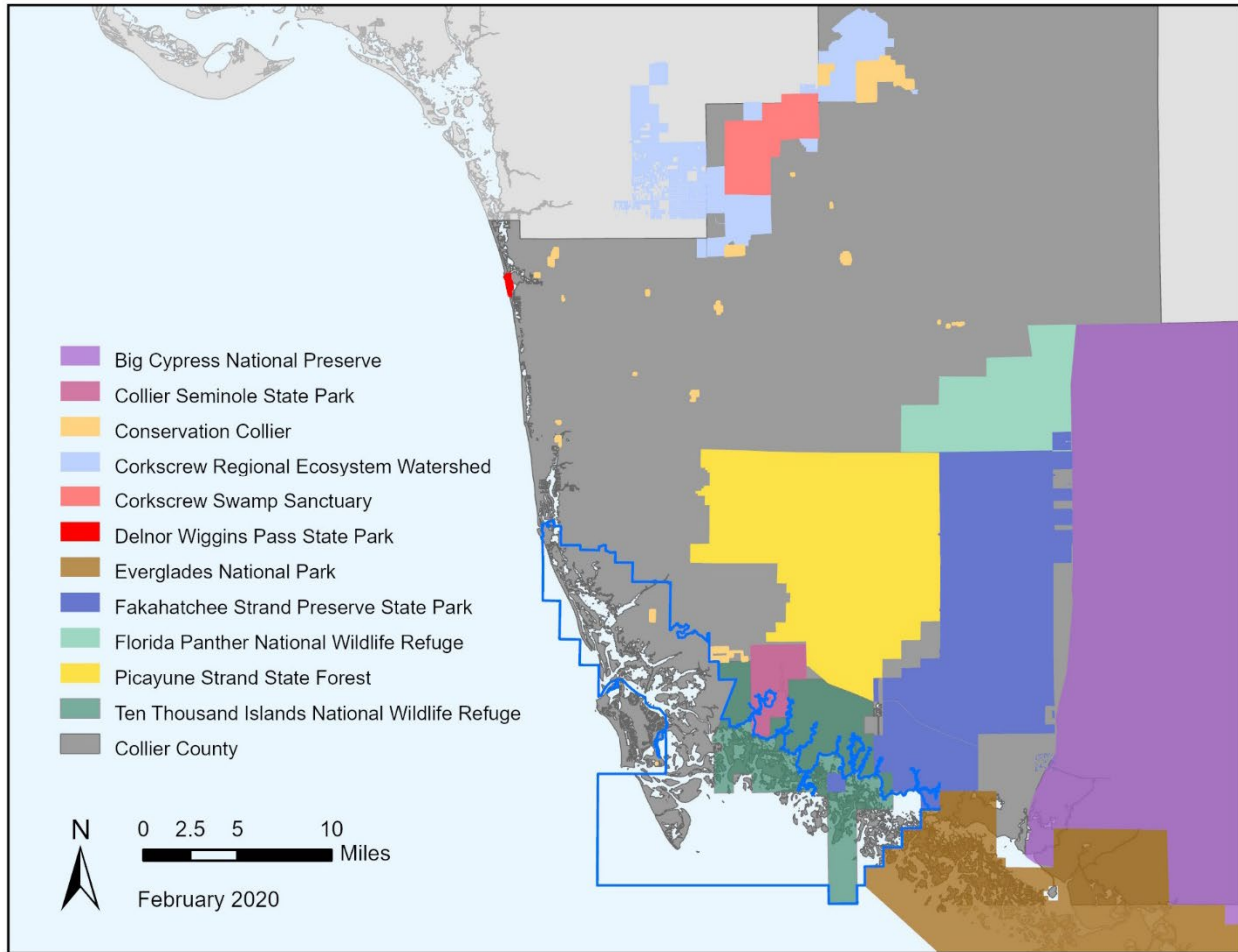


FIGURE 6: PUBLIC LANDS IN AND AROUND ROOKERY BAY NATIONAL ESTUARINE RESEARCH RESERVE

To meet the challenges associated with increased development and population, Rookery Bay Reserve works cooperatively with federal, state, and local partners to ensure that the best available science-based information is used to make decisions affecting coastal resources. The goal of the research with respect to watershed issues is to reduce the impact of watershed land use on coastal resources by identifying priority pollutants and encouraging best management practices in partnership with federal, state, and local agencies; colleges and universities; private industry; and citizens. Specific research, stewardship, and education strategies are presented in this management plan.

Changes in land use within the watershed and adjacent coastal lands has resulted in significant environmental changes within Rookery Bay Reserve. Urban development and agricultural land use within the Reserve's watershed, and their associated impacts on freshwater inflows to the Rookery Bay and Ten Thousand Islands estuaries, remain two of the most significant threats to the ecological integrity of the Reserve. These impacts include alterations to the volume and timing of freshwater, with a resulting negative impact on natural salinity regimes within the estuary, and degradation of water quality as land use upstream contributes pollutants from leaching of septic tanks and the use of fertilizers and pesticides. Land use classifications in and around Rookery Bay Reserve are shown in Figure 7 below.

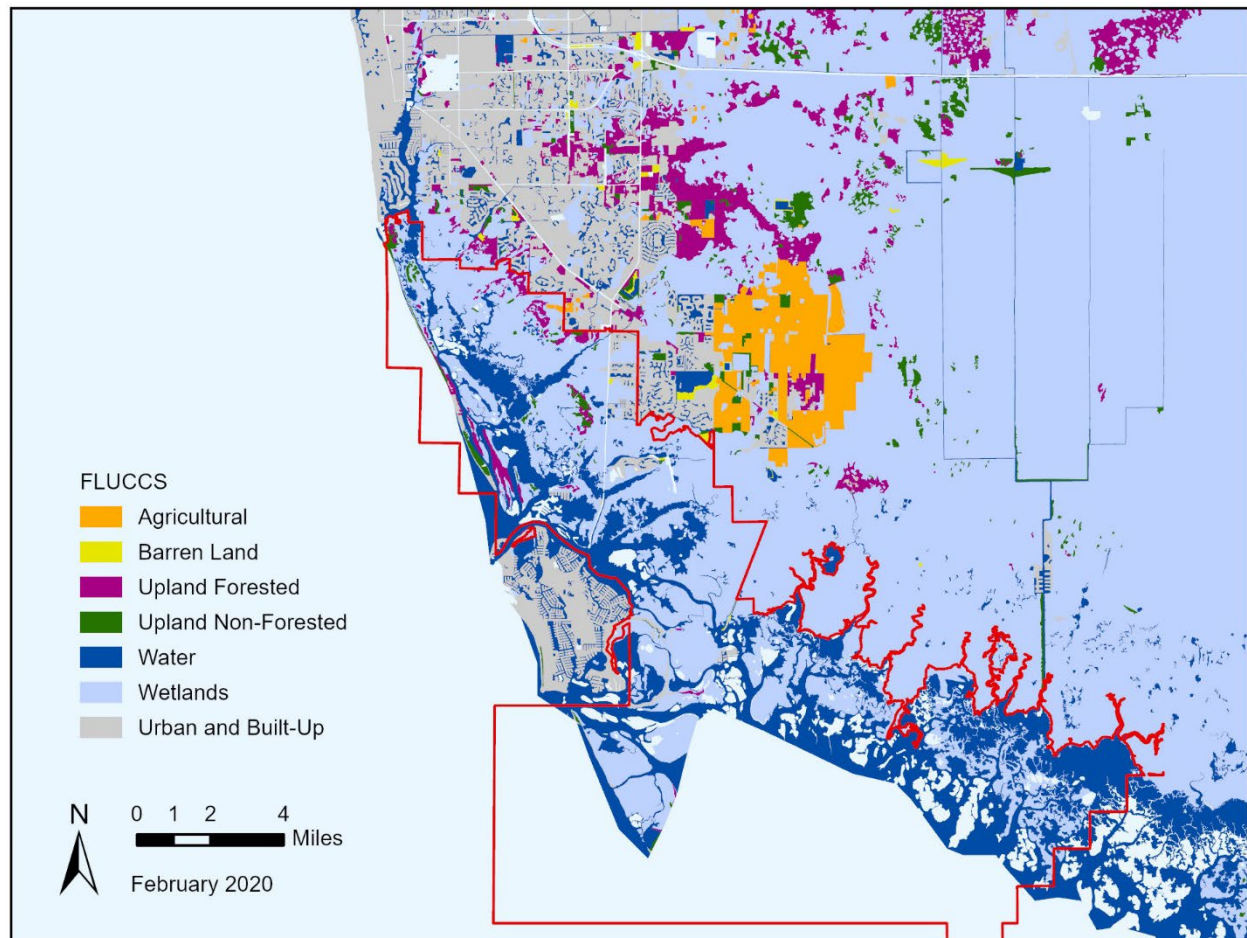
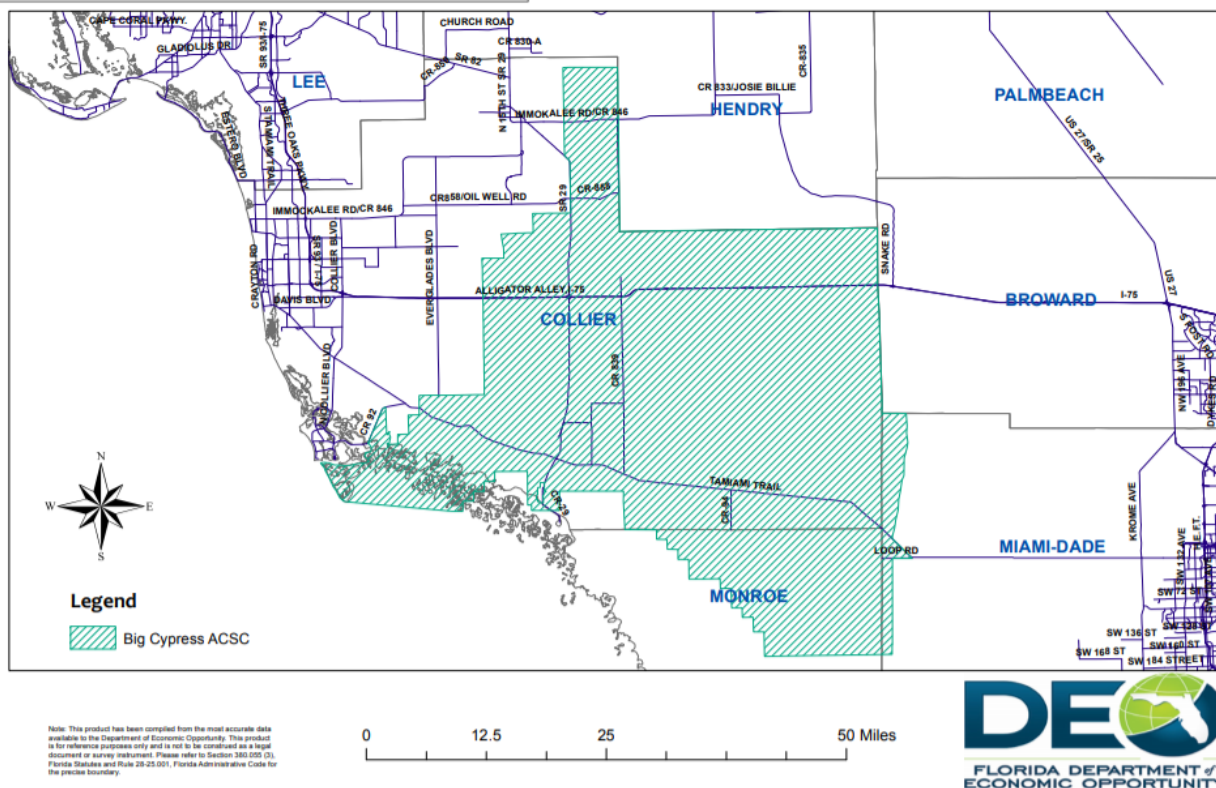


FIGURE 7: FLORIDA LAND USE COVER AND FORMS CLASSIFICATION SYSTEM (FLUCCS) IN AND AROUND ROOKERY BAY NATIONAL ESTUARINE RESEARCH RESERVE

The Florida Department of Economic Opportunity has included portions of Rookery Bay Reserve among the designated Areas of Critical State Concern (ACSC) (see Figure 8 below). The ACSC program was created by the Florida Environmental Land and Water Management Act of 1972 with the intent of protecting resources of state-wide significance from uncontrolled development. Such ACSC-designated land includes portions of Cape Romano-Ten Thousand Islands Aquatic Preserve, Big Cypress National Preserve, and Fakahatchee Strand Preserve State Park. Under the ACSC program, the Florida Department of Economic Opportunity reviews any development order for construction as defined by Chapter 380.04, F.S., for consistency.

Big Cypress Area of Critical State Concern



**FIGURE 8: DESIGNATED AREAS OF CRITICAL STATE CONCERN IN AND AROUND
ROOKERY BAY NATIONAL ESTUARINE RESEARCH RESERVE**

Agriculture represents another major land use in Rookery Bay Reserve's watershed, with farmlands in the Belle Meade agricultural area draining into Henderson Creek. Crops include citrus and vegetables. Due to changes in real estate values during the last 10 years, there has been a significant shift in land use from agriculture to residential development within the Belle Meade agricultural area.

Prior to development, sheetflow was the primary source of surface runoff in the drainage watersheds for Rookery Bay and Ten Thousand Islands. Significant alterations in the natural drainage patterns of the Belle Meade agricultural area and Picayune Strand State Forest have occurred as the result of water conveyances such as canal construction, along with the construction of new roads. U.S. 41 (Tamiami Trail) and State Road 951 (Collier Boulevard), obstruct sheetflow patterns that had historically fed into Rookery Bay Reserve.

Climate Change and Other Sources of Environmental Stress

While NERRs were designated under the premise that they are representative of relatively pristine estuarine ecosystems, they are increasingly exposed to human and environmental stressors that must be understood in order to manage and adapt to changing conditions. Major stressors to the Rookery Bay Reserve include climate change, episodic events, and watershed alteration. These stressors can alter the natural environment to an extent that negatively affects the associated ecosystem services from which people benefit. Therefore, the Reserve strives to understand the dynamics of these multiple stressors and

assess new management strategies to address their impacts. More detailed descriptions of these stressors are provided in the following sections of this management plan.

Climate Change (Reserve Sensitivity and Vulnerability)

Natural and human-induced climate changes have the potential for significant impacts to the ecological integrity of Rookery Bay Reserve. Analysis of global climate and temperature trends indicate that accelerated changes in climate are occurring and are driven primarily by an atmospheric increase in carbon emissions related to the burning of fossil fuels (Intergovernmental Panel on Climate Change [IPCC] 2013). The effects of climate change have become better understood, and it is now clear that atmospheric warming is coupled with relative sea-level rise (SLR) (Rahmstorf 2007, Vermeer and Rahmstorf 2009, IPCC 2013). This warming has led to glacial melting and thermal expansion of the oceans, thus contributing to relative SLR (IPCC 2013). Globally, SLR rates have increased from 1.7 mm/year between 1900 and the mid-1990s to approximately 3.2 mm/year thereafter (Church and White 2011). SLR is continuing to accelerate and is projected to reach an additional 0.44 to 0.74 m above current levels by 2100 (Church et al. 2013). There is significant evidence of SLR along Florida's coastline as indicated by NOAA Center for Operational Oceanographic Products and Services tide gauge data (NOAA 2018) (see Figure 9 below). Pensacola and Key West have the longest periods of continuous water elevation data of all the referenced locations in Florida, making these the two most widely referenced locations for relative SLR in the state. Water elevation data recorded at Pensacola indicate an increase of 2.31 mm/year, equating to 0.76 feet/century (23 cm/century). Such data recorded at Key West indicate an increase of 2.40 mm/year (0.79 feet/century). Data from the closet tide gauge to Rookery Bay Reserve, at Naples Beach, indicates an increase of 11.9 inches/century (3.02 mm/year). The effect of SLR is likely to vary across Florida's Gulf coast based on local topography, the presence of coastal man-made structures, and the presence and extent of coastal vegetative types. Additionally, unanticipated changes in wind, wave, and current patterns may cause short- or long-term differences that may accelerate SLR at some coastal locations (Mitchum et al. 2017).

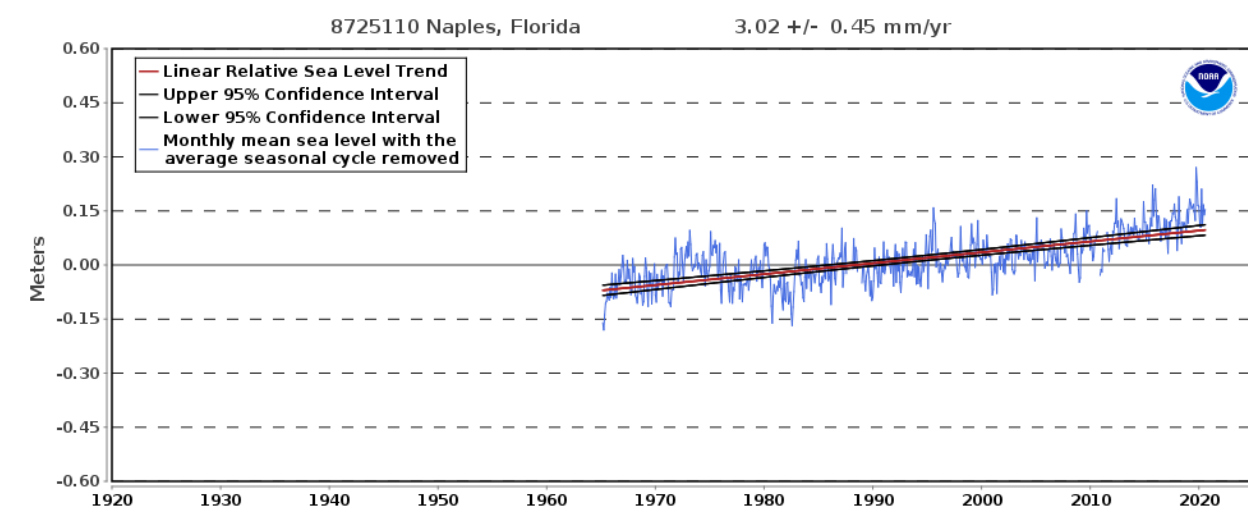


FIGURE 9: SEA LEVEL RISE TREND ALONG FLORIDA'S COASTLINE BASED ON NOAA (2018) DATA

As SLR continues, Rookery Bay Reserve anticipates significant changes to the natural habitats and wildlife within its boundaries and elsewhere in the region. The effects of SLR on coastal systems can be severe and chronic and can vary by location. Episodic storms and storm surge are two major exacerbating factors.

Zhang et al. (2004) found that loss of coastal land from erosion due to episodic storms and storm surge can be two orders of magnitude higher than predicted from continuous processes. SLR can also alter sediment budgets for barrier islands, increase the size of bays and estuaries, increase the tidal prism, and alter tidal function (FitzGerald et al. 2008, Irish et al. 2010). These changes may lead to loss of sandy beaches and may ultimately threaten populations of nesting sea turtles (Fish et al. 2005, Reece et al. 2013). Beach inundation increases the chances of inundation of sea turtle nests, potentially resulting in mortality of the embryos or hatchlings. Beach inundation can also bring waves farther up the beach, allowing erosive wave action to reach and potentially wash out sea turtle nests or expose them to predators.

Shorebirds and beach-nesting birds in particular, such as Snowy Plover (*Charadrius nivosus*), Black Skimmer (*Rynchops niger*), and Least Tern (*Sternula antillarum*), listed by the State of Florida as Threatened, may be greatly impacted by loss of critical feeding and nesting habitat (Goss-Custard et al. 1994, Galbraith et al. 2002, Chu-Agor et al. 2012). Of added concern is the anticipated loss of emergent wetlands as the migration of marine wetlands continues to track rising sea levels until reaching a static urban boundary, a process termed the ‘coastal squeeze’ (Doody 2004). The long-term impacts of SLR will likely be the single most significant threat to the ecological integrity of Rookery Bay Reserve due to the potential for catastrophic and irreversible change.

Episodic Events

In addition to long-term SLR, short-term catastrophic events such as hurricanes can strongly impact natural resources within Rookery Bay Reserve. The Reserve, especially the Ten Thousand Islands, has been repeatedly impacted by these powerful storms. Historical records indicate that mangrove-forested wetlands in the Reserve were severely damaged as a result of a hurricane in 1918. And in 1960, Hurricane Donna made landfall near Goodland as a Category 3 hurricane with estimated winds of 120 mph. This caused massive damage to mangroves in the Ten Thousand Islands area (Dunion et al. 2003). In 1992, Hurricane Andrew impacted mangrove forests and hardwood hammocks in the Ten Thousand Islands as it exited Florida after making landfall along Florida’s southeast coast as a Category 5 hurricane with sustained winds of 165 mph (Nalley et al. 1997). In 2005, Hurricane Wilma made landfall in the Reserve at Cape Romano as a Category 3 hurricane with sustained winds of 120 mph. In 2017, Hurricane Irma passed over Cape Romano before making landfall on Marco Island as a Category 3 hurricane with winds of 115 mph. Hurricanes may have long-term impacts to the ecology of Rookery Bay (Alexander and Crook 1974). Barrier islands such as Keewaydin, Little Marco, and Cannon islands provide evidence of significant changes in geomorphology through trend analysis of aerial photographs from 1928 compared to today. These changes are primarily a result of storm events and the cumulative effects of longshore currents.

Not only do the above-mentioned catastrophic events impact coastal systems and the wildlife that inhabit these systems, but red tide and other harmful algal blooms can also have a significant effect on wildlife. Red tide is caused by a brevetoxin (a category of neurotoxin) emitted by certain diatoms, chiefly *Karenia brevis*, when it multiplies to higher-than-normal concentrations due to an abundance of certain nutrients along with other environmental factors. In 1996, a severe red tide event resulted in the mass mortality of over 150 Florida Manatees (*Trichechus manatus latirostris*). An intense red tide event that occurred during a long period of time in 2017–2018 affected most of the Florida Gulf coast from Naples to Tampa. FWC attributed the deaths of 589 sea turtles, 213 Florida Manatees, and 127 Bottlenose Dolphins (*Tursiops truncatus*) to this episode of red tide. The high number of deaths of these species attributed to this event led NOAA to declare it an unusual mortality event. The causes and long-term effects of these red tide events are not well understood.

Periodic cold snaps can also have impacts on species and ecosystems. For example, in January 2010, water temperatures across Florida decreased substantially following the passage of multiple cold fronts. This was the most severe cold event in the Everglades area on record in the past 100 years (Boucek and Rehage 2014). During this time, water temperatures in the Peace River fell to 8°C (47°F) and stayed below 15°C (<59°F) for 13 days. Water temperatures in Rookery Bay and the Ten Thousand Islands also dropped to 8°C (47°F) during this time. This extreme cold event resulted in the deaths of at least 197 manatees across the state and mass mortality of cold-sensitive fishes such as Common Snook (*Centropomus undecimalis*) in estuaries throughout central and southern Florida (Blewett and Stevens 2014). Rookery Bay Reserve was no exception, as massive die-offs such as Common Snook and Tarpon (*Megalops atlanticus*) were observed within its boundaries. In addition, 16 endangered Smalltooth Sawfish (*Pristis pectinata*) were found dead across Florida during this cold event (Poulakis et al. 2011). Ecological changes observed following this extreme cold event included a large increase in local Pinfish (*Lagodon rhomboides*) populations. Observed ecological changes such as this may warrant monitoring to improve understanding of coastal processes and to determine appropriate responses.

The *Deepwater Horizon* oil spill in the northern Gulf of Mexico began as a blowout in an exploratory oil well on April 20, 2010. The oil continued spilling into the Gulf until the well was capped on July 15, 2010. The estimated 200 million gallons of oil spilled into the Gulf during this event is an example of a regional catastrophe with the potential for significant environmental effects within Rookery Bay Reserve and adjacent coastal areas. While the oil from *Deepwater Horizon* did not reach Southwest Florida, it nonetheless had significant impacts in the northern Gulf of Mexico. Oil spills can result in loss of emergent wetlands (e.g., salt marsh, mangroves) and submerged habitats (e.g., seagrass, coral reefs), mortality of marine mammals and sea turtles, and long-term lethal and sub-lethal effects to estuarine animals. The loss of coastal wetlands in the northern Gulf of Mexico related to the oil spill amplifies the need to sustain and restore remaining intact Gulf wetland ecosystems that can help sustain wildlife.

Watershed Alteration

One of the most significant stressors to Rookery Bay Reserve may be alterations to the quantity, quality, timing, and duration of freshwater inflows to the estuaries. Changes in the land use of watersheds and adjacent coastal lands and waters have resulted in significant environmental changes within the Reserve. Urban development and agricultural land use within the Reserve's watershed and the associated impacts on freshwater inflows to the Rookery Bay and Ten Thousand Islands estuaries remain as some of the most significant threats to the ecological integrity of the Reserve. These impacts can result in negative effects on natural salinity regimes within these estuaries. Additionally, land use upstream contributes pollutants from leaching of septic tanks and the use of fertilizers and pesticides, and these pollutants can decrease water quality downstream.

Upstream sources of water for Rookery Bay Reserve include the watersheds of Belle Meade, Henderson Creek, and Picayune Strand. These areas are located within the boundaries of water resource restoration projects including the Comprehensive Everglades Restoration Plan (CERP) and the RESTORE Act project. These projects seek to improve water resource quality and quantity. This will be achieved by such measures as restoring more natural sheetflow from man-made canals, rehydrating historically drained wetlands, recharging surficial aquifers, and reestablishing natural seasonal salinity cycles in downstream estuaries. These projects will be integrated with Collier County's Watershed Management Plans and represent important planning tools for improving the quantity and quality of the Reserve's water resources.

CHAPTER 3.
ROOKERY BAY NATIONAL ESTUARINE RESEARCH RESERVE,
2022–2027 STRATEGIC PLAN

Rookery Bay National Estuarine Research Reserve

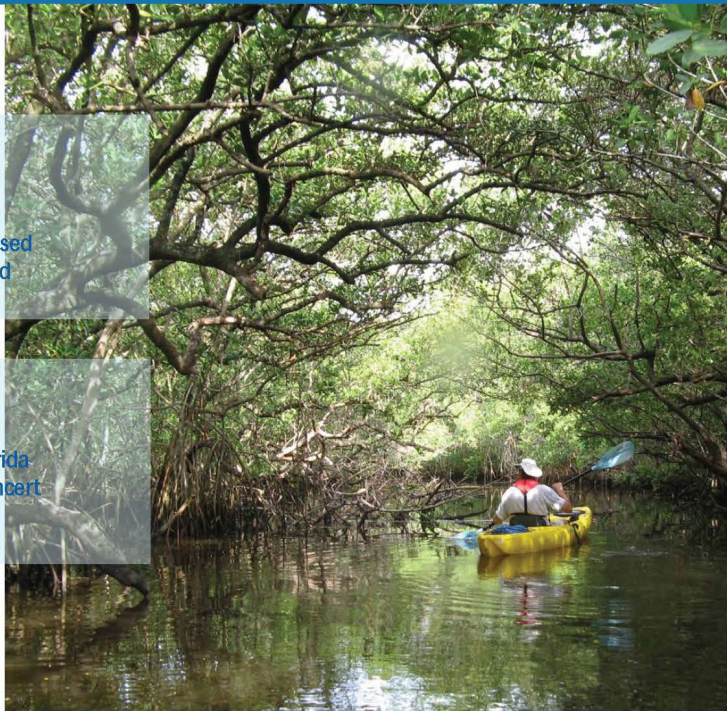
Strategic Plan 2022-2027

MISSION

To serve Southwest Florida as a trusted resource for science-based information to foster human and ecological communities.

VISION

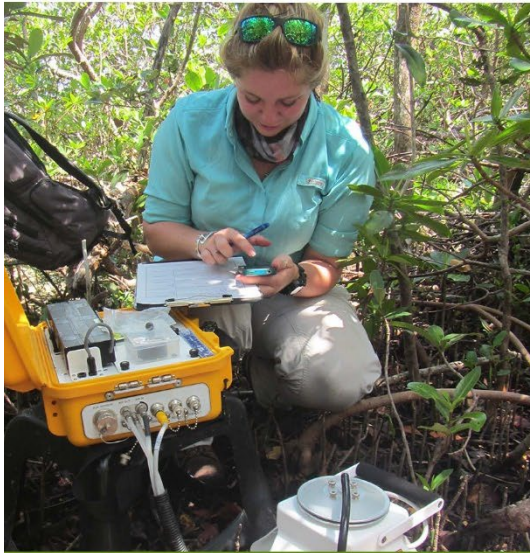
Communities in Southwest Florida value nature and prosper in concert with healthy estuaries.



The Rookery Bay National Estuarine Research Reserve encompasses 110,000 acres of coastal lands and waters and is managed by the Florida Department of Environmental Protection's Office of Resilience and Coastal Protection in partnership with NOAA. Its mission is to provide a basis for informed stewardship of estuaries in Southwest Florida through research and education. RookeryBay.org.



1 ECOSYSTEMS



The Reserve manages coastal lands to ensure their health and to serve as a model of appropriate land stewardship for other organizations. Actions within the Ecosystem goal address issues relate primarily to habitat protection.

Goal

Habitats and species within the Reserve exhibit long-term integrity, function and biodiversity.

Objectives

- 1.1** Ecological conditions are monitored to understand trends and drivers of change.
- 1.2** Habitats are enhanced to support vulnerable species through science-led management activities



2 HUMAN CONNECTIONS

Goal

Connections among people and resources in the Reserve are understood and enhanced.

Objectives

- 2.1** Cultural resources within the Reserve are understood and enhanced.
- 2.2** Natural resources protection is enhanced by improved communication between scientists and stakeholders.
- 2.3** Southwest FL communities understand the socio-economic values of local ecosystems.



Understanding the Reserve's long history and existing human connections is key to appreciating the entire socioeconomic system which the Reserve functions within. Actions within the Human Connections goal address issues relate to water quality and habitat protection.



3

RESILIENCE



Bridging science, management and community involvement will lead to resilient, productive and adaptable ecosystems and human communities. Actions within the Resilience goal address issues related primarily to environmental change.

Goal

Strong science-to-management connections ensure that ecosystems and communities across the Gulf of Mexico are resilient and adaptable to environmental changes and episodic events.



Objectives

- 3.1** Communities are engaged through collaborative projects to monitor and manage effects of coastal watershed change.
- 3.2** Coastal practitioners use observations of ongoing change to support proactive management actions for future conditions and events.
- 3.3** The Reserve serves as a living laboratory to understand how change impacts ecosystems and ecosystem services.

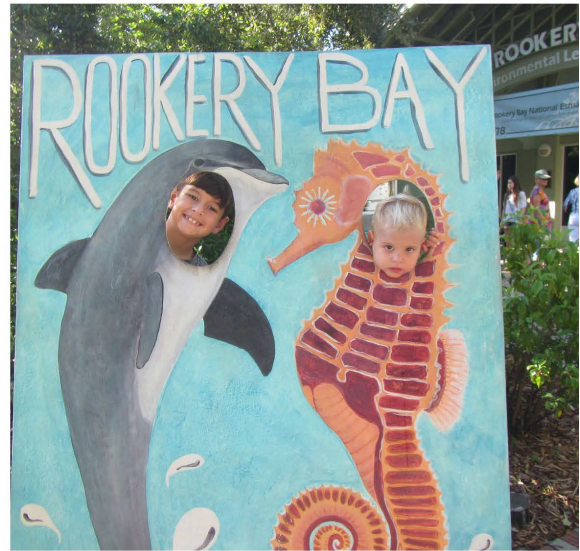
4 OUTREACH

Goal

Value of the coastal environment drives informed stewardship actions.

Objectives

- 4.1 Residents and visitors have a greater awareness of the Reserve and understand how to protect it.
- 4.2 Students experience the coastal environment through place-based learning.
- 4.3 Stakeholder and partners apply science-based knowledge to make informed decisions.



The Reserve shares scientific information and this information forms the basis for an appreciation of the value of the environment, which in turn promotes a public sense of ownership of natural resources. Actions within the Human Connections goal address issues related to environmental change, water quality and habitat protection.



A strategic plan is a key component of a management plan as it provides direction through a vision of what the organization would like to achieve and specific goals to achieve that vision. Each National Estuarine Research Reserve (NERR) undergoes a strategic planning process that outlines the goals and actions necessary to achieve each desired outcome. Rookery Bay Reserve has established the following vision and mission for southwest Florida.

Reserve Vision: *Communities in southwest Florida value nature and prosper in concert with healthy estuaries.*

Reserve Mission: *To serve southwest Florida as a trusted resource of science-based information fostering connected human and ecological communities.*

Priority Coastal Management Issues and Reserve Niche

Rookery Bay Reserve's priority coastal management issues align with those addressed by the NERR System 2017–2022 strategic plan: environmental change, water quality, and habitat protection.

In southwest Florida environmental changes, including sea level rise and increased storm frequency and intensity, are of concern for both natural and human communities. The Reserve is uniquely suited to address these issues. This is partly due to the Reserve's connection to NOAA's established programs focusing on climate change and partly due to the State of Florida's focus on enhancing coastal resilience. Because all of Florida is affected by coastal issues such as storm events and climate change, it is important for Rookery Bay Reserve and other parts of Florida to be resilient to these effects. Coastal resilience is the ability to recover quickly from disasters and to adapt to future conditions such as sea level rise. The Reserve is ideally positioned to provide scientific information to increase the resilience of both human and natural coastal communities.

Water quality has long been a focal point of work at the Reserve and is important to local stakeholders in southwest Florida. Surficial waters of southwest Florida are characterized by a mosaic of freshwater marshes, rivers, streams, agricultural areas, canals, mangrove estuaries, and salt marshes that form the watershed that drains into the Gulf of Mexico. These watersheds include increasingly urbanized areas, which can lead to impacts to water quality. The Reserve's history of water quality monitoring and education about the importance of a healthy watershed enables it to lead in addressing water quality issues in the region.

Habitat protection is a key component of coastal resilience to environmental change and water quality issues for the Reserve. Since the Reserve's stewardship and research sectors are directly involved in monitoring, research, and resource management, these sectors are uniquely suited to testing and assessing innovative land management actions to protect and restore coastal habitats of the Reserve. These actions enable the Reserve to address habitat protection issues and provide an example of land stewardship to other regional land managers. The Reserve engages in many activities across departments to address environmental change, water quality, and habitat protection as outlined in the strategic plan and in program chapters in this management plan.

Rookery Bay Reserve has four goals that will be used to realize its vision and mission. Each of the following text boxes outlines a goal on a specified topic (topics are indicated in brackets).

Goal 1: [ECOSYSTEMS] Habitats and species within the Reserve exhibit long-term integrity, function, and biodiversity.

The Reserve manages coastal lands to ensure their health and to serve as a model of appropriate land stewardship for other organizations. Actions within the ecosystem's goal address issues relating primarily to habitat protection.

Goal 2: [HUMAN CONNECTIONS] Connections among people and resources in the Reserve are understood and enhanced.

Understanding the Reserve's long history and existing human connections key to appreciating the entire socioeconomic system within which the Reserve functions. Human connections include benefits to people, how people perceive environmental issues, economic contributions from natural resources, and the attitudes and beliefs people have about natural resources. Through better understanding these connections, the Reserve can adapt its programs to develop a more holistic approach that better incorporates human dimensions to natural resource management decisions. Actions within the human connections goal address issues related to water quality and habitat protection.

Goal 3: [RESILIENCE] Strong science-to-management connections ensure that ecosystems and communities across the Gulf of Mexico and similar Caribbean habitats are resilient and adaptable to environmental changes and episodic events.

Effectively bridging science, management, and community involvement allows for resilient, productive, and adaptable ecosystems and human communities. Actions within the resilience goal address issues related primarily to environmental change.

Goal 4: [OUTREACH] The value people place on the coastal environment drives informed stewardship actions.

Rookery Bay Reserve shares scientific information with the community and stakeholders, and this information forms the basis for an appreciation of the value of the environment. This appreciation in turn promotes a public sense of ownership of natural resources. Actions within the outreach goal address issues related to environmental change, water quality, and habitat protection.

Strategic Plan

Table 1 below outlines the Strategic Plan developed to guide each Rookery Bay Reserve program. These programs consist of research, stewardship, education, Coastal Training Program (CTP), volunteer/visitor services, and communications. Each goal has objectives and actions designed to accomplish the objectives for each department. Although each action is assigned to a program that will take the lead, most actions will be accomplished only through collaboration between two or more programs. The Reserve recognizes that to achieve the mission and vision, it is necessary to work together. Most projects at the Reserve involve at least two departments joining their skills and resources.

TABLE 1. STRATEGIC PLAN OVERVIEW FOR ROOKERY BAY NATIONAL ESTUARINE RESEARCH RESERVE

VISION: *Communities in southwest Florida value nature and prosper in concert with healthy estuaries.*

MISSION: *To serve southwest Florida as a trusted resource of science-based information fostering connected human and ecological communities.*

Research	Stewardship	Education	CTP	Volunteers and Visitor Services	Communications
Goal 1: [ECOSYSTEMS] Habitats and species within the Reserve exhibit long-term integrity, function, and biodiversity.					
Objective 1.1 Ecological conditions are monitored to understand trends and drivers of change.					
Monitor environmental and physical conditions of coastal and watershed ecosystems	Monitor the effects of prescribed fire	Incorporate monitoring data into student and visitor programming	Provide training to support use of monitoring data	Ensure that volunteers support monitoring efforts through sea turtle monitoring, fisheries research, invasive plant removal, and bird monitoring field work	Share monitoring data on website
Monitor habitat structure, vegetation, and wildlife community compositions	Monitor the effects of invasive species control and removal efforts			Share all milestones and research data in the Environmental Learning Center	Share stories about staff monitoring wildlife habitats with local media, Facebook, and RookeryBay.org news blog
Engage partners to link monitoring data with current research	Work with partners to monitor changes				Share information with key partners about current research happening within Reserve
Foster the development of new tools and technologies that bolster monitoring efforts	Participate in continued monitoring of priority FWC and USFWS species				
	Staff and Team OCEAN support monitoring efforts to protect sensitive species				

Research	Stewardship	Education	CTP	Volunteers and Visitor Services	Communications
Objective 1.2 Habitats are enhanced to support vulnerable species through science-led management activities.					
Maintain updated habitat maps that can include non-native species, fire habitat, and wildlife habitat use	Manage habitats with prescribed fire	Share research updates (e.g., invasive species, prescribed fire) through interpretive programs	Provide training on invasive and vulnerable species	Ensure that volunteers are trained and qualified to support science-led management activities	Communicate habitat and management activities to the public and Florida DEP/NOAA
Evaluate the effects of management actions on wildlife and ecosystems to inform adaptive management	Utilize invasive species removal program to manage habitats of the Reserve		Provide training on restoration techniques to natural resource managers and other professional audiences	Provide up-to-date data for visitors	
Identify the effects of influencing factors (e.g., human activities, invasive species presence) on wildlife and ecosystems	Implement natural resource adaptive management protocols that are based on relevant monitoring and research				
Evaluate trends of loss or recovery of natural communities to prioritize restoration and management needs	Coordinate management of disturbance-sensitive species, such as nesting birds, with FWC				

Research	Stewardship	Education	CTP	Volunteers and Visitor Services	Communications
Goal 2: [HUMAN CONNECTIONS] Connections among people and resources in the Reserve are understood and enhanced.					
Objective 2.1 Cultural resources within the Reserve are identified and conserved.					
Maintain spatial assessment of cultural resources	Search for new sites using existing anecdotal data, aerial imagery, and GIS/LiDAR data to locate possible unknown sites	Highlight historic and recent cultural resource findings in educational programming	Collaborate with partners to provide cultural resource training	Have trained and qualified volunteers relay educational messages and findings to visitors	Ensure exhibits reflect current cultural resources and protective efforts
Support research activities to identify, study, and conserve cultural resources	Collect new information about known cultural resources and sites				Highlight cultural resources and protective actions on website and social media
	Update cultural resource assessments as needed (vulnerability, status)				
	Engage with partners to expand knowledge of known and unknown cultural sites throughout the Reserve.				
Objective 2.2 Natural resource protection is enhanced by improved communications between scientists and stakeholders.					
Engage in expert working groups to advise natural resource management and scientific development	Participate in collaborative working groups to exchange information and provide input regarding the Reserve's watershed		Serve as a host and facilitator for information exchanges within the natural resource management community		

Research	Stewardship	Education	CTP	Volunteers and Visitor Services	Communications
Promote visiting scientist engagement and communication with Reserve staff, partners, and stakeholders	Engage with partners to explore innovative funding opportunities for the Reserve's habitat restoration projects		Facilitate collaborative working groups to address environmental issues along the coast		
Facilitate researcher community collaboration and develop or support communities of practice					
Maintain the research library and other databases as information repositories for Reserve studies, data, and literature					
Objective 2.3 Southwest Florida communities understand the socioeconomic values of local ecosystems					
Develop social science research priorities and collaborate with external researchers to conduct socioeconomic research and monitoring of the communities the Reserve serves	Share information regarding the importance of prescribed fire	Coordinate science-based lectures for the general public	Host training workshops on ecosystem services and socioeconomic indicators for decision-makers	Encourage trained and qualified volunteers to participate in community outreach programs educating the general public	Communicate to the public the economic and social value of the Reserve and healthy estuaries and coast
		Highlight cultural resources in exhibits and programs	Collaborate with social scientists to better understand how the community values estuaries		
			Collaborate with partners to establish socioeconomic indicators and develop a monitoring program		

Research	Stewardship	Education	CTP	Volunteers and Visitor Services	Communications
Goal 3: [RESILIENCE] Strong science-to-management connections ensure that ecosystems and communities across the Gulf of Mexico are resilient and adaptable to environmental changes and episodic events.					
Objective 3.1 Communities are engaged through collaborative projects to monitor and manage effects of coastal watershed change.					
Identify and monitor downstream indicators of local or watershed-scale restoration actions	Inform management agencies of Reserve resources via research and social science tools		Provide technical assistance to collaborative working groups to address coastal resilience	Train volunteers to support Reserve research and monitoring	Engage people and groups through social media
Coordinate with partners to develop citizen/community science programs	Provide input regarding development projects being proposed within the Reserve's watershed		Enhance collaborative relationships with other CTPs	Recruit volunteers to participate in collaborative projects	Communicate watershed change findings through various media
Objective 3.2 Coastal practitioners use observations of ongoing change to support proactive management actions for future conditions and events.					
	Collaborate with partners to utilize adaptive management techniques to increase resilience		Provide training on new technology, techniques, and tools to monitor, model, and adapt to environmental changes		
Develop assessments that identify vulnerabilities and/or opportunities for enhanced resilience for natural and human communities	Prioritize management actions based upon sensitivity and vulnerability of habitats and species		Provide training on Reserve monitoring data applications and communicate lessons learned		

Research	Stewardship	Education	CTP	Volunteers and Visitor Services	Communications
Objective 3.3 The Reserve serves as a living laboratory to understand how change impacts ecosystems and ecosystem services.					
Engage with the international coastal research community to promote the Reserve as a valuable place and resource for ecosystem studies through in-situ and comparative studies		Volunteer interpreters are informed about ongoing research in the Reserve	Enhance training opportunities on extreme storm-relevant management and response tools and applications	Strengthen how visitors learn about the latest research in the Environmental Learning Center and encourage volunteer interpreters to give programming with this information	Share information about how episodic events impact ecosystems
Use episodic events as an opportunity for long term monitoring of habitat change and recovery		Enhance field-based educational programs to address latest science on impacts to Reserve ecosystems			
Promote research on the interaction between climate change and natural resources					

Research	Stewardship	Education	CTP	Volunteers and Visitor Services	Communications
Goal 4: [OUTREACH] Value of the coastal environment drives informed stewardship actions.					
Objective 4.1 Residents and visitors have a greater awareness of the Reserve and understand how to protect it.					
Publish a review of research at the Reserve		Conduct outreach activities throughout the community	Host communication skills workshop for target audiences	Train volunteers to be ambassadors for the Reserve	Update content for exhibits and websites as needed
		Offer an array of onsite public programs		Provide a safe and welcoming environment at the Environmental Learning Center	Enhance use of social media to raise awareness of natural resource issues
		Host topic-specific training for staff and volunteers who interact with the public		Enhance the visitor experience at the Environmental Learning Center using the latest technology	Promote visitation to the Environmental Learning Center
				Utilize Team OCEAN to provide on-the-water education for boaters to protect Reserve habitats and species	

Research	Stewardship	Education	CTP	Volunteers and Visitor Services	Communications
Objective 4.2 Students experience the coastal environment through place-based learning.					
Support and mentor student and early-career researchers; including the Margaret A. Davidson graduate fellow		Provide high quality, field-based science education programming for students pre-K through grade 20 for better-informed decision-making			Use social media to provide information to the public about student education, field trips, and programming occurring at the Reserve throughout the year
Objective 4.3 Stakeholders and partners apply science-based knowledge to make informed decisions.					
Support decision science applications for natural resource management		Represent the Reserve at community forums	Provide educational events for elected officials and community leaders		Produce and disseminate the Rookery Bay Review newsletter
		Conduct annual Teacher on the Estuary workshops	Host science-based workshops for business audiences		Develop and facilitate content for stakeholders accessible on website
			Provide Best Management Practice (BMP) training for landscape professionals		
			Implement a needs assessment of coastal decision makers		

CHAPTER 4.

NATURAL, SOCIAL AND CULTURAL RESOURCES



Calusa mask

Geomorphology

The geomorphology and marine terraces in and around Rookery Bay Reserve are shown in Figures 10 and 11, respectively. Rookery Bay Reserve is characterized by flat sandy coastal lowlands supporting pine flatwoods and xeric scrub communities, inland freshwater marshes, cypress slough and prairies, coastal margin salt marshes, extensive mangrove forests, a reticulated mangrove island system, and associated mudflats, oyster bars, and seagrass beds. The bays that comprise Rookery Bay, Dollar Bay, and Johnson Bay are part of a larger interconnected system that once extended northward along the Florida Gulf coast to the vicinity of Tampa Bay. Many of these bays formed on the landward side of barrier islands and have gradually filled in either through natural hydrographical processes or as a result of human activities. Consequently, the once continuous inter-coastal lagoon system along Florida's Gulf coast, north of Rookery Bay, is now mostly fragmented.

The coastal geomorphology (Figure 10) of Rookery Bay Reserve is a result of some 3,000 years of slowly rising sea levels, a limited supply of sediment via rivers that empty behind the mangrove islands, and very low energy conditions along this portion of the coast (Davis 1997). The portion of Rookery Bay Reserve that includes the Ten Thousand Islands is characterized by mangrove islands separated by numerous tidal channels and back bays such as Faka Union Bay and Pumpkin Bay. The Ten Thousand Islands area also includes small discontinuous beaches composed of shell hash and sand (Davis 1997). The sand deposits in and around Rookery Bay Reserve are associated with marine terraces

The barrier islands in the vicinity of Rookery Bay have coalesced into incipient (Marco Island) or actual (Naples area) headlands. However, the extensive mangrove-dominated ecosystem continues to flourish and to expand into these areas as well as the coastal mainland. It now forms a vast uninterrupted coastal ecosystem from south of Naples to the southeastern margin of Florida Bay in Everglades National Park.

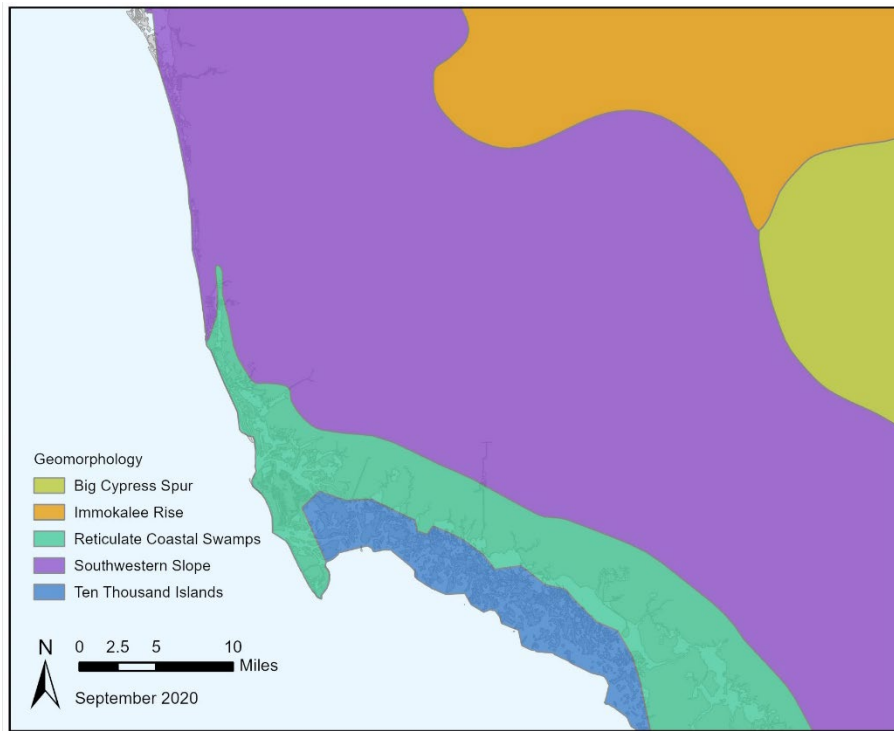


FIGURE 10: GEOMORPHOLOGY IN AND AROUND ROOKERY BAY NATIONAL ESTUARINE RESEARCH RESERVE

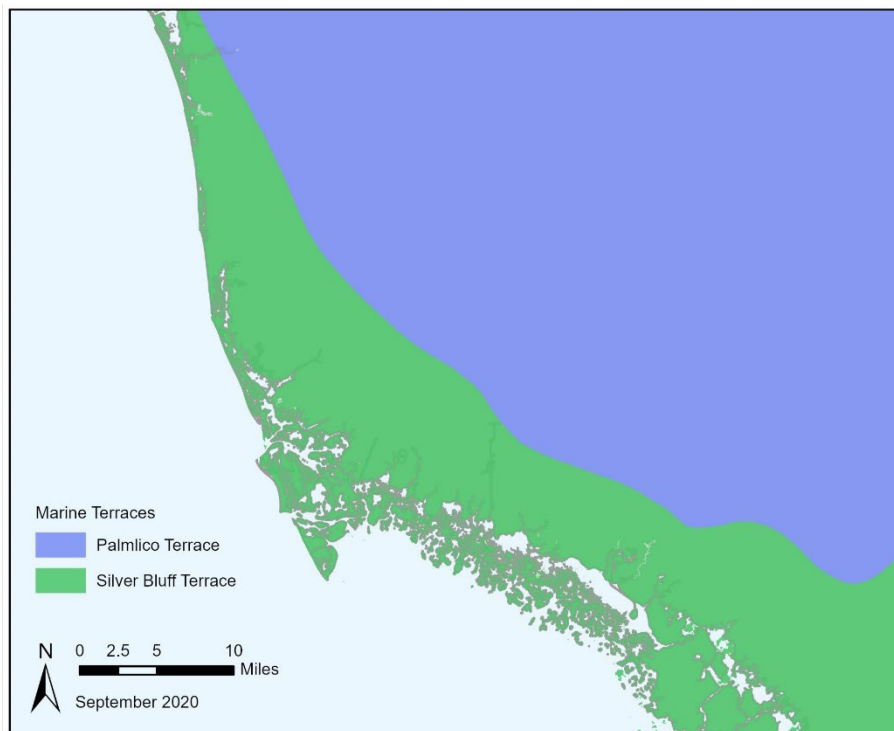


FIGURE 11: MARINE TERRACES IN AND AROUND ROOKERY BAY NATIONAL ESTUARINE RESEARCH RESERVE

Geology

The uplands of Rookery Bay Reserve are predominantly higher elevation Pleistocene-age sand dunes mixed with organic soils. Much of these uplands are at a mean elevation of 4 feet (1.2 m) above mean sea level, but a sandy ridge running roughly parallel with Shell Island Road in a north-south direction has an elevation of over 5.5 feet (1.7 m). These sandy regions are intermediately to well-drained and, as a consequence, support characteristic xeric vegetational assemblages.

The highest elevation in Rookery Bay Reserve is 22 feet (6.7 m) above mean sea level and is located on the shore of Stopper Creek. This area, named Sand Hill, is part of a long dune ridge that extends to the northeast beyond the Reserve's boundaries and eventually intergrades into the higher contours of the Belle Meade and Camp Keais coastal zones (Gore 1984). Test borings in this area produced sand down to an elevation of 6 feet (1.8 m). The bottoms of these borings are thought to have reached the limestone of the Tamiami Formation (The Conservation Foundation 1968).

Another unique upland feature of the Rookery Bay Reserve region are shell mounds, which are mostly kitchen middens and refuse sites used by the aboriginal Calusa Indians. They often form prominent topographical features above the low-lying contiguous tidelands of the Reserve.

Landforms of Rookery Bay Reserve are a combined result of Florida geologic and oceanographic processes. The late Miocene to Pliocene-age Tamiami Formation underlies all of Collier County, including Rookery Bay. During the interglacial periods of the Pleistocene era, much of Florida was under water. Several long-term sea level rise events took place between glacial events of the Pleistocene and left remnants of shorelines at seven different levels, which are now referred to as terraces (Figure 11). The two lowest terraces in Florida, Talbot and Pamlico, are evident in Collier County. The Talbot terrace was formed when the sea level was an estimated 25 to 42 feet (7.6 to 12.8 m) above the current sea level. The Pamlico terrace was formed when the sea level was an estimated 20 to 25 feet (6.1 to 7.6 m) above the current sea level (McCoy 1962, Scholl 1964, Wanless et al. 1994). The Silver Bluff terrace represents the remains of a shoreline that occurred during a warmer period, some 4,000 to 6,000 years ago (MacNeil 1950), when the shoreline was at a somewhat higher elevation than today's shoreline (Figure 11).

Using current topographical information for Collier County, an estimated shoreline for these terraces can be illustrated using GIS. A 5-meter (16.4-foot) elevation contour was used to represent the Pamlico terrace. This elevation may also match the sea level that occurred 3200 years before present (YBP) (Wanless et al. 1994) when most of the southwestern Florida coastline was again temporarily inundated. A 10-meter (32.8-foot) contour was used to represent the Talbot terrace. The resulting GIS map indicated that nearly all of Collier County, except for a small island near present day Immokalee, was under water for most of the Pleistocene era.

There are several periods in geologic history when Florida's Gulf coast was much farther out along the continental shelf (Wanless et al. 1994), but current bathymetry maps covering areas far enough out to illustrate this level are not available.

Because of the relatively rapid change in sea level throughout the period from 15,000 to 3200 YBP, no significant marine ridges were formed, and coastal lagoons and estuaries were ephemeral and narrow bands of vegetation. The rate of advance and retreat has slowed from a high of about 6.6 feet (2 m) per year (during 9000 YBP) to the current rate of 11.8 inches (30 cm) per 100 years. While mangrove forests

and marl levees provide stability and slow changes to the shoreline during these rises, barrier islands such as Keewaydin experience highly variable changes in shoreline due to currents and wave action.

The geologic formations and related surficial geology present in the Rookery Bay Reserve core area, associated aquatic preserves, and surrounding watershed are described by the United States Geological Survey (USGS) as:

- Quaternary
 - Qh1: Holocene sediments; quartz sand with minor amounts of clay and organic matter from lagoon deposits; no formations recognized.
 - Qsu1: undifferentiated shell-beds.
- Tertiary
 - Tt2: Tamiami Formation; limestone, clay, sand and marl, sometimes fossiliferous.

Minerals

There are no known abundant mineral resources (e.g., oil, gas, phosphates) within Rookery Bay Reserve.

Soils

During sea level transgressions in the late Pleistocene, one of the dominant geomorphic features in Collier County was formed. This feature is the Immokalee Rise and is described as a southerly extension of the Pamlico marine sands. Landforms in the Rookery Bay Reserve are dominated by Durbin and Wulfert mucks soil series (Figure 12). This soil series consists of level (1–2 percent slopes), slightly saline to strongly saline, very poorly drained organic soils in tidal mangrove swamps (Liudahl et al. 1998, Natural Resources Conservation Service 2019). These soils were formed in thick layers of organic material over sandy marine sediments and are mixed with decaying organic material and mangrove peats to form the mixtures of soils found in Rookery Bay Reserve today (Leighty 1954). Quartz sand and shell hash, produced by erosion of marine and subaerial limestones to the north and subsequently carried southward into the Reserve area by longshore currents, also comprise an important sedimentary layer here. In addition, mangrove-derived peats 1–2 feet (0.3–0.6 m) thick, marls (calcitic mud), and shelly sand or plain sand may form a typical stratigraphic sequence along the mainland shore. Much of the shell hash within the bay was produced by biological and physical processes that break down the calcium carbonate shells of estuarine bivalves, particularly the Eastern Oyster (*Crassostrea virginica*). These processes continue today. Lying beneath the shell hash in the protected bays and tidal creeks are layers of fine sand and mud. Various composites of these sediments may occur anywhere in the bay.

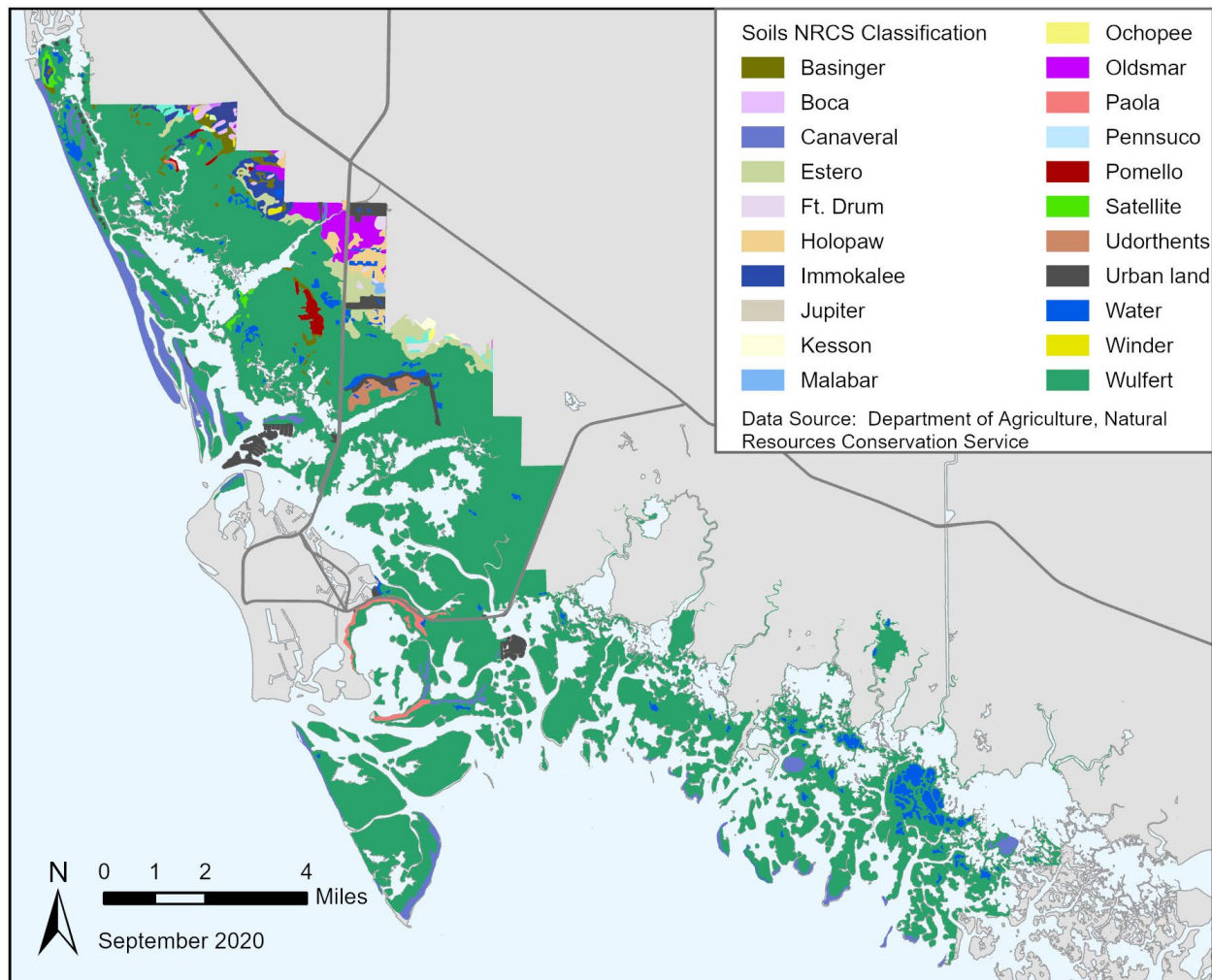


FIGURE 12: MAJOR SOIL SERIES OF ROOKERY BAY NATIONAL ESTUARINE RESEARCH RESERVE

Hydrology

Natural drainage patterns within Collier County have been significantly altered by the construction of canal systems designed to lower annual peak water levels during the wet season to prevent flooding. Such canals include the Golden Gate Canal, Henderson Creek Canal, Lely Canal, Lely Manor Canal, Faka Union Canal, and borrow canals used for constructing U.S. 41 (Tamiami Trail), State Road 84, State Road 27, State Road 951 (Collier Boulevard), and County Road 92 (Figure 1). A combination of fixed weirs and gates control canal flow, preventing excessive freshwater drainage and saltwater encroachment.

The primary basins that feed the Rookery Bay Reserve watershed are Lely (South Florida Water Management District [SFWMD] No. 6), Henderson Creek, and Picayune Strand (Figure 13). These basins are sub-units of South Florida Water Management District (Figure 5). Freshwater inflow to Rookery Bay proper comes primarily from Henderson Creek at the northeastern corner of the Reserve. This creek has an average water depth of 2.6 feet (0.8 m) and a mean flow rate of 2,073,600 cubic feet/day (58,718 m³/day) (Water Resources Data, Florida 1983, FL-83-2A) and drains the Belle Meade area (Gore 1984).

The Lely Area Stormwater Plan canals are also significant sources of freshwater inflow to Rookery Bay. These waterways drain the inland areas to the immediate northeast of Rookery Bay and produce a combined mean daily flow of 144,000 cubic feet/day (4,078 m³/day). A substantial but undetermined amount of sheetflow also drains overland into the Rookery Bay area.

The Faka Union Canal, located southeast of Marco Island, drains the southern portion of Golden Gate Estates through a series of connected canals and discharges into the Ten Thousand Islands estuary.

Rookery Bay has a surface area of 1,034 acres (4.2 km²) and a mean depth of about 3.3 feet (1 m) (Lee and Yokel 1973). Average open-water depths range from about 3.3 feet (1 m) at low tide to a maximum of 18 feet (5.5 m) at high tide in the channel at the southern entrance to the bay. Salinity in Rookery Bay is affected by freshwater inflow from Henderson Creek and by tidal cycles. Salinity data recorded from Rookery Bay over the four-year period of 2001–2004 showed that September had the lowest average monthly salinity at 0.26 parts per thousand (ppt) and May had the highest average monthly salinity at 27.6 ppt (PBS&J 2010). Average monthly salinities during the wet season (May through October) ranged from 0.26 to 27.6 ppt. Average monthly salinities during the dry season (November through April) ranged from 10.5 to 24.0 ppt during the period 2001–2004 (PBS&J 2010). However, salinities exceeding those of the open Gulf of Mexico (35 to 36 ppt) have also been recorded from Rookery Bay.

Rookery Bay has a mixed semi-diurnal tide. Tidal range averages 0.6 m (2 feet) with higher and lower extremes during periods of spring tides. Approximately 2.1 million cubic meters (75 million cubic feet) of water, estimated to be half of the volume of water in the bay, enters and exits Rookery Bay during each tidal cycle through the northern and southern openings. Two thirds of this water flows through the southern entrance, which has a deep channel and a strong current (The Conservation Foundation 1968). Florida DEP has designated tidally connected waters within Rookery Bay Reserve and Cape Romano-Ten Thousand Islands aquatic preserves as Class II and Outstanding Florida Waters.

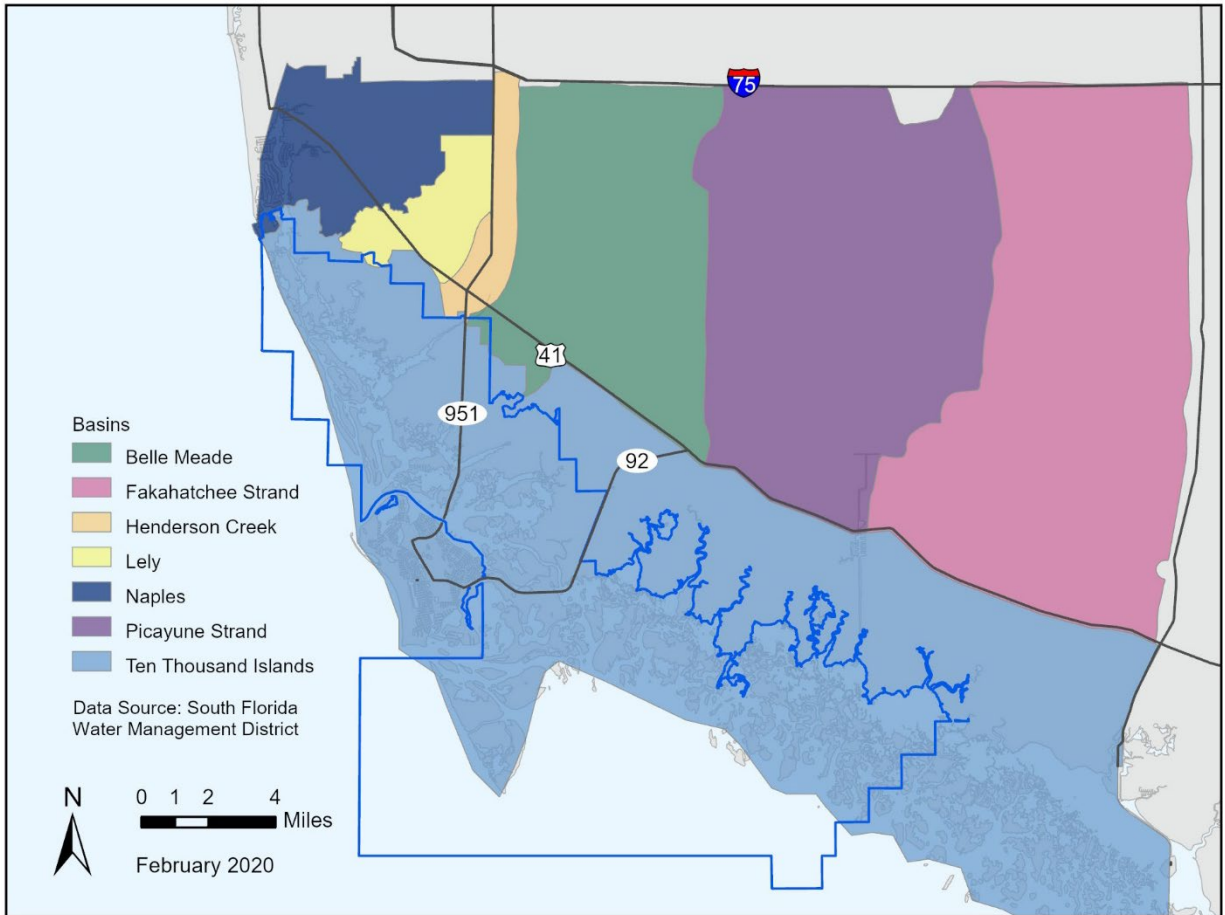


FIGURE 13: HYDROLOGY OF ROOKERY BAY NATIONAL ESTUARINE RESEARCH RESERVE BY DRAINAGE BASIN

Climate and Weather

The average annual air temperature in the Rookery Bay area is 24°C (75°F). This is due to the influence of the warm-water Florida Current, the seasonal effects from the Loop Current, and its geographical position at 26° N latitude. Rookery Bay Reserve is in the Tropical Rainy climatic group of Koppen (1931), due to a combination of the average monthly air temperatures not falling below 17.7°C (64°F) and its geographic position south of Fort Myers and Melbourne. Winter temperatures range from -1°C (ca. 30°F) to about 26°C (75°F), with cooler days and nights (10° to 15°C [50° to 68°F]) in January and February. Warming trends in April and May are frequently modified by blustery winds from the southwest off the Gulf of Mexico and by late-season cold fronts with northerly breezes. Summer high temperatures approach 35°C (95°F) and are higher on occasion (Thomas 1974).

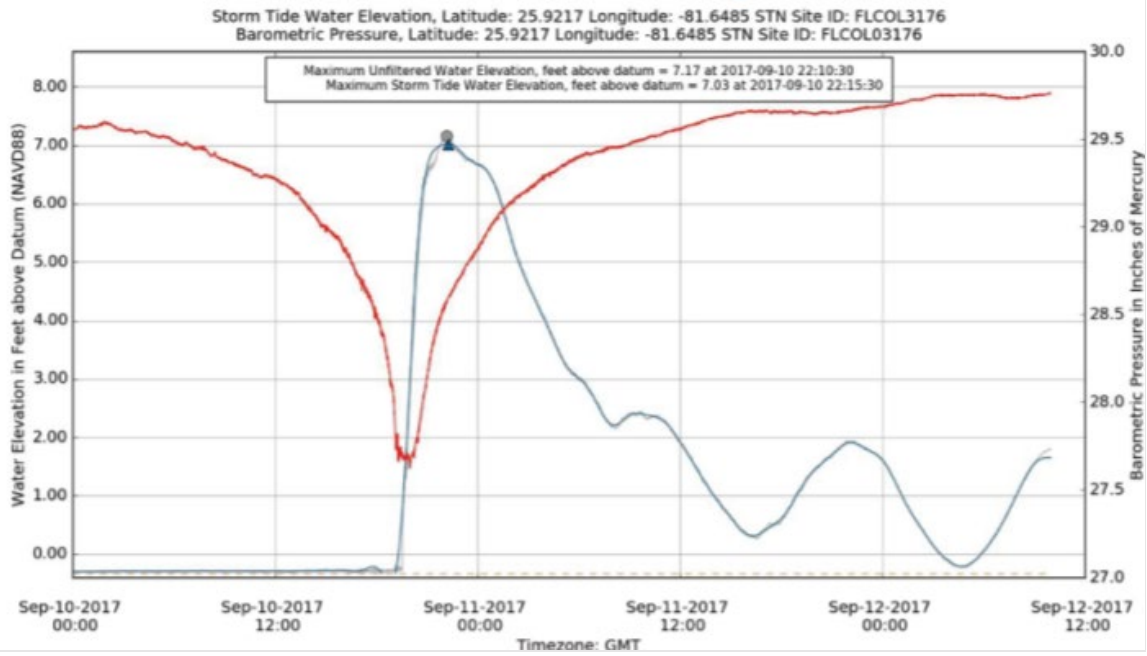
Rookery Bay Reserve and vicinity have an annual rainfall of 127 to 140 cm (50 to 55 inches) (Thomas 1974). The heaviest average monthly rainfall, 20.3 to 22.9 cm (8 to 9 inches) per month, occurs from June through September. The lowest average rainfall occurs from November through March, at 2.5 to 5.0 cm/month (1 to 2 inches/month). Approximately 66 percent of the total yearly rainfall occurs from June through October. Southwestern Florida lies in the seasonal tropical weather belt that channels hurricanes toward or along the coast.

One of the most common extreme weather impacts to the Naples area is from tropical cyclones such as tropical depressions, tropical storms, and hurricanes. On average, Naples is affected once every 2.67 years by tropical cyclones, every 6.68 years by hurricanes, and every 10.5 years by major hurricanes. The last major hurricane that affected this area was Hurricane Irma on September 10, 2017, which made landfall on Marco Island with sustained winds of 115 mph. The most recent hurricane to impact the Reserve was Hurricane Irma which impacted the entire Reserve (Figure 14). The maximum storm tide recorded by USGS in Collier County was 8.92 feet (2.72 m), in Everglades City, southeast of the Reserve. The highest surge from Irma in the Reserve was found by USGS on Goodland from a high-water mark of 7.17 feet (2.19 m) above NAVD 88 and a maximum storm tide water elevation of 7.03 feet (2.14 m) above NAVD 88 (Figure 14) (Byrne and Dickman 2019).



EXPLANATION

- Unfiltered Water Elevation
- Storm Tide (Lowpass Filtered) Water Elevation
- Minimum Recordable Water Elevation
- Barometric Pressure
- Maximum Unfiltered Water Elevation
- ▲ Maximum Storm Tide Water Elevation



Water Depth

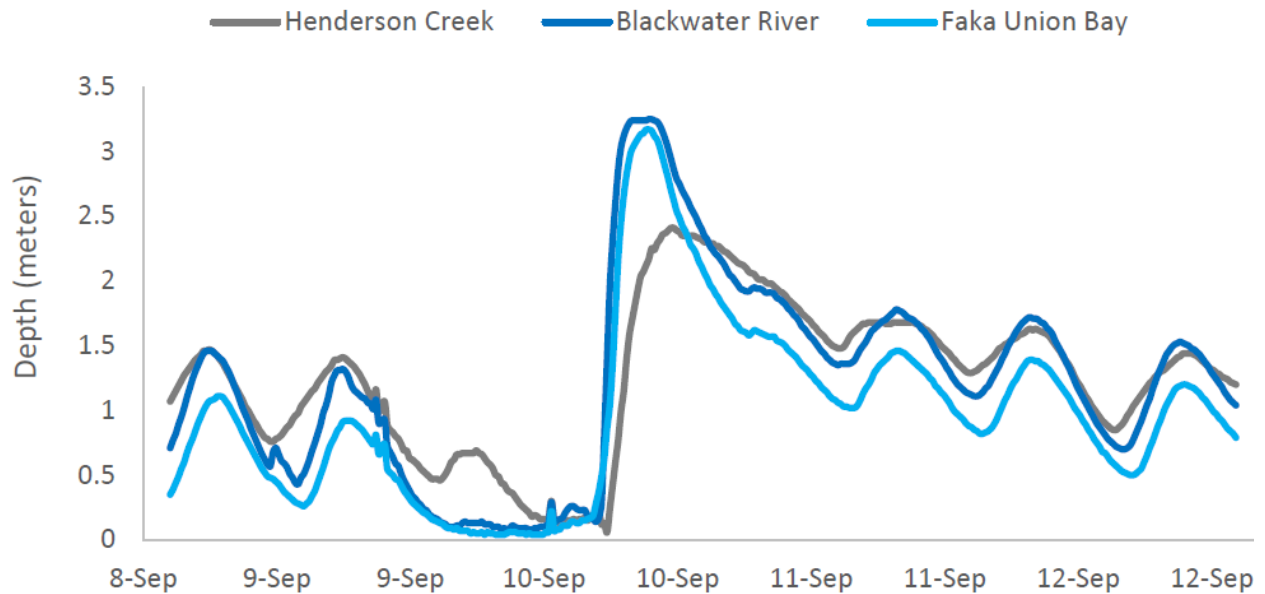
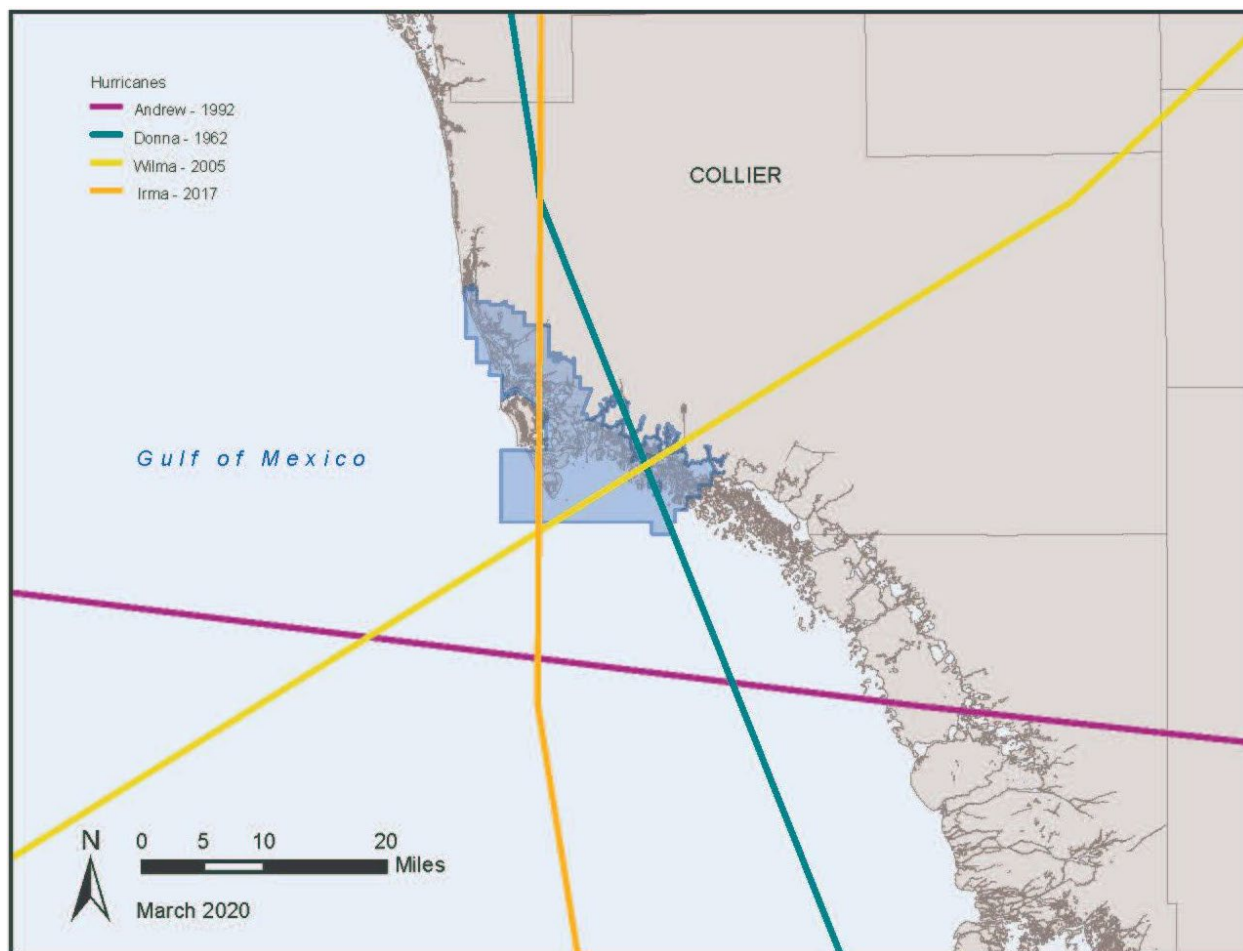


FIGURE 14: WATER DEPTHS RECORDING DURING HURRICANE IRMA IN SEPTEMBER 2017 AT ROOKERY BAY NATIONAL ESTUARINE RESEARCH RESERVE

Prior to Hurricane Irma, in 2005, Hurricane Wilma, a Category 3 storm, made landfall in the center of Rookery Bay Reserve at Cape Romano, causing significant shoreline changes in barrier islands within the Ten Thousand Islands and deforestation within mangrove-forested wetlands along the coast. In 1960, Category 3 Hurricane Donna caused extensive damage to the Naples area with flooding and high winds. This storm resulted in devastation of the vegetation and widespread damage to homes and buildings in the Rookery Bay-Naples area (Dunion, et al. 2003). An earlier storm in 1918 also produced severe damage to human and natural features and is considered responsible for considerable damage to mangrove systems in Collier County. The mangroves have since naturally regenerated over the ensuing decades. The paths of previous major hurricanes that have affected Rookery Bay Reserve are shown in Figure 15 below.



**FIGURE 15: THE TRACKS OF MAJOR HURRICANES THAT HAVE IMPACTED
ROOKERY BAY NATIONAL ESTUARINE RESEARCH RESERVE**

Habitat Classification

The Reserve's upland habitats were mapped in 2010 by hand digitizing features using aerial imagery, LiDAR and extensive ground truthing (Barry et al. 2013). Additionally, a historic habitat map was created based on 1940 aerial imagery and field observations made during ground truthing efforts. Upland habitats were mapped according to the Comprehensive Everglades Restoration Plan (CERP) classification scheme (Rutchev et al. 2006). The classification is hierarchical and based on dominant vegetation and forest structure. The detailed classification enables the Reserve to detect subtle habitat changes and

guide land management (i.e., prescribed fire, exotic vegetation removal). A crosswalk system was developed to match CERP classifications with the Cooperative Land Cover Classification to meet state management plan requirements (Figure 16). The Cooperative Land Cover classification system was created in partnership between the Florida Fish and Wildlife Commission (FWC) and Florida Natural Areas Inventory (FNAI).

The Reserve's benthic habitats were mapped in 2015 using aerial imagery and extensive ground truthing (Figure 17). The benthic features were classified using modified codes from the Florida Land Use Land Cover Classification System (FLUCCS).

An interactive map of the Reserve's upland and benthic habitats is available online (<https://rookerybay.org/learn/research/gis-mapping/>).

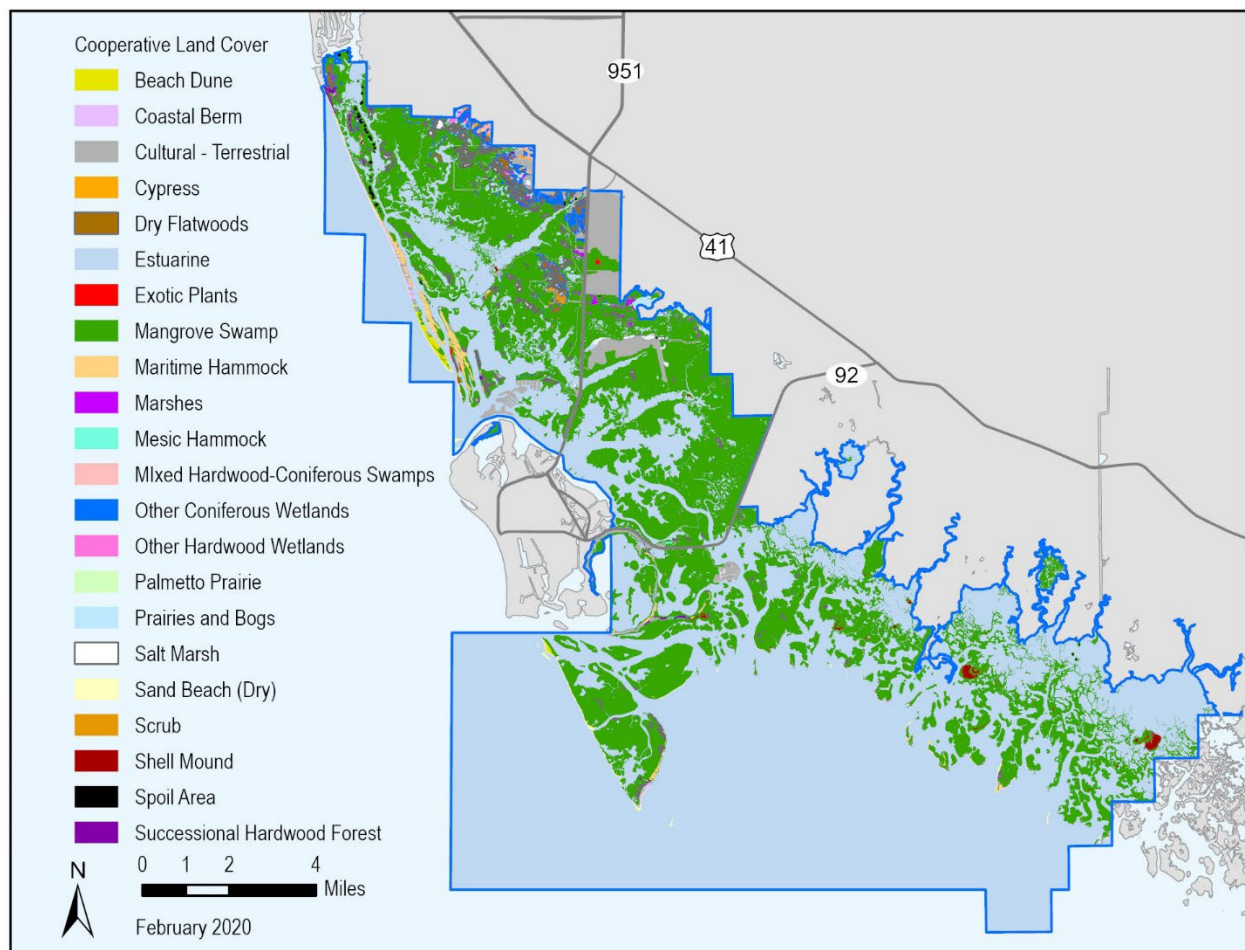


FIGURE 16: COOPERATIVE LAND COVER HABITAT AT ROOKERY BAY NATIONAL ESTUARINE RESEARCH RESERVE

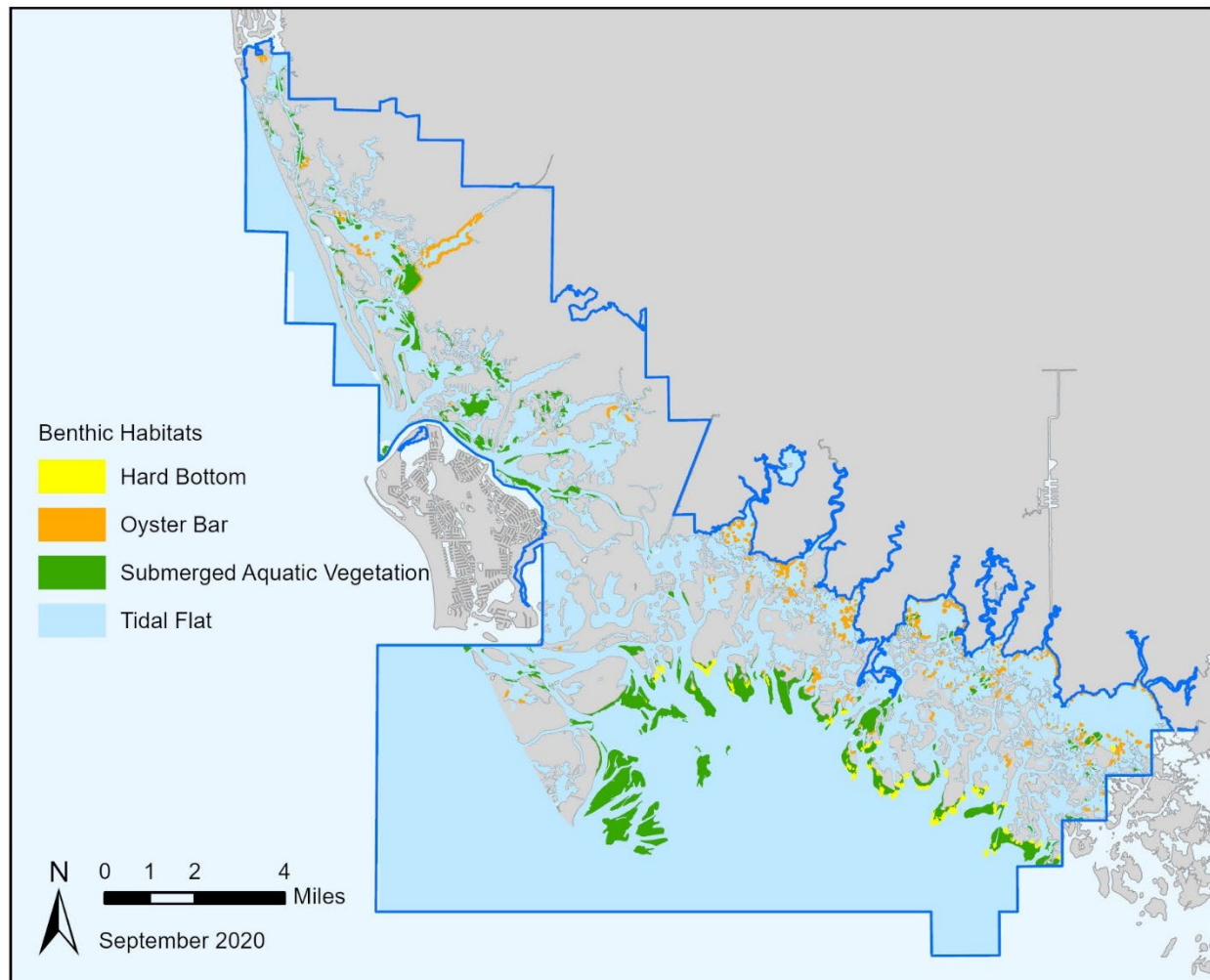


FIGURE 17: SUBMERGED BENTHIC HABITAT AT ROOKERY BAY NATIONAL ESTUARINE RESEARCH RESERVE

Native Species

Native flora and fauna within Rookery Bay Reserve is diverse and abundant, ranging from large mammals such as Florida Manatee (*Trichechus manatus latirostris*), Florida Panther (*Puma concolor coryi*), Florida Black Bear (*Ursus americanus floridanus*), and Bobcat (*Lynx rufus*) to a diverse assemblage of microscopic plankton in coastal waters, including algae and larval stages of crabs, shrimp, and fishes. There is an abundance of fish and shellfish species of commercial and recreational importance, including Blue Crab (*Callinectes sapidus*), Pink Shrimp (*Farfantepenaeus duorarum*), Snook (*Centropomus undecimalis*), Tarpon (*Megalops atlanticus*), Gray Snapper (*Lutjanus griseus*), Sheepshead (*Archosargus probatocephalus*), and Gulf Flounder (*Paralichthys albigutta*).

Rookery Bay Reserve is nationally recognized for its importance in providing foraging and resting areas and rookeries for over 150 species of wading birds, shorebirds, and raptors. Such iconic species as Bald Eagle (*Haliaeetus leucocephalus*), Osprey (*Pandion haliaetus*), Least Tern (*Sternula antillarum*), Roseate Spoonbill (*Platalea ajaja*), and Reddish Egret (*Egretta rufescens*) are found at the Reserve.

Lists of endangered and threatened species, invasive animal species, invasive plant species, and nuisance species are found in Appendices B4.1 through B4.4.

Listed Species

Rookery Bay Reserve provides important habitats for many species listed as endangered or threatened under the Endangered Species Act (ESA) (16 USC 1531 et seq.) and (or) FWC (Chapter 39-27.003-005, F.A.C.). Some of the most notable species are Florida Manatee (ESA-threatened), Loggerhead Sea Turtle (*Caretta*, ESA-threatened), Gopher Tortoise (*Gopherus polyphemus*, state-threatened), Least Tern (ESA-threatened), Eastern Indigo Snake (*Drymarchon couperi*, ESA-threatened), Smalltooth Sawfish (*Pristis pectinata*, ESA-endangered), and American Crocodile (*Crocodylus acutus*, ESA-threatened). Sightings of Florida Panther (ESA-endangered) have been confirmed by telemetry and photo evidence within the Reserve and are increasing as local populations appear to be in recovery.

The construction of a manatee mitigation feature was completed in April 2016 along the west bank of Faka Union Canal, south of Port of the Islands, as part of the Picayune Strand Restoration Project. The associated manatee mitigation plan was added in 2014 to Rookery Bay Reserve's previous management plan. Florida DEP approved the amendment to the management plan in 2014. The warm-water lens at the Port of the Islands Marina, used historically by manatees to keep warm in winter, is being altered or eliminated as sheetflow restoration efforts decrease point-source freshwater discharges into Faka Union Canal. The mitigation feature is designed to act as a new warm-water refuge for manatees to use during the cooler winter months.

A summary of listed species of plants and animals known to occur in Rookery Bay Reserve, based on information from the FNAI and on observations made by staff of Rookery Bay Reserve, is in Appendix B.4.1.

Invasive Non-native Species

Reducing the effects of invasive non-native species in Rookery Bay Reserve is an important part of management and restoration efforts at the Reserve as these species cause significant stress to native ecosystems (Adams and Steigerwalt 2010) and reduce native plant and animal diversity (Elton 1958). Dominant invasive plant species at the Reserve include Australian pine (*Casuarina* spp.), Brazilian pepper, melaleuca (*Melaleuca quinquenervia*), latherleaf (*Colubrina asiatica*), and climbing fern (*Lygodium* spp.). These and other invasive plants continue to disrupt the native biodiversity of the Reserve's natural communities. Natural communities that are at highest risk include those on barrier islands and within transition zones such as freshwater marshes.

Invasive non-native animal species found in Rookery Bay Reserve include feral Hog (*Sus scrofa*), Black Spinytail Iguana (*Ctenosaura similis*), and Burmese Python (*Python bivittatus*). Feral Hogs have depredated sea turtle nests on Keewaydin Island. Burmese pythons have been found throughout the Reserve including on barrier islands. Other invasive animal species observed in the Reserve include the introduced Asian Green Mussel (*Perna viridis*). See Appendix B.4 for more detailed descriptions of invasive plant and animal species found in Rookery Bay Reserve and Appendix B.8 for invasive species control plans.

Problem Species

Raccoon (*Procyon lotor*) and Coyote (*Canis latrans*) populations on barrier islands within Rookery Bay Reserve have caused serious problems due to depredation of sea turtle nests during summer months.

Population Demographics

Collier County has experienced unprecedented population growth over the last three decades. Between 1990 and 2019, the county's population increased from 152,099 to 376,706, an increase of 148 percent. In addition to the population of full-time (non-seasonal) residents of Collier County, there is an additional 65,000+ of seasonal residents that live in Collier County part-time (primarily during the cooler months). Current projections for Collier County estimate an additional population increase of up to 53 percent through 2040 (Rayer and Wang 2020). Such projected population growth will include the eastern Naples area, including areas east of State Road 951 (Collier Boulevard) and along U.S. 41 (Tamiami Trail) east to the boundaries of conservation land such as Collier-Seminole State Park and Picayune Strand State Forest. These urban-designated areas where continued growth is anticipated are adjacent to the eastern and northern boundaries of Rookery Bay Reserve. The Collier County Comprehensive Plan presents criteria for development of county lands and provides a map of future land use in Collier County with recommendations for land use.

In 2018, Collier County's working age population (ages 25–54) represented 31.9 percent of the total population. The population was estimated to be 51.0 percent female, while race distributions were estimated to be 62.6 percent non-Hispanic White, 30.1 percent Hispanic, and 7.2 percent non-Hispanic Black (Rayer and Wang 2019). The median family income in 2016 was estimated to be \$65,700 (HUD), and the total number of people below poverty level in 2014 was estimated to be 49,211 (US Census Bureau).

Jobs and Employment Drivers

The unique natural landscapes and wildlife of Rookery Bay Reserve bring many visitors and marine industries jobs to Collier County. Tourism is the leading employer and primary economic engine for southwest Florida. The estimated two million visitors to Collier County in 2018 spent over \$1.5 billion (Collier County Tourist Development Council 2018). The tourism industry supported 38,000 jobs, indicating that 1 in every 10 jobs in the county is tourism dependent. While it is hard to quantify the entire value that the natural environment in southwest Florida brings to the tourism industry, the majority of visitor's report engaging in nature-based activities. In a survey of visitors to Collier County, 77 percent reported visiting the beach and 25 percent reported enjoying nature/birding/wildlife during their trip (Research Data Services, Inc. 2018).

In addition to recreational fishing, which is considered part of the tourism industry, there is also a commercial fishing industry in Collier County. Within Rookery Bay Reserve, there are 16 species of commercially valuable fishes and shellfish, with Striped Mullet (*Mugil cephalus*) the principal finfish and Blue Crab (*Callinectes sapidus*) and Stone Crab (*Menippe mercenaria*) the major shellfish. The commercial fishing industry, including seafood processing and seafood markets, supports 251 jobs in Collier County (NOAA 2016).

In response to a request from the Board of Collier County Commissioners, the Board of Trustees of the Internal Improvement Trust Fund authorized during 2004 the use of sovereignty submerged lands to establish two aquaculture-use areas within Rookery Bay Reserve. A lease for submerged lands is required per Ch 18-20.004 F.A.C. to conduct aquaculture in an aquatic preserve. Aquaculture is regulated by the Florida Department of Agriculture and Consumer Service. Two tracts of submerged lands were designated as the Cape Romano Aquaculture Use Area (50 acres [0.20 km²]) and the White Horse Key Aquaculture Use Area (44 acres [0.18 km²]). In total, 32 leases of two acres each were granted within the aquaculture use areas for the production of the native bivalves, Northern Quahog, (*Mercenaria mercenaria*) and Sunray Venus Clam (*Macrocallista nimbosa*), as food products.

Ecosystem Services

Estuarine systems provide numerous social, economic, and environmental benefits and can be defined as benefits that flow from nature to people. Due to the strong link between healthy habitats and the services they provide to people, it is necessary to incorporate threats to nature and people into coastal management considerations. An ecosystem services approach to management is a useful perspective to consider multiple stakeholders' needs and manage for an intact and resilient ecosystem. Ecosystem services are inherently cross-sectoral and involve integration of multiple beneficiary groups' perspectives. Knowing how people value natural resources and understanding the links between nature and the benefits people derive from these coastal systems will help society make better decisions about the use, or non-use, of those resources and how best to maximize benefits. To better understand ecosystem services in southwest Florida, Rookery Bay Reserve collaborated with researchers from Duke University to build an ecosystem services conceptual model for mangrove forests (Figure 18 below). This model provides a framework point for beginning to consider a suite of ecosystem services into a restoration project. The model illustrates how a management intervention (restoration) cascades through a mangrove ecosystem and results in ecosystem services. This model can be used to consider how ecosystem services are likely to change with restoration activities, a useful tool to identify or plan future mangrove restoration sites. Rookery Bay Reserve plans to continue such work to engage with the community to understand the values of natural resources and incorporate this information into decision-making.

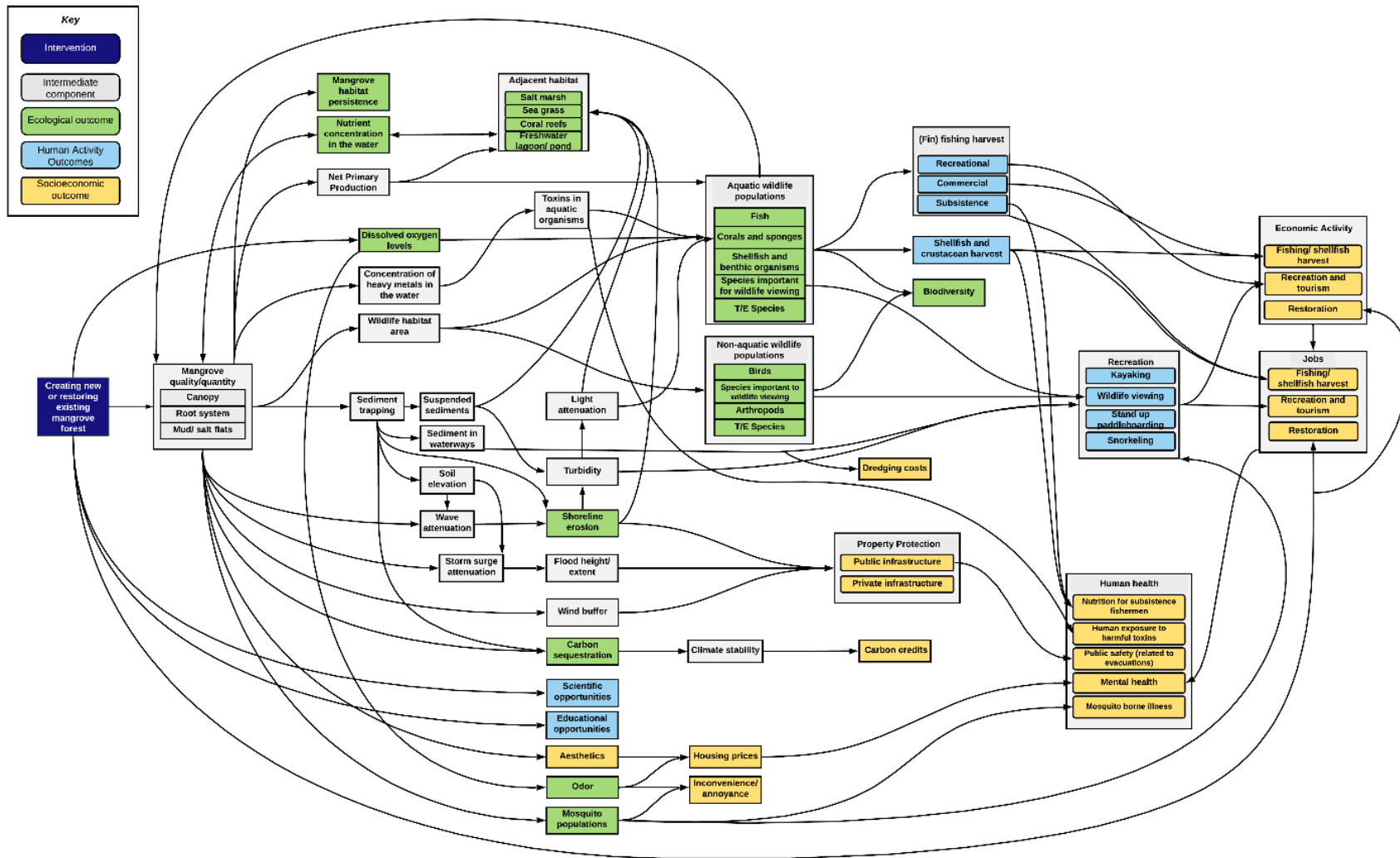


FIGURE 18: CONCEPTUAL MODEL OF ECOSYSTEM SERVICES AT ROOKERY BAY NATIONAL ESTUARINE RESEARCH RESERVE

Conceptual model is from website of Nicholas Institute at Duke University:

<https://nicholasinstitute.duke.edu/project/ecosystem-services-toolkit-for-natural-resource-management/coastal/conceptual-model-collection>

Archaeological and Cultural Resources

Rookery Bay Reserve has numerous prehistoric midden sites located on mangrove-forested islands and within coastal scrub and pine flatwood communities. The earliest documented habitation by humans in what is now Rookery Bay Reserve is about 4000 years ago during the Late Archaic period (Brown 1994). The anthropological history of this area since then is rich and filled with evidence of a network of native American settlements and a history of outlaws and pioneers seeking refuge and commerce in hostile, unknown territories. The first recorded non-native settlements in Rookery Bay and southwest Collier County began in the late 1880s. General locations of archaeological and cultural resources are shown in Figure 19. See Appendix B.7 for more information on recorded managed archaeological sites of Rookery Bay. See Appendix E.4 for a summary of management procedures for archaeological and historical sites on state-owned or controlled land.

Pre-European

A number of known cultural sites have been the subject of research projects conducted by visiting scientists in cooperation with the Florida Division of Historical Resources. Most notably, a study was completed in the Ten Thousand Islands that cataloged a series of prehistoric sites within Rookery Bay Reserve and Ten Thousand Islands National Wildlife Refuge. In 1995, archaeologists with the Florida Bureau of Archaeological Research conducted a reconnaissance of approximately 12,000 acres (48.6 km²) of CARL program lands within the Reserve. They recorded 20 sites: 11 pre-European and 9 from late 19th and early 20th century homesteads.

Sites in Horrs Island and along the Turner River and elsewhere in the Ten Thousand Islands were probably villages. Artifacts recovered by archaeologists at these sites included objects of stone, shell, bone, and pottery (Brown 1994). At the nearby Key Marco site (now part of Marco Island), even perishable objects of wooden bowls, mortars and pestles, spears and atlatls (a stick used to improve spear-throwing) and handles of several types of tools were uncovered because the muck at this site preserved such materials (Brown 1994). Cord, ropes, and nets of palm fiber were uncovered there, as the muck preserved these items as well. Early inhabitants of the area were hunters, fishers, and gatherers (Gilliland 1975, Kozuch 1993, Brown 1994). Whitetail Deer (*Odocoileus virginianus*) and Raccoon were occasionally killed and eaten, and their bones were used to make tools. Small fish were caught using nets made from plant fibers (Brown 1994). Shellfish, especially Quahog (*Mercenaria* sp.), Lightning Whelk (*Sinistrofulgur perversum*), Florida Fighting Conch (*Strombus alatus*), Bay Scallops (*Argopecten irradians*), and Eastern Oysters (*Crassostrea virginica*) were important food and tool sources, and their abundance often determined where these people would settle for long periods of time (Brown 1994). Fish were also commonly consumed by these early people. Hardhead Catfish (*Ariopsis felis*), Atlantic Thread Herring (*Opisthonema oglinum*), and Pinfish (*Lagodon rhomboides*) were commonly captured in nets and were consumed (Brown 1994). Sharks were also occasionally captured, probably by use of large wooden hooks, or perhaps by composite hooks of wood and bone, attached to line made of plant fibers (Kozuch 1993).

Over the last decade, careful surveying, mapping, and testing of the extensive prehistoric sites contained within Rookery Bay Reserve challenge the traditional assumption that these sites were little more than shell middens formed from the everyday disposal of daily shellfish meals. Results of such pursuits by researchers now suggest that these sites represent settlements that connected communities and allowed the sharing of similar social, political, and ideological characteristics by the Native Americans who lived there thousands of years ago (Schwadron 2010, 2017). Records for these important archaeological sites are on file at the Reserve's headquarters facility.

Post-European

The Henderson Creek area of Rookery Bay Reserve contains several historic sites that are relatively undisturbed remnants of pioneer settlements dating from the 1800s. In the early 1900s, growth in Collier County continued to be slow despite the construction of the Tamiami Trail (now U.S. 41) connecting Naples to Miami in 1928. Naples and the surrounding area have changed from the slow-paced fishing village of the 1960s to the sprawling urban resort area of today, with one of the highest concentrations of golf courses in the United States. Rookery Bay and its barrier islands were saved from development in the 1960s by the concerted efforts of local citizens concerned about dwindling natural coastal resources. In 1977, lands surrounding Rookery Bay that were purchased for conservation were accepted into the NERR System.

The Southwest Frontier

The colorful history of the Ten Thousand Islands has been popularized through books such as *Killing Mister Watson* by Peter Matthiessen in 1990 and *Ten Thousand Islands* by Randy Wayne White in 2000. These semi-fictional accounts provide a glimpse of southern Collier County as a refuge for outlaws and loners willing to deal with mosquitos and swamps and making a living off American Alligators (*Alligator mississippiensis*), brightly colored bird plumage, sugarcane, tropical fruit, and fish. Another local history was written by long-term resident Loren “Totch” Brown in 1993 entitled *Totch: A Life in the Everglades*.

A newspaper article from *The Naples News*, January 1, 2000, recounts the 1923 swearing-in of Collier County’s first sheriff, Captain W.R. Maynard. Also during the 1920s, advertising entrepreneur and land developer Barron Collier began his ambitious dredge, fill, and build program in the Everglades, bringing civilization to this challenging American frontier. The Florida legislature named the newly created Collier County after him on May 8, 1923. This was done largely on the premise that Mr. Collier would get construction of Tamiami Trail underway (Tebeau 1971). Mr. Collier was the first person to take aerial photographs of Collier County. This produced the first landscape-scale understanding of the flow-ways and habitat patterns and allowed the building of roads to upland areas suitable for development.

A recent grant-funded project re-assessed all the original prehistoric and historic sites assessed during the acquisition of CARL program lands and updated all other known cultural resource site data and information throughout Rookery Bay Reserve. Records for the prehistoric and historic sites discussed above are on file at the Reserve’s headquarters. A GIS database was also created to house all known cultural resource site information. This database consists of maps and topographic drawings of sites, historic deeds, oral interviews, images of artifacts, and curated inventories.

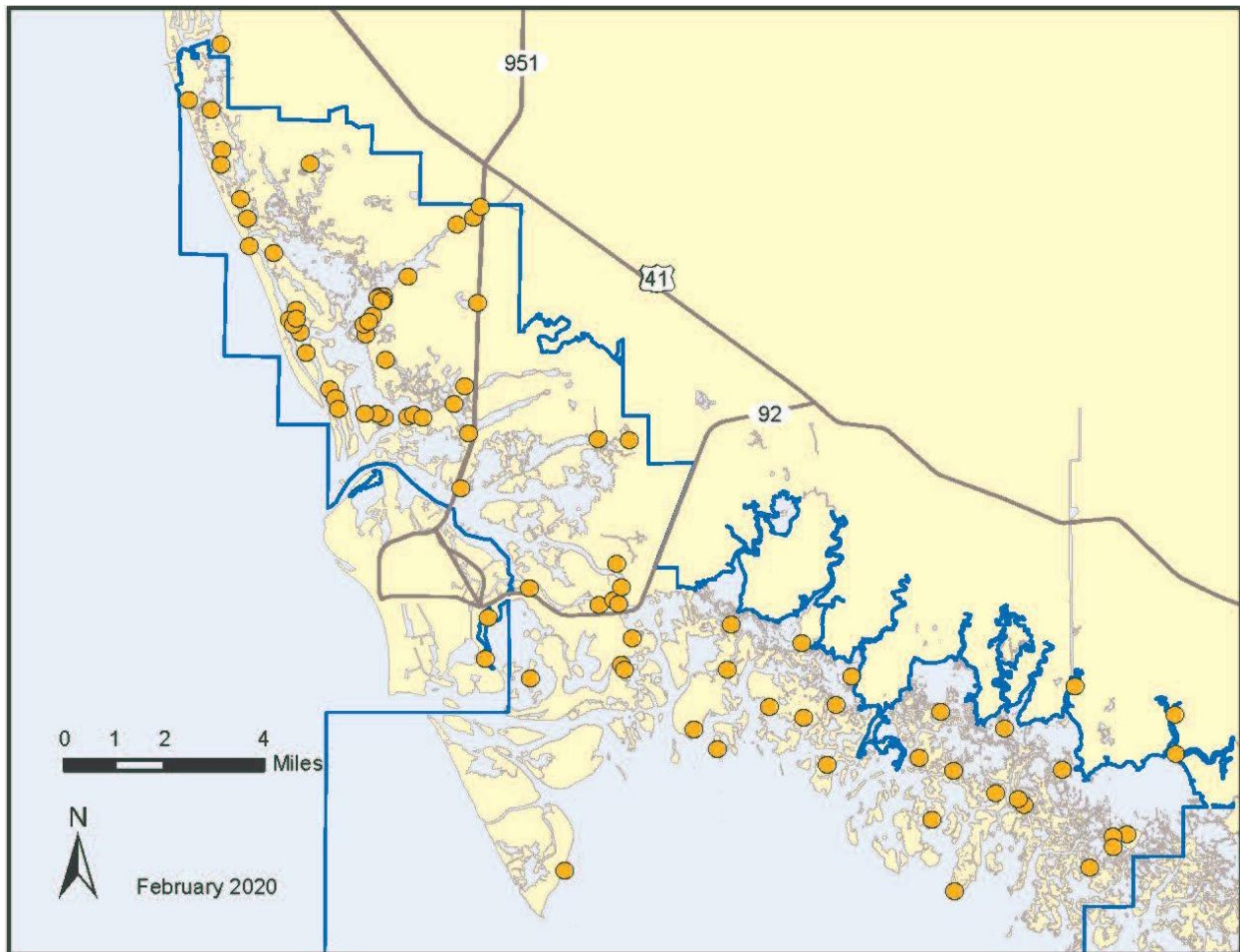


FIGURE 19: GENERAL LOCATIONS OF CULTURAL RESOURCES OF ROOKERY BAY NATIONAL ESTUARINE RESEARCH RESERVE

The preservation of cultural resource integrity within Rookery Bay Reserve is important to the Reserve as it manages the resources, cultural and otherwise, located within its boundaries. In order to assess, interpret, and protect the vast range of cultural resources on its land, the Reserve will continue to facilitate and (or) conduct targeted research to function as the basis for developing a comprehensive cultural resources management plan. Degradation, including erosion, vandalism, and destruction by wildlife and other natural occurrences, impact the integrity of the Reserve’s cultural resources. Sea level rise may also be adversely influencing coastal erosion. The Reserve will collaborate with other governmental agencies, First Nations’ tribes, universities, private groups, and citizens to seek solutions to preserving the cultural heritage on its managed land in southwest Florida. More information on recorded managed archaeological sites is in Appendix B.7. Management procedures for archaeological and historical sites on state-owned or controlled land are in Appendix E.4.

CHAPTER 5.

RESEARCH AND MONITORING



Shark research at Rookery Bay Reserve includes a shark tagging program in the Ten Thousand Islands

The National Estuarine Research Reserves were created to provide a stable platform for long-term research on estuarine conditions and relevant coastal management issues. The System-Wide Monitoring Program (SWMP) delivers standardized measurements of short-term variability and long-term changes in water quality and biological systems and maps land use and land cover characteristics across all reserves. The effort is focused on three ecosystem characteristics: abiotic characteristics (water temperature, salinity, and quality and weather); biotic characteristics (habitat types and species); and watershed and land use characteristics (land cover and elevation changes). Reserve-generated data meet federal geographical data standards and are available via the Reserve System's Centralized Data Management Office. Reserves also serve as sentinel sites for observing how coastal habitats respond to changing water levels. This program is guided by the [Reserves' SWMP Plan](#), the [Reserve Habitat Mapping and Change Plan](#), and [Sentinel Sites Guidance \(National Oceanic and Atmospheric Administration \[NOAA\] 2016\)](#).

The Reserve System also supports applied research through its Science Collaborative program and the Margaret A. Davidson Graduate Fellowship program. The Science Collaborative funds competitive research projects that engage end-users in the project design and address system wide NERR System research and management needs. The goal of the Davidson Fellowship is to build the next generation of leaders in estuarine science and coastal management. The fellowship provides opportunities for graduate students to conduct research within a reserve under the guidance of a mentor who also supports their professional development (NOAA 2016). The Davidson fellow will work with other sectors to support their professional training and to share information across all sectors, especially Education and Communication.

The Reserve System Strategic Plan outlines research objectives to maintain and expand biophysical and socioeconomic monitoring to track environmental change; increase the use of collaborative research to address decision-maker needs; and ensure that scientific, education, and management audiences can use the data, research results, and tools developed by the system (NOAA 2016).

Research and Monitoring Program Context

Of the 30 reserves across the nation, Rookery Bay Reserve is distinct in terms of regional climate (tropical-rainy; Kopper 1931), habitat dominance (karst-based mangrove and coastal scrub), and geological setting (southeastern Gulf of Mexico; contiguous to the Florida Everglades). Therefore, the Reserve serves as a climatic and regional representative unique to the NERR system. In addition to key ecologically and economically relevant resident wildlife species, the Reserve is valued for its role as a migratory hotspot that connects habitats across North and South America and the Caribbean. This is one example of how the impact of the Reserve's Research and Monitoring Program extends beyond its boundary. This management plan highlights the key work performed by the Reserve's Research and Monitoring Program and the valuable connections forged among internal and partner-based research, management, and education programming through comparative studies, wildlife tracking, development of novel techniques, and long-term monitoring. The Reserve serves a global coastal science and resource management community through its efforts to enhance understanding and adaptive management of habitats and wildlife in southwest Florida.

Building on the research accomplishments from the 2013–2018 management plan, the research team will continue to dedicate its resources and efforts toward (1) habitat mapping and change (including the impact of sea level rise on Reserve habitats); (2) wildlife community distribution, production, and habitat use; and (3) effects of natural resource management and restoration. Some highlights of these focus areas are described below (see Appendix D.3 for a list of major accomplishments):

1. Habitat mapping and change analysis

- A comprehensive Reserve habitat map (<https://fdep.maps.arcgis.com/apps/View/index.html?appid=8411a48443da4b029380951f70ce7885>) was created in 2015. All land habitats were mapped according to the Comprehensive Everglades Restoration Plan (CERP) classification scheme using 2010 aerial imagery, LiDAR-based elevation data, and extensive field data collection. Submerged habitat was mapped according to the Florida Land Use, Cover and Forms Classification System (FLUCCS) using 2014 aerial imagery. Updates to this map are focusing on key transition areas, especially for the Henderson Creek Sentinel Site (below).
- The Henderson Creek Sentinel Site Program was developed in 2018 to monitor changing vegetation in response to sea level change (described in more detail below). Twelve Surface Elevation Tables (SETs) were installed to measure habitat-specific elevation change. In addition, the earliest known SETs to have been installed during the 1990s by the U.S. Geological Survey (USGS) in fringe, watershed, and overwash mangrove habitats that occurred at Rookery Bay Reserve; these have since been transferred to the Reserve's Research and Monitoring Program to monitor in partnership with USGS and the National Park Service.
- Rookery Bay Reserve monitors changing vegetation communities and habitat structure through its own management actions (prescribed fire), episodic events (hurricane impact), and external control (mangrove impoundment by road construction) through internal GIS analysis and external partnerships. Key areas of the Reserve's coastline are periodically mapped using GIS, including the south end of Keewaydin Island and the Critical Wildlife Area sandbar called Second Chance. Examples of this work can be viewed in the Story Maps on the Reserve's GIS website at <https://rookerybay.org/learn/research/gis-mapping/>.

2. Wildlife population change and habitat use

- A beach-nesting shorebird population monitoring program, which includes nesting success, behavior, and habitat use, is conducted during the breeding season (April through September) at key locations such as the south end of Keewaydin Island, the Cape Romano Complex, Second Chance sandbar, and the Ten Thousand Islands. Additional wading bird, shorebird, and seabird monitoring includes nesting and aggregation locations, refighting's, and abundance. Information from these efforts is submitted to the Florida Shorebird Alliance database and is communicated with local avian research and management partners (Audubon Florida, Audubon of the Western Everglades, Florida Fish and Wildlife Conservation Commission (FWC), Ten Thousand Islands National Wildlife Refuge).
- Rookery Bay Reserve manages several locations of essential nesting habitat for Loggerhead Sea Turtles (*Caretta caretta*) and Green Sea Turtles (*Chelonia mydas*). During nesting season, the research and stewardship teams regularly patrol these locations to identify and protect nests, monitor nest temperatures, and collect other environmental data (e.g., rain, storm events) that affect the sex ratio of developing sea turtles, and assess hatchling production success. The Conservancy of Southwest Florida and the Ten Thousand Islands National Wildlife Refuge are close partners in this joint research-stewardship effort. All data are shared with cooperating agencies and non-governmental organizations.
- The Ten Thousand Islands fish and shark monitoring programs have been active for over 20 years. The fish monitoring program conducts monthly bottom trawls at three adjacent embayments (Fakahatchee Bay, Faka Union Bay, and Pumpkin Bay) with different salinity regimes to learn about how fish populations respond to different environmental conditions within the same geographic location. The shark-tagging program conducted in the same bays has recently begun

acoustic tagging of juvenile sharks to assess habitat preference and site fidelity. This effort has been recently complemented through a 2018 partnership with the National Centers for Coastal Ocean Science's Marine Spatial Ecology group to extend the array of acoustic receivers, tag economically relevant resident fish such as (Mangrove Snapper [*Lutjanus griseus*] and Red Drum [*Sciaenops ocellatus*]) and analyze the long-term trawl data.

3. Effects of natural resource management and restoration

- The Restoring the Rookery Bay Estuary Project (2012–2015) focused on collaborative watershed management in Collier County (<https://rookerybay.org/wp-content/uploads/FinalReport-lowres.pdf>). This project was funded by the NERR System Science Collaborative to assess the human need and value of freshwater as well as the impact of highly managed freshwater distribution to coastal systems within Rookery Bay Reserve. The results of this collaborative project were incorporated into the ongoing Collier County Comprehensive Watershed Improvement Plan, which includes future freshwater redistribution from upper Collier County through the Reserve. The plan elements and modeling from this project are also the basis of the Collier County RESTORE Act project. This project is designed to restore sheetflow to the Rookery Bay watershed and help recharge the surficial aquifer and dry season groundwater flows to Henderson Creek. Collier County is the sponsor of the project and Rookery Bay Reserve is a co-sponsor.
- The Fruit Farm Creek mangrove die-off area on CR-92 (San Marco Road), between Marco Island and Goodland, resulted from historic road construction and hydrologic restriction (Worley 2006). In preparation for restoration of the site, Rookery Bay Reserve continues to collaborate with a cohort of scientists at USGS, Conservancy of Southwest Florida, the Coastal Resources Group, the University of South Florida, the Florida Forest Service, and the University of Florida to monitor ecosystem changes including food web dynamics, mangrove structure, elevation change, standing water levels, sediment characterization, and recent hurricane effects. In 2018, the Reserve collaborated with Restore America's Estuaries, Terra Carbon, and Silvestrum Climate Associates to assess carbon storage potential of a large-scale mangrove restoration.
- In 2017, the Reserve hosted a 40th anniversary Mangrove Symposium that brought scientists and managers together to review historic and current mangrove studies at the Reserve and for Florida and to identify both natural and social science information needed for successful mangrove monitoring and management in Florida. The recommendations from four working groups focused on monitoring, management, ecosystem services, and restoration have been directly applied to projects such as the Mangrove Coast Science Collaborative and the Fruit Farm Creek restoration program.

The research community continues to engage strongly with Rookery Bay Reserve. A recent partnership with the Florida International University (FIU) Center for Coastal Oceans Research within the Institute Environment provides an opportunity for enhanced relationships with FIU faculty and students. Additionally, Florida Gulf Coast University (FGCU) has a long-standing relationship of both faculty and students conducting research within the Rookery Bay Reserve. The relationship between Rookery Bay and other Florida universities remains strong through project-based partnerships. On a national level, the Reserve serves as a site of long-term research and monitoring by federal agencies, including USGS and NOAA/National Centers for Coastal Ocean Science.

In addition to building upon the work described in the preceding section, Rookery Bay Reserve's Research and Monitoring Program prioritizes collaborative projects that address the following issues:

(1) Coastal change and resilience

What are the effects of long-term environmental change (e.g., sea level rise, temperature, and rainfall shifts) on coastal habitats?

What are the barriers to adaptation and resilience for vulnerable habitats and species?

How do systems respond to and recover from episodic events (e.g., fires, hurricanes, harmful algal blooms) under the context of long-term change?

What are the main drivers and tipping points of ecosystem change (e.g., habitat or population loss, harmful algal blooms)?

(2) Ecosystem services, with an emphasis on water quality

What is the socioeconomic value of habitat conservation and restoration within the Reserve?

What key factors support ecosystem services, and how can resource management enhance these factors and effects?

(3) Ecological foundations to support habitat conservation and restoration

What are the functional relationships between residential and migratory wildlife communities and habitat?

What are the interactive effects of freshwater management and sea level rise on coastal vegetation communities and estuaries?

What are the effects of resource management (e.g., prescribed burns, invasive species removal) on ecosystem function?

Research and Monitoring Program Capacity

Staff and Infrastructure

The Research Team is composed of a research coordinator, two SWMP positions (water quality manager and technician), a GIS specialist, and two staff biologists. Supporting infrastructure includes a research wing at headquarters (library/GIS laboratory, two dry laboratories, one wet laboratory) and a satellite field laboratory at the Shell Island Road station. There are two field stations: Shell Island Road station provides access to the northern area of Rookery Bay Reserve (Rookery Bay, Hall Bay, Keewaydin Island), and the Ten Thousand Islands station in Goodland, Florida, provides access to the Cape Romano-Ten Thousand Islands Aquatic Preserve. Dormitories for visiting scientists and students are available at each field station. The dormitory reservation website (<https://rookerybay.org/visit/explore-the-reserve/visiting-scientists/dormitory-reservation/>) lists amenities and capacity at both locations. Vessels include several small (17- to 19-foot) outboard skiffs, mullet skiffs (captain and 15-member crew capacity), and a covered research vessel that can be used for extended/overnight field trips (captain and eight-member crew capacity). All-terrain vehicles are used to access field sites on Keewaydin Island and other remote areas of the Reserve.

Partnerships

The target audiences of research and data developed at Rookery Bay Reserve include:

- Regional resource managers such as (Southwest Florida Aquatic Preserves, Ten Thousand Islands National Wildlife Refuge, Collier-Seminole State Park, Fakahatchee Strand Preserve State Park, South Florida Water Management District [SFWMD], Florida Forest Service, and FWC);

- Local and regional municipalities (Lee and Collier counties and cities within);
- National and regional science and resource management agencies and groups (U.S. Fish and Wildlife Service, USGS, National Park Service, NOAA, U.S. Army Corps of Engineers [Corps], Northern Gulf of Mexico Sentinel Site Cooperative);
- Non-governmental partner organizations and partnerships (such as National Estuarine Research Reserve Association, Audubon Florida, Audubon of the Western Everglades, Conservancy of Southwest Florida, Charlotte Harbor National Estuary Program, Restore America's Estuaries, The Nature Conservancy, Sanibel-Captiva Conservation Foundation);
- Academic and research partners (FIU, FGCU, University of Florida, University of South Florida, University of Central Florida, Mote Marine Laboratory, other universities involved with specific research projects);
- Florida Coastal Everglades Long Term Ecological Research community;
- National and international coastal research and management communities (Coastal and Estuarine Research Federation, NERR System).

Research and Monitoring Program Delivery

Rookery Bay Reserve's Research and Monitoring Program will monitor and communicate environmental and biological conditions to understand multiple drivers and effects of change in the Reserve's managed area. This is delivered in part through the Reserve's SWMP program, which includes monitoring for water quality and weather conditions, and the Sentinel Site Application Module 1 (SSAM-1) program as described below. Additional biological and habitat-focused monitoring complements the standardized monitoring efforts. The Research and Monitoring Program also provides non-monitoring-focused research activities to meet the Reserve's management goals through externally funded projects, including the NERR System Science Collaborative and the Margaret A. Davidson Graduate Fellowship program.

System-Wide Monitoring Program: Water Quality and Meteorology

Rookery Bay Reserve collects water quality and meteorological data to describe the coastal environment and to measure seasonal, episodic, or long-term change of estuarine conditions. These data contribute to a greater understanding of watershed-level environmental change for coastal habitats and biological communities within the Reserve.

A meteorological station (located at 26.0501 °N, 81.7017 °W) is equipped with a NOAA Geostationary Operational Environmental Satellites (GOES) telemetry system. This station collects temperature, humidity, barometric pressure, wind speed and direction, precipitation, and photosynthetically active radiation. These measurements are taken at 15-minute intervals and are recorded on a data sonde and is also uploaded to CDM in near real time (<http://cdmo.baruch.sc.edu/get/realTime.cfm>).

Rookery Bay Reserve has five water quality stations: one located at the mouth of Henderson Creek for the Rookery Bay aquatic site and four located in bays within the Ten Thousand Islands region (see Figure 20 and Table 2). YSI EXO-series data sondes deployed at these stations measure temperature, specific conductivity, salinity, dissolved oxygen, relative water level, pH, turbidity, and total suspended solids at 15-minute intervals. A monthly grab sample is collected for nutrients (dissolved inorganic nitrogen and ortho-phosphate), colored dissolved organic material, and chlorophyll-a at each station combined with a diel (24-hour) set of nutrient samples collected near the Henderson Creek station. All nutrient samples are analyzed by the Florida Department of Environmental Protection's (DEP's) Analytical Water Quality Laboratory.

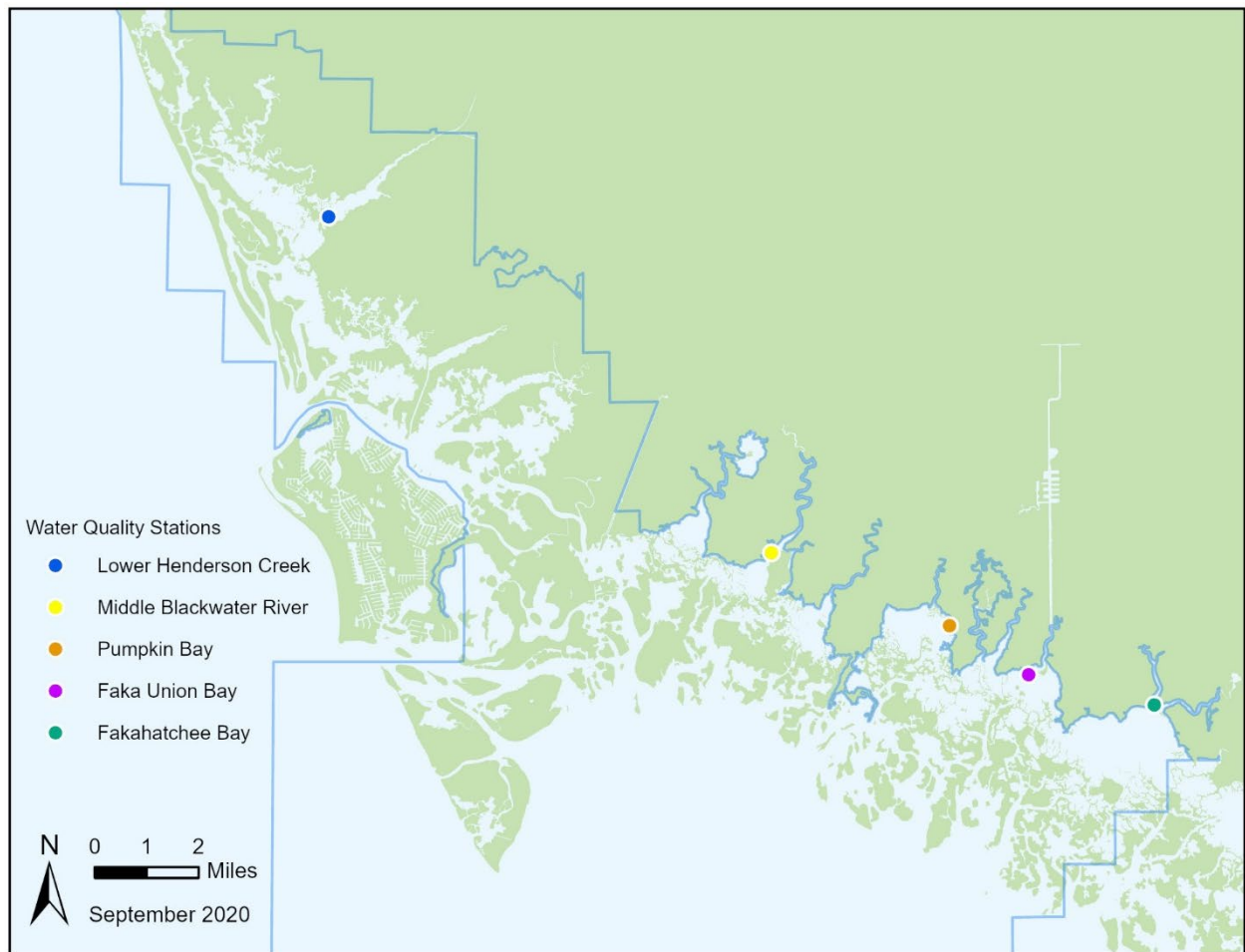


FIGURE 20: WATER QUALITY STATION LOCATIONS AT ROOKERY BAY NATIONAL ESTUARINE RESEARCH RESERVE

TABLE 2. ROOKERY BAY RESERVE'S WATER QUALITY MONITORING STATIONS

Station	Location	Notes
Lower Henderson Creek	26.0257 °N, 81.7332 °W (water quality station) 26.0255 °N, 81.73208 °W (nutrient station)	Station for Rookery Bay aquatic area; transmits real-time data using a GOES telemetry system; receives altered freshwater due to municipal control and use.
Middle Blackwater River	25.9343 °N, 81.5946 °W	Nonpoint source pollution from agricultural operations and golf courses may affect this site. In addition, canals and roads built during the 1960s in what is now Picayune Strand (formerly the southern portion of Golden Gate Estates) may have caused significant disruptions to overland sheetflow reducing the amount of freshwater flowing to this estuary.
Pumpkin Bay	25.9141 °N, 81.5404 °W	Secondary SWMP station; designation received in 2016. Sheetflow reduced due to Picayune Strand build-out and may be restored with the upcoming restoration.
Faka Union Bay	25.9005 °N, 81.5159 °W	Represents a significantly altered seasonal salinity regime from the Faka Union Canal associated with the Picayune Strand. Restoration of sheetflow will reduce the amount of freshwater entering this bay during the rainy season.
Fakahatchee Bay	25.8922 °N, 81.4770 °W	Least impacted by land use modification; provides reference data for freshwater input into Ten Thousand Islands estuary.

The water quality program manager and a technician oversee the water quality and meteorological programs. Activities for these programs include cleaning, maintenance, calibration and deployment of water quality equipment, field collection of nutrient and chlorophyll samples, data management, and periodic submissions to the NERR System Centralized Data Management Office ([CDMO](https://cdmo.baruch.sc.edu/)) operated by the University of South Carolina <https://cdmo.baruch.sc.edu/>.

The SWMP data are used on an annual basis to develop a status report using a template developed by the CDMO. This status report uses statistical packages to evaluate hypotheses and detect trends in abiotic and biotic data. For example, large rain events may be evaluated as a driver for increased turbidity.

System-Wide Monitoring Program: Sentinel Site

The purpose of the NERR System SSAM-1 at Rookery Bay Reserve is to monitor changes in local sea level and inundation patterns and the related responses of coastal vegetation. The program incorporates standardized protocols to record local elevation, water level and inundation patterns, and vegetation community change over time. A rigorous review process has been established by the NERR System to

ensure standardized protocols, training, and appropriate site selection and monitoring protocols. Accurate and standardized measurements will allow cross-site comparisons at a national scale and can detect trends within natural variations. Additional ecological data (e.g., groundwater levels, precipitation trends, invasive species presence) are incorporated to understand multiple and interactive environmental effects as they relate to changing water levels.

The first module of the NERR System Sentinel Site program (Sentinel Site Application Module 1: *Coastal Habitat Response to Changing Water Levels*) is designed to address the following framing questions:

- What are the current distributions of vegetation communities with respect to elevation and tidal range?
- What is the response of coastal vegetation spatial distribution to long-term changes in local water levels and inundation patterns?
- How sensitive are community distributions to inter-annual variability in local sea levels, tidal range, and inundation patterns?
- What is the effect of long-term and episodic changes in local water levels and inundation patterns on coastal sediment elevation?

With the consultation of stakeholders and information end-users, Rookery Bay Reserve developed three additional site-specific research objectives:

- Understand the interactive effects of freshwater management and sea level rise on coastal vegetation communities (Goal 3, Objective 3.1)
- Identify vulnerable habitat and species facing barriers to adaptation and resilience (Goal 3, Objective 3.2)
- Document response and recovery to episodic events (e.g., fire and hurricanes) (Goal 3, Objective 3.3)

Rookery Bay Reserve's Sentinel Site team submitted a draft plan for the Henderson Creek Sentinel Site in June 2018. Due to on-the-ground modifications of infrastructure placement, the plan is under review by NOAA OCM. This plan was created with input from partnership with regional scientists and resource managers at a Reserve-hosted workshop. Additional input and guidance were solicited from hydrologists with the USGS Florida Water Science Center, ecologists with USGS at the Wetland and Aquatic Research Center, professional land surveyors with Cardno, Inc., the Bureau of Survey and Mapping within Florida DEP, and NOAA Center for Operational Oceanographic Products and Services. Vegetation transects were determined by field-scouting to identify areas of recent change, significant habitat resources, and accessibility.

The Henderson Creek Sentinel Site is 16 km from the closest NOAA-maintained tide gauge station at Naples Pier (Station 8725110; 26.1192 °N, 81.8014 °W). The tide gauge station is part of the National Water Level Observation Network. The station was established in 1965 and updated in 1992. Oceanographic (water level and temperature) and meteorological (air temperature and pressure) data are collected at this site. Water levels are measured by an acoustic sensor. All station data can be accessed at tidesandcurrents.noaa.gov/stationhome.html?id=8725110.

Over the next five years, the Henderson Creek Sentinel Site will be monitored (see Goal 1, Objective 1.2) with four to six plots representing different coastal habitats: salt marsh/encroaching scrub mangrove; brackish marsh; saw palmetto coastal scrub; restored scrub mangrove; fringe and basin mangrove; oak

scrub and mixed uplands. Vegetation community composition, structure, and biomass will be measured at plots within each transect. Locally relevant surface elevation tables and groundwater wells will be monitored and referenced to published benchmarks for vertical control geo-referencing. While the Henderson Creek Sentinel Site is in range of the Naples Pier National Water Level Observation Network tide gauge station mentioned above, there is a need an additional tide gauge to enhance water level and sea-level rise monitoring in the Ten Thousand Islands.

Data and products derived from Rookery Bay Reserve's sentinel site program will support other programs and audiences. It is worth noting that long-term trends of elevation, sea level, and vegetation change will not be evident for several years (up to a decade) following the implementation of this program. However, the basis of this program and its foundational knowledge will be valuable. For example, a needs assessment conducted in 2017 by the Rookery Bay Coastal Training Program (CTP) indicated that climate change and sea level rise are top-priority issues faced by decision-makers in southwest Florida, and that they desire science-based information and training on these topics. Based on this report, regional and local decision-makers (e.g., natural resource managers, municipal staff, floodplain managers, non-governmental organizations) will be informed of the SSAM-1 monitoring program. Outside scientists, resource managers, and educators will be more involved with the data interpretation. Education staff and docent volunteers at the Reserve's Environmental Learning Center will also be educated about the project to answer student and visitor questions. While no formal curriculum for these audiences is yet planned, education staff have participated in field work to record videos and hosted a master naturalist class at a Sentinel Site station.

Other audiences for the products of SSAM-1 (e.g., accretion rates, rates and extent of inundation, short-term changes in water levels due to storm events, changes in coastal vegetated communities) are Rookery Bay Reserve staff and their partners who need to understand the vulnerability of southwest Florida natural resources in the face of sea level rise. In turn, this information can support future studies and management strategies for vulnerability assessments and building capacity for adaptation and resilience.

Other Reserve-based Monitoring Efforts

In addition to Rookery Bay Reserve's SWMP, the Reserve will conduct local monitoring of habitats, wildlife communities, and management actions:

I. Habitat monitoring

- Monitoring shoreline change at critical locations annually and following episodic events using drone, aerial, and satellite-based information as available
- Measurement of SET established by USGS in Rookery Bay and the Ten Thousand Islands
- Photo-point establishment and unmanned aerial vehicle-based monitoring of prescribed burn areas to examine change and recovery following burns
- Continued evaluation of impacts and recovery from Hurricane Irma (2017)

II. Wildlife monitoring

- Sea turtle nesting activity (nest attempts, locations, and hatchling success) at Sea Oat Island, Cape Romano Complex, and Ten Thousand Islands
- Continued participation in a state-wide study of temperature trends and variations associated with sea turtle nesting (2013 to present)

- Monitoring resident fish and juvenile shark populations and benthic habitat cover in three bays of the Ten Thousand Islands to monitor the downstream effects of the Picayune Strand Restoration Program
- Acoustic tagging of juvenile sharks and fishes in the Ten Thousand Islands
- Monitoring and stewardship of wading birds, shorebirds, and seabirds with an emphasis on designated Critical Wildlife Areas (e.g., ABC Islands and Rookery Islands) through traditional (sight-based) and novel (field cameras, telemetry) techniques.
- Other community assessments including environmental DNA (eDNA) and/or soundscape ecology

III. Effects of Restoration

- In collaboration with research partners, measurement of ecological and socioeconomic effects of mangrove restoration at the Fruit Farm Creek location with an emphasis on carbon storage and flux rates
- Identification of additional habitat (e.g., mangroves, oyster reefs) in need of restoration actions

Research and Monitoring Program Future Needs and Opportunities

As one of the largest subtropical extents of conserved coastal habitat in North America, Rookery Bay Reserve is an ideal location for visiting scientists to study a gradient of environments from open water and submerged vegetative habitat to wetlands, coastal scrub forest, and urban edge habitats. The research team is dedicated to supporting visiting research by providing site access, resources to conduct fieldwork, and site-specific knowledge of the Reserve's resources. The Research and Monitoring Program also provides a knowledge base of information including long-term monitoring and historical data; a comprehensive library of regional studies; and spatial inventories of habitats, management and research activities, and cultural resources. Finally, a significant opportunity for scholars, students, and managers is the ability to network and exchange ideas through Reserve-led research activities and events (e.g., Science Collaborative projects, symposia, workshops).

With stakeholder input, the research team periodically develops a list of priority questions for research partners and students to consider. Below is a list of recent (2019) highlighted research needs:

- (1) The Picayune Strand Restoration Project is currently underway to restore natural freshwater sheetflow to coastal wetlands and embayments within the Ten Thousand Islands, and Rookery Bay Reserve staff are monitoring downstream indicators of change to water quality and resident fisheries. However, there are still many questions about the impact of freshwater alteration and restoration on coastal vegetation, oyster reefs, and other macro- and micro-fauna. Therefore, additional information is needed to understand the long-term impacts of freshwater management and natural flow restoration on estuarine production and connectivity.
- (2) Coastal wetlands and uplands (e.g., mangroves, high marsh, scrub forest) perform ecosystem services that include storm buffering and flood reduction. These systems are undergoing spatial, biological, and physical changes from sea level rise and storm impacts, but a greater understanding of the resilience and recovery regimes of these systems after major storm events is needed. Therefore, additional information is required to understand the combined effects of regional climate changes and episodic storms on coastal vegetation resilience and recovery.

- (3) Coastal and upland habitats (e.g., salt and brackish marsh and scrub forests) are vulnerable to a spatial squeeze from landward-migrating mangroves and developed areas. There are currently other projects underway and proposed (such as the Collier County Comprehensive Watershed Improvement Plan, Picayune Strand Restoration Project, and the Collier County RESTORE Act) currently underway to restore natural freshwater sheetflow to the region, but more information is needed to determine the interactive effects of freshwater restoration and sea level rise and how they affect habitat changes.
- (4) The barrier islands in and adjacent to Rookery Bay Reserve have changed significantly with impacts from episodic storms and sea-level rise. Erosion, accretion, and longshore sediment transport have altered natural habitats and shifted associated use by shorebirds, beach-nesting birds, and sea turtles. These shifts in sediment are also responsible for changes in natural habitats such as pocket beaches, seagrass, and emergent shoals. There may be a link between these sediment changes and turbidity levels within the Reserve that may affect light levels reaching submerged aquatic vegetation. Understanding overall sediment budgets and erosional, accretional, and habitat shifts in response to natural and anthropogenic drivers will guide management decisions to protect and restore critical habitats for avian communities and nesting sea turtles.
- (5) Rookery Bay Reserve is positioned in the subtropics at the northern edge of the range of many plants and animals from the tropics and in the southern range of temperate plants and ecosystems. Changes in temperature (particularly a reduction in freeze events), rainfall, and episodic storms may drive shifts in floral and faunal communities and introduce new species. Developing a detection system and predictive ability to forecast ecosystem changes will inform management decisions.

Research and Monitoring Program Gaps and Challenges

Resource limitations contributed to temporal and spatial information gaps in Rookery Bay Reserve's seagrass and water quality programs. In addition to the research needs listed above, the Reserve seeks to re-establish monitoring programs for oysters and plankton. Over the next five years, the Reserve will continue to strengthen partnerships that can increase the research team's expertise and exposure to new technologies and techniques that can address some of these data gaps (e.g., environmental DNA). The Reserve continues to seek external funding to enhance the Research and Monitoring Program's efforts and impacts.

Other identified research needs include

- Monitoring natural resources during and following storms or other major episodic events
- Salinity and/or hydrodynamic modeling of coastal rivers and embayments
- Effects of nutrient loading
- Vegetation structure and succession following prescribed fire
- Effects of environmental change on cultural resources
- Larval fish community responses to environmental change (e.g., peak flow timing)
- Inventory, status, and description of marine, aquatic, and terrestrial invertebrates
- Inventory and effects of marine, estuarine, and upland invasive species
- Avian breeding, abundance, and migration patterns
- Ecosystem service valuation, including carbon assessments

Research-Related Objectives and Actions

Goal 1 [ECOSYSTEMS] Habitats and species within the Reserve exhibit long-term integrity, function, and biodiversity.

Objective 1.1 Ecological conditions are monitored to understand trends and drivers of change.

Action: Monitor and communicate environmental and physical conditions of coastal and watershed ecosystems. In accordance with the NERR SWMP, the Rookery Bay Reserve Research and Monitoring Program will monitor abiotic water quality (pH, temperature, salinity, dissolved oxygen, turbidity, nutrients), weather (precipitation, wind speed, photosynthetically active radiation, air temperature), and the physical coastal landscape (elevation, sea level, groundwater levels).

The abiotic water quality monitoring will continue to be conducted at the stations listed in Table 2. Additional stations may be added in response to watershed restoration programs (i.e., Picayune Strand Restoration Project; Collier County Comprehensive Watershed Improvement Plan). Groundwater levels will be monitored at the Henderson Creek SSAM-1 plot locations. Habitat-specific elevation change will be monitored through SETs at three stations within each SSAM-1 plot, as well as at stations set up by USGS at the Fruit Farm Creek mangrove restoration area and additional mangrove-based locations. Digital leveling and static real-time kinematic occupation of stationary benchmarks will be conducted periodically (one to two years) to maintain vertical control for sea level, groundwater level, and elevation measurements. Rookery Bay Reserve will seek partnerships to install an additional tide gauge to cover an NWLON gap for the Ten Thousand Islands.

Action: Monitor and communicate habitat structure, vegetation, and wildlife community compositions. The Research and Monitoring Program will conduct periodic assessments of habitat and change including coastline structure, habitat classification, non-native species prevalence, and fire-affected habitat regeneration. Vegetation transects will be incorporated into the SSAM-1 program.

In addition to habitat monitoring, resident and migratory wildlife assessments will be periodically conducted to better understand distribution, behavior, and habitat use. These activities include:

- Ten Thousand Islands fish monitoring programs
- Sea turtle monitoring program at Cape Romano, Keewaydin Island, and the Ten Thousand Islands
- Seabird, shorebird and wading bird monitoring programs

Currently, the sole biological monitoring component of the SWMP water quality program is chlorophyll concentrations. The following monitoring programs would enhance Rookery Bay Reserve's understanding of ecosystem change if funding becomes available:

- Submerged benthic habitat
- Estuarine food webs
- Terrestrial mammal populations and habitat use

Action: Engage partners to link monitoring data with current research. Rookery Bay Reserve will continue to promote use of its monitoring data through public dissemination, training and workshops, and cross-reserve comparative efforts and to partner with other local and national reserves to compare monitoring information for cross-system evaluations of environmental change and management strategies.

Action: Foster the development of new tools and technologies that bolster monitoring efforts. Rookery Bay Reserve research team seeks to develop new internal skills and external partnerships that take advantage of novel tools to enhance the quantity or quality of information or to increase the efficiency of data collection and analysis. For example, a 2019 NERR System Science Collaborative Catalyst project funded a partnership between Rookery Bay Reserve and researchers at the University of South Florida. The collaborative project used satellite imagery and computer learning algorithms to delineate habitat loss and regeneration following Hurricane Irma. In addition, the Reserve is investing in GIS software and drone technology to better record field-based information including habitat change monitoring and marine debris recording. The research team will continue to engage with partners who seek to use the Reserve’s “living laboratory” as a site to develop new techniques to enhance ecosystem science.

Objective 1.2 Habitats are assessed to support the management of vulnerable species.

Action: Maintain updated habitat maps that may include non-native species, fire habitat, and wildlife habitat use. The habitat map created in 2015 will be updated every five years with vegetation and elevation data. An emphasis will be placed on transition areas, coastlines, and recovery locations following episodic events or major management activities.

Action: Evaluate the effects of management actions on wildlife and ecosystems to inform adaptive management. Monitoring programs described in Objective 1.1 inform resource management practices such as critical wildlife conservation and restoration needs. In turn, the Research and Monitoring Program provides an assessment of the effectiveness of these management actions. The research team will continue to work closely with the stewardship team to provide spatially explicit information on key management areas.

Action: Identify the effects of influencing factors (e.g., human activities, invasive species presence) on wildlife and ecosystems. Rookery Bay Reserve will continue to prioritize research focused on vulnerable habitats and areas of transition that affect ecosystem function and wildlife communities. The Reserve will partner with external researchers to better understand multiple drivers of change and develop management strategies that can enhance ecosystem health and resilience.

Action: Evaluate trends of loss or recovery by natural communities to prioritize restoration and management needs. The research team engages in multiple spatial assessments of ecosystem loss and recovery. State-level assessments include Florida DEP’s Statewide Ecosystem Assessment of Coastal and Aquatic Resources (SEACAR) and FWC’s Coastal Habitat Integrated Mapping and Monitoring Program. On a more local level, a 2018 satellite-based habitat map available online at <https://storymaps.arcgis.com/stories/eab62698d9674640bba6787bb05c1bb6> produced images of mangrove loss and recovery following hurricane Irma in 2017. These and future assessments can be used to prioritize management efforts that can produce meaningful results.

Goal 2: [HUMAN CONNECTIONS] Connections among people and resources in the Reserve are understood and enhanced.

Objective 2.1 Cultural resources within Rookery Bay Reserve are identified and conserved.

Action: Maintain a spatial assessment of cultural resources. The research and stewardship teams, in partnership with anthropological research organizations, will maintain and periodically update its spatial profile of cultural resources in the Reserve.

Action: Support research activities to identify, study, and conserve cultural resources. Rookery Bay Reserve will support external research with a focus on cultural resources through information sharing, logistical support, and a platform to collaborate and communicate results.

Objective 2.2 Natural resources protection is enhanced by improved communications between scientists and stakeholders.

Action: Engage in expert working groups to advise natural resource management and scientific development. Several research team members serve on working groups such as the NERR System habitat mapping and change group, the NERR System blue carbon group, and the Collier/Lee County shorebird partnership group. Currently, Rookery Bay Reserve staff serve on the environmental sub-group of the Picayune Strand Restoration Project and on the resource assessment data team for the SEACAR project. Providing Reserve technical expertise on advisory panels supports partner engagement, helps inform decision-making, and highlights the professional capacity of the Reserve staff.

Action: Promote visiting scientist engagement and communication with Reserve staff, partners, and stakeholders. The research team will continue to work with the education and communication teams to promote visiting scientist engagement through public lectures, articles and videos, and timely workshops and training opportunities. On-site support of visiting researchers, particularly students, provides direct communication and exchange of ideas. The Reserve will seek opportunities to provide on-site office space to support visiting investigators and students, and the research team will encourage research students to engage with field monitoring efforts.

Action: Facilitate researcher community collaboration and develop or support communities of practice. The research team will continue to work with the CTP team to develop Project Advisory Groups for research projects. One example is the Sentinel Site Advisory Group. Most projects submitted by Rookery Bay Reserve to the Science Collaborative include Project Advisory Group guidance and end-user and subject-expert feedback that can promote successful development and usefulness of the research products.

Action: Maintain the research library and other databases as information repositories for Reserve studies, data, and literature. The Research and Monitoring Program provides a knowledge base of information including long-term monitoring and historical data; a comprehensive library of regional studies; and spatial inventories of habitats, management and research activities, and cultural resources. An expanded library could serve as a site for the local community, students, and researchers to use these materials more extensively and to interact with Rookery Bay Reserve staff.

Objective 2.3 Southwest Florida communities understand the socioeconomic values of local ecosystems.

Action: Develop social science research priorities and collaborate with external researchers to conduct socioeconomic research and monitoring of the communities the Reserve serves. Rookery Bay Reserve will work with other sectors in the NERRS and the Florida DEP to communicate socioeconomic valuations of management activities (e.g., blue carbon, resilience credits). Recent and current studies have focused on ecosystem services provided by Reserve resources. The results of these studies can help set the foundation for future research needs, outreach opportunities, partners for future projects and funding opportunities, and objectives for management actions.

Goal 3: [RESILIENCE] Strong science-to-management connections ensure that ecosystems and communities are resilient and adaptable to environmental change and episodic events.

Objective 3.1 Communities are engaged through collaborative projects to monitor and manage effects of coastal watershed change.

Action: Identify and monitor downstream indicators of local or watershed-scale restoration actions.

Baseline conditions of the Ten Thousand Islands aquatic areas downstream of the Picayune Strand Restoration Program have been assessed through the SWMP water quality program and Ten Thousand Islands biological programs. Other possible indicators (e.g., algae, invertebrates, larval fish, environmental DNA) are not currently monitored. The Research and Stewardship Coordinators will work with research and resource manager partners to develop a more comprehensive downstream monitoring program and to identify funds for the effort.

Action: Coordinate with partners to develop citizen/community science programs. The research team will coordinate with volunteer and education staff to develop community science programs and training that engage community scientists. These programs can be modified from community science programs at other NERRs, including oyster monitoring at the Guana Tolomato Matanzas NERR and the plastic nurdle (a pre-production plastic pellet) observation program developed by Mission-Aransas NERR.

Objective 3.2 Coastal practitioners use observations of ongoing change to support proactive management actions for future conditions and events.

Action: Develop assessments that identify vulnerabilities and (or) opportunities for enhanced resilience for natural and human communities. Beginning in 2020, a NERRS Science Collaborative 3-year project entitled “Resilience of the Mangrove Coast: Understanding Links between Degradation, Recovery, and Community Benefits” will include comparative mangrove condition assessments at the Reserve and the Jobos Bay NERR and will begin the process with resource managers to design a framework to translate these assessments into resource management decisions. The Reserve will pursue grants that focus on addressing information gaps for enhancing coastal resilience.

Objective 3.3 Rookery Bay Reserve serves as a living laboratory to understand how change impacts ecosystems and ecosystem services.

Action: Engage with the international coastal research community to promote the Reserve as a valuable place and resource for ecosystem studies through in-situ and comparative studies. The Reserve will continue to reach the external research community through education, training, and communication products that highlight long-term monitoring databases and needs for data analyses or complementary research.

Action: Use episodic events as an opportunity for long-term monitoring of habitat change and recovery.

Habitat and wildlife monitoring provide a platform to identify impacts from episodic events, including changes to vegetation structure, wildlife community composition and habitat use, and biogeochemical changes. The research team will work with external partners to develop questions and protocols for pre- and post-event monitoring.

Action: Promote research on the interaction between climate change and natural resources. In addition to monitoring work through the Sentinel Site program and the Fruit Farm Creek die-off site, the Reserve will continue to highlight critical research needs in ecosystem-scale change.

Goal 4: [OUTREACH] Value of the coastal environment drives informed stewardship actions.

Objective 4.1 Residents and visitors have a greater awareness of the Reserve and understand how to protect it.

Action: Work with the Education team to translate Reserve science into educational activities.

Action: Publish a review of research at the Reserve. Efforts are currently underway to produce review publications of research for both professional and general audience. For example, the 20-year fish trawl dataset is currently being analyzed with water quality data for a peer-reviewed publication. Additionally, organizers of the 40th anniversary Mangrove Symposium (2018) determined that a general-audience publication of historic mangrove research in relation to the growth of the Reserve would provide an insightful review of the lasting impact of the Reserve for research and public communities.

Objective 4.2 Students experience the coastal environment through place-based learning.

Action: Support and mentor student and early-career researchers, including the Margaret A. Davidson graduate fellow. Rookery Bay Reserve will host students through the NOAA Five-Colleges summer program, the Hollings Scholars program, and the Margaret A. Davidson Fellowship. The Reserve will continue its partnership with FGCU and FIU to mentor graduate student research based at the Reserve. Outside of these programs, the research team supports student work through field access, information and resources, and assistance to develop successful research projects.

Objective 4.3 Stakeholders and partners apply science-based knowledge to make informed decisions.

Action: Support decision science applications for natural resource management. The research team will support projects that have an explicit approach to informing natural resource management strategies.

Program Evaluation

Regular evaluation of the Research and Monitoring Program ensures the success of the program (defined as accurate and robust ecological data collection and dissemination) as well as periodic assessments of research priority needs. While there is no current formal evaluation of the program, it is anticipated that a Reserve Advisory Group will be established within the next five years to assist the success and enable greater outcomes of the Research and Monitoring Program.

The SWMP abiotic component includes a rigorous Quality Assurance/Quality Control (QA/QC) Program. The SWMP Quality Control Program includes standardized protocols for the routine calibration, deployment, and recovery of automated data sondes and guidelines for the identification and treatment of outliers and suspect data. SWMP abiotic data are subject to three levels of QA/QC. The first level is an automated assessment of data quality (based on sensor limits and expected values) and is conducted immediately upon submission to the CDMO. These data are available as “provisional” data. A second, more intensive level of review is conducted by Reserve staff, and results are submitted quarterly under the classification “provisional plus” data. The final level of review occurs annually by the CDMO. Once data have undergone all stages of QA/QC, they are considered “authenticated” data and are archived accordingly. All SWMP abiotic and biotic data can be accessed through the CDMO website (www.nerrsdata.org). The NERR System SWMP oversees a committee that evaluates timely data submission, completeness of the dataset, and excessive gaps in data.

CHAPTER 6. EDUCATION PROGRAM



The National Estuarine Research Reserve System seeks to enhance public awareness and understanding of estuarine areas and provide suitable opportunities for public education and interpretation. The Reserve System increases estuary literacy among students, teachers, and the public through the K-12 Estuarine Education Program (KEEP) and Conservation Action Education programs (National Oceanic Atmospheric Administration [NOAA] 2020).

The K-12 Estuarine Education Program helps educators bring estuarine science into the classroom through hands-on learning, experiments, fieldwork, and data explorations using grade-appropriate lessons, activities, and videos. Reserves also offer teacher development programs that use established coastal and estuarine science curricula aligned with state and national science education standards. Teachers on the Estuary (TOTE) workshops give teachers the opportunity to explore coastal habitats and conduct field investigations, learn how to integrate local and national monitoring data into the classroom, and gain hands-on experience using estuary education resources (NOAA 2016).

As part of the Conservation Action Education program, reserves conduct formal and informal education activities and outreach activities that target culturally diverse audiences of educators, students, and environmental professionals; people who use these natural resources for work or play; and the public. Reserves integrate research and monitoring into their educational and outreach efforts, providing a multi-faceted, locally focused approach aimed at engaging the community (NOAA 2016).

The Reserve System Strategic Plan outlines education objectives designed to increase the public's awareness of and participation in stewardship activities; improve educators' and students' understanding and use of the Reserve System and National Oceanic and Atmospheric Administration (NOAA) resources for place-based and inquiry-based learning; and grow and motivate the next generation of coastal professionals through access to programs and facilities that facilitate research, resource management, and educational opportunities (NOAA 2016).

Education Program Context

The Education Department reaches many audiences with the variety of programs offered each year. Of the nearly 4,000 students attending field trips at Rookery Bay Reserve, most are from Collier County. Teachers involved in the Reserve's workshops are recruited both locally and on a national level to maintain diversity. Public program participant data show that the type of guests who attend a lecture, class, or ecotour differs seasonally; locals attend in summer and locals and season residents attend in winter. With the pivot to virtual programming in 2020, the audience has broadened from those within driving distance to outside of the local area, in other time zones, and even in other countries.

Rookery Bay Reserve's Education Department uses social science to develop and deliver its field-based science, technology, engineering, art, and math (STEAM) programs for Collier County students. Research conducted in 2015 with grant funding through NOAA Bay Watershed Education and Training (B-WET) included a market analysis of environmental education programming in the region and an audience needs assessment of kindergarten through 12th grade teachers. The final report illustrated program gaps as well as the Reserve's niche in providing site-based estuarine education.

As a result, Rookery Bay Reserve's formal and non-formal education programming target K–12 students, teachers, university and college students and faculty, as well as the general public who visit the Reserve's Environmental Learning Center or connect in the Reserve's virtual programming. Additional outreach events are conducted upon request at local venues and festivals.

Rookery Bay Reserve's Education Program will remain focused on one primary issue—Informed Community and Individual Action—during the next five years. The new strategic plan divides this issue into four themes: ecosystems, human connections, resilience, and outreach.

Education Program Capacity

Rookery Bay Reserve's Education Program plans to continue operating with an education coordinator, and three education specialists. Each education specialist is responsible for a range of grades funded through a variety of sources. The elementary (pre-K through 5th grade) education specialist and high school and college (grades 9–20) education specialist are contracted through FIU. The middle school (grades 6–8) education specialist is a State of Florida Other Personnel Services (OPS) position funded by multiple grants and donations through FORB sources.

Education staff offices are located at the Environmental Learning Center and Shell Island Road field station. Much of the work takes place at these two locations. A recent renovation of a former outdoor classroom at the Field Station has created a new space for environmental education opportunities. For example, a field trip experience offered to 7th grade students in certain Collier County Public School programs is based out of the Shell Island Road field station. This field experience, called SURVIVORS, represents a recent collaborative effort between Rookery Bay Reserve and the Conservancy of Southwest Florida (CSF). Additional updates and upgraded equipment at the Shell Island Road lab and indoor classroom have improved the facility and educational resources for field trips and classes, which have led to an increase in program numbers. The recent acquisition of a handicap-accessible pontoon boat by the Friends of Rookery Bay (FORB) will be an asset to future education programming as well.

Additionally, the program is continuing its close relationship with the Collier County Public School District in the Field Trip Specialist Program, as well as other activities such as SIMS (the Summer Institute for Marine Science), STEAM (field-based science, technology, engineering, art, and math) programs, and the regional science fair. Other partners include CSF, University of Florida, FGCU, and FIU.

Education Program Delivery

Rookery Bay Reserve education staff will continue to implement NOAA programs KEEP and TOTE. Both programs are mandated by NOAA and utilize the Estuary 101 curriculum, in addition to Reserve-specific activities aligned with state and national science education standards.

Rookery Bay Reserve's education team continues to host the 4th grade Estuary Explorers, 7th grade SURVIVORS, and a variety of high school and college Marine Science field trip programs. In addition, Kids Free Fridays and the Summer Institute for Marine Science will continue to be scheduled. The education team also conducts public programs as well as ongoing outreach activities in the community when requested. New virtual programs include Fly through July, Summer Art Competition, Science Solutions Lecture Series, and Virtual Binoculars: Beach Birding with Biologists.

Several education activities rely on other Rookery Bay Reserve sector staff to operate successfully. TOTE, National Estuaries Week, Lunch & Learn Lecture Series, and the Festival of Birds depend on Reserve staff. Numbers of program attendees are recorded in a database and used by the Education Department to project future goals. The database is also used by Reserve administration as well as by FORB.

The Education Program regularly evaluates its programming through standardized pre- and post-tests and student and teacher post-trip surveys. The education staff are interested in conducting more in-depth evaluations and developing new methods to increase survey responses. These staff participate in evaluation workshops to sharpen these skills. Recently, a candidate for a master's degree at Duke University's Nicholas School of the Environment worked with the education team to build and test an evaluation for field experiences for students and teachers. Additionally, Reserve Educators have worked as a cohort with collaborative evidence-based learning network evaluators as part of a grant-funded project with Clemson University and Virginia Tech.

Over the next five years, Rookery Bay Reserve's education team plans to increase the capacity of the major programs outlined above while continuing to fulfill the needs outlined in the market analysis and needs assessment. In order to do so, staff resources and funding must increase. The ecotour program has recently shifted to FORB. As a result, the Education Department will increase the emphasis on interpretation training to ensure consistent messaging in all programs.

Future Needs and Opportunities for the Education Department

Southwest Florida's growing "snowbird" population creates a need for the Reserve to target more adults through educational programming (e.g., Florida Master Naturalist Program Coastal Module). Incorporation of technology into programs for school-age students represents both a future need and an opportunity.

The following goals are priorities to be addressed during the next five years:

- Increasing the use of technology in exhibits and programs.
- Offering a menu of opportunities for teachers and groups.
- Building Rookery Bay Reserve's Interpretation Program in partnership with Volunteer Program staff.
 - This will help address the need to adequately train the increasing number of volunteers who help the Reserve achieve visibility and accomplish tasks.
- Integrating the Florida Master Naturalist Program courses into the program schedule.
 - This should help address the increasing need for these courses in upcoming years.

Education-Related Objectives and Actions

Goal 1 [ECOSYSTEMS] Habitats and species within the Reserve exhibit long-term integrity, function, and biodiversity.

Objective 1.1 Ecological conditions are monitored to understand trends and drivers of change.

Action: Incorporate monitoring data into student and visitor programming. The Education Program will continue to use science and monitoring data from Rookery Bay Reserve, and elsewhere in the NERR System, in school and public programming. Such data involve abiotic parameters (e.g., water temperature, salinity, water quality), biotic characteristics (e.g., habitat types, species), and watershed and land-use metrics. These data and science will be translated into interpretation training for volunteers teaching on behalf of the Reserve.

Objective 1.2 Habitats are enhanced to support vulnerable species through science-led management activities.

Action: Share research updates (e.g., invasive species, prescribed fire) through interpretive programs. The Education Program will maintain a partnership with the Research and Stewardship departments by assisting with fieldwork. Information gathered will be incorporated into programs and exhibits at Rookery Bay Reserve.

Goal 2: [HUMAN CONNECTIONS] Connections among people and resources in the Reserve are understood and enhanced.

Objective 2.1 Cultural resources within Rookery Bay Reserve are identified and conserved.

Action: Highlight historic and recent cultural resource findings in education programming. Through collaboration with the Stewardship staff, information about cultural resources will be incorporated into education programming such as school field trips, outreach activities, and public lectures.

Objective 2.2 Southwest Florida communities understand the socioeconomic values of local ecosystems.

Action: Coordinate science-based lectures for the general public. The Education Program will continue the Lunch & Learn Lecture Series, which focuses on science-based information for a general audience. Partners in the series may include the Florida Humanities Council, FORB, and FIU. Additionally, an increase in the number of Florida Master Naturalist Program offerings to meet the high demand will be considered.

Action: Highlight cultural resources in exhibits and programs. The Education Program will work closely with the programs of Visitor Services, Communications, and Facilities to develop and update exhibits in the Environmental Learning Center. Cultural resources will also be highlighted in public program offerings like the Florida Master Naturalist Program and TOTE.

Goal 3: [RESILIENCE] Strong science-to-management connections ensure that ecosystems and communities across the Gulf of Mexico are resilient and adaptable to environmental changes and episodic events.

Objective 3.3 Rookery Bay Reserve serves as a living laboratory to understand how change impacts ecosystems and ecosystem services.

Action: Volunteer interpreters are informed about ongoing research at Rookery Bay Reserve. Interpretive programs at the Environmental Learning Center focus on research at the Reserve. Updated information on the latest findings will be included in all interpretive training for volunteers.

Action: Enhance field-based education programming to address latest science on impacts to the ecosystems at Rookery Bay Reserve. Over the next five years, the Education Program will broaden its menu of field trip offerings to include a variety of options for all visiting groups.

Goal 4: [OUTREACH] Value of the coastal environment drives informed stewardship actions.

Objective 4.1 Residents and visitors have a greater awareness of Rookery Bay Reserve and understand how to protect it.

Action: Conduct outreach throughout the community. Over the next five years, the Education Program will expand outreach programming with assistance from the Friends of Rookery Bay. Training outreach volunteers and coordinating marketing efforts to reach local community groups will take place through the Communications and Visitor Services departments. Additionally, the Education Program will work with the Stewardship Program to share relevant information with residents about land management activities

that impact adjacent communities such as prescribed fire, invasive species removal, and other habitat restoration activities.

Action: Offer an array of onsite public programs. To provide up-to-date scientific information and educate the community, the Education Program will continue to organize family-friendly educational events such as National Estuaries Day and Festival of Birds. Additionally, classes, workshops, and lectures will be offered to provide opportunities for skill building in a variety of topics including birding and nature photography.

Action: Host topic-specific training for staff and volunteers who interact with the public. The Education Program oversees interpretation training. Over the next five years, this program will include more workshops to adequately prepare for consistent Rookery Bay Reserve representation.

Objective 4.2 Students experience the coastal environment through place-based learning.

Action: Provide high quality, field-based science education programming for students pre-K through grade 20. The Field Trip Specialist Program targets students in grades 4 and 7, high school, college, and post-graduate studies. It uses hands-on, field-based activities to illustrate science, technology, engineering, art, and math (STEAM) principles. Additionally, other grade levels can visit the Environmental Learning Center including but not limited to home schools, scouts, and Girls in Science overnight slumber programs.

Objective 4.3 Stakeholders and partners apply science-based knowledge to make informed decisions.

Action: Represent Rookery Bay Reserve at community forums. Education department staff attend a wide variety of local, regional, state-wide, and national gatherings with like-minded individuals. These staff represent the Reserve by attending conferences and participating in work groups and planning committees.

Action: Conduct annual Teacher on the Estuary workshops. The Education Department will continue to host TOTE each year, targeting area teachers to learn about Rookery Bay Reserve.

CHAPTER 7. COASTAL TRAINING PROGRAM



The Coastal Training Program provides up-to-date scientific information and skill-building opportunities to coastal decision-makers on relevant coastal management issues. Target audiences may vary for each reserve, but generally include local elected or appointed officials, managers of public and private lands, natural resource managers, coastal and community planners, and coastal business owners and operators. They may also include such audiences as farmers, watershed councils, professional associations, recreation enthusiasts, researchers, and more (National Oceanic and Atmospheric Administration [NOAA] 2020)

The place-based nature of reserves makes them uniquely positioned to deliver pertinent information to these audiences. Each reserve conducts an analysis of the training market and assessment of audience needs to identify how best to deliver relevant training on priority issues to their area (NOAA 2016).

Partnerships are integral to the program's success. Reserves work closely with a host of local partners, as well as several NOAA programs, to determine key coastal resource issues and the appropriate target audiences and expertise needed to deliver relevant and accessible programs (NOAA 2016).

The Reserve System Strategic Plan outlines coastal training objectives designed to ensure that coastal decision-makers and environmental professionals understand and effectively apply science-based tools, information, and planning approaches that support resilient estuaries and coastal communities (NOAA 2016).

Coastal Training Program (CTP) Context

Rookery Bay Reserve's CTP began in 1989 as a series of bimonthly Coastal Zone Management workshops designed to help improve decision-making about coastal resources in southwest Florida. This effort evolved into a forum for professional training, field education, and networking for southwest Florida professionals working to resolve coastal environment issues. The CTP training model was eventually adopted for use at all 30 National Estuarine Research Reserves (NERRs). Since inception, the CTP has continually evolved to meet the needs of its stakeholders. The three priority areas for the next five years are:

- Coastal resilience
- Water quality
- Habitat restoration and conservation

Rookery Bay Reserve's CTP primarily serves decision-makers in Collier, Lee, and Monroe counties, but audiences sometimes include people from Hendry, Glades, Highlands, DeSoto, Hardee, Sarasota, Manatee, Hillsborough, Pinellas, Saint Lucie, Martin, Palm Beach, Broward, and Miami-Dade counties. For more detailed information on the socioeconomic demographics of human communities and attributes of the natural communities, refer to information in Chapter 4 of this management plan.

Target audiences for Rookery Bay Reserve's CTP include elected and appointed officials, planners, floodplain managers, water managers, land managers, scientists, business owners, and other professional groups. These groups have all been identified as having decision-making power over coastal resources at a community scale. The CTP focuses on providing information, training opportunities, and technical assistance to these key individuals to achieve positive outcomes for the coastal environment in south Florida.

Coastal Training Program Capacity

Rookery Bay Reserve's CTP currently has a full-time coordinator and a full-time training specialist. The Reserve's Environmental Learning Center provides an auditorium and two small meeting rooms for events. Several boats are available for field experiences, and field sites are used for hands-on activities for specific training workshops.

Rookery Bay Reserve currently lacks sufficient large meeting spaces or lecture hall appropriate for workshops with small group activities. Some events are hosted offsite at partner facilities, which include Conservancy of Southwest Florida, Florida SouthWestern State College, and Naples Botanical Garden. Partnerships are also integral to planning, developing, and delivering programs. Program development and planning will be assisted by Florida International University, NOAA's Office for Coastal Management, Project Greenscape Alliance, Collier County, Florida Audubon, Florida Gulf Coast University, Southwest Florida Cooperative Invasive Species Management Area (CISMA), U.S. Fish and Wildlife Service (USFWS), and University of Florida. Program delivery will be assisted by these organizations as well as several others, dependent on the topic (i.e., The Nature Conservancy, National Estuary Programs, Florida Sea Grant, South Florida Water Management District, Miami-Dade County, and Lee County).

Coastal Training Program Delivery

To support the southwest Florida community, the CTP will continue to offer two types of services: training and technical assistance. Training will be delivered primarily via in-person workshops. Staff will also host webinars and conferences and develop written materials to be distributed in print and electronically. Workshops typically last four to eight hours but can be longer if covering a large amount of content or imparting skills. When appropriate, staff from other sectors will attend workshops or participate as guest speakers to share information about research or stewardship activities at Rookery Bay Reserve. CTP staff will make every effort to integrate interactive components to training workshops such as small group discussions, hands-on activities, field excursions, scenario development, and group brainstorming. In addition to training activities, the CTP will offer technical assistance in the form of leading collaborative working groups and facilitating meetings. CTP staff will offer technical assistance of relevance to the CTP such as grant writing and serving on advisory groups. Assistance is often carried out in collaboration with other Reserve sectors to assist with ongoing work or to initiate new projects.

Rookery Bay Reserve's CTP staff regularly integrate NERR System-wide programs and priorities into workshops and events and collaborate with other NERRs and NOAA whenever possible. The priority issues addressed by the 2017–2022 NERR System strategic plan are environmental change, water quality, and habitat protection. The Reserve's CTP focal topics are informed by needs assessments detailed in the next section. Currently, CTP focuses on coastal resilience, water and stormwater management, habitat restoration, and natural resources conservation. These topics align well with the objectives of the NERR System strategic plan to help address climate change, habitat, protection, and water quality.

Over the next five years, Rookery Bay Reserve's CTP will continue offering programs focused on these topics to professional audiences. Programs are marketed as appropriate to targeted audiences in cooperation with the Communications department. Marketing efforts include email lists, social media posts, the Rookery Bay website, and direct calls or mail. The objective of all CTP activities is to provide stakeholders with science-based information, tools, and skills that allow them to improve and maintain coastal resources. To ensure this outcome, the Reserve's programs are regularly evaluated through surveys following completion of each formal program and by periodic informal interviews with select stakeholders. The survey results are entered into a central database and reviewed informally several times

throughout the year. CTP staff perform a formal review of survey results annually to decide how best to improve programs. In the next five years, a needs-assessment update is planned to ensure that program priorities remain in line with stakeholder needs.

Coastal Training Future Needs and Opportunities

An updated needs assessment was compiled in 2017 through structured interviews along with results of an online questionnaire. Interviews indicated the greatest interests in training sessions were on communication, sea level rise, water quality, stormwater management, and grant proposal assistance. The online questionnaire responses indicated that stakeholders had the greatest interests in training sessions on ecosystem/hydrological restoration, coastal resiliency (vulnerability assessments for storm surge and sea level rise, living shorelines, and green infrastructure), and natural resources (land management planning, policy, and invasive species management). These results indicate that stakeholders for Rookery Bay Reserve's CTP are most interested in training focused on restoration, coastal resiliency, communication (especially grant/funding assistance), natural resources, and water/stormwater management.

To increase capacity of the CTP, Rookery Bay Reserve is seeking grant funding to support up to two additional full-time employees to address the identified needs. Such grant-funded positions would likely focus on a specific topic, such as coastal resilience, where the community has expressed great interest. In addition to seeking outside funding to increase CTP staffing, opportunities exist to strengthen partnerships with other NERRs. Due to overlap in stakeholder needs and similar natural resource issues, collaboration is sought with the other two NERRs in Florida and the three Gulf Coast NERRs outside Florida. By leveraging expertise and experience from other CTPs, program capacity can potentially be increased.

Training-Related Objectives and Actions

Goal 1 [ECOSYSTEMS] Habitats and species within the Reserve exhibit long-term integrity, function, and biodiversity.

Objective 1.1 Ecological conditions are monitored to understand trends and drivers of change.

Action: Provide training to support use of monitoring data. The CTP is currently working on a needs assessment to determine what training or collaborative efforts are needed to move monitoring data into action. The needs assessment consists of interviews with staff from all Reserve sectors. The interviews discuss both past successes and current barriers to using monitoring data for decision-making. This needs assessment will inform the development of training to support staff and partners in using monitoring data in decision-making.

Objective 1.2 Habitats are enhanced to support vulnerable species through science-led management activities.

Action: Provide training on invasive and vulnerable species. The CTP will continue to partner with other organizations to offer these workshops. Through collaboration with listing agencies such as Florida Fish and Wildlife Conservation Commission (FWC) and USFWS, workshops will be offered on vulnerable species that occur within Rookery Bay Reserve such as shorebirds, rare plants, sea turtles, and manatees. The CTP will work with stewardship and research staff, as well as local organizations such as the Southwest Florida Cooperative Invasive Species Management Area, to host workshops on invasive plant and animal identification and control techniques. Additionally, special workshops will be offered exclusively for law enforcement professionals and officers. These special workshops will be organized to provide information on vulnerable species and critical wildlife areas within the Reserve.

Action: Provide training on restoration techniques to natural resource managers and other professional audiences. The CTP will share Reserve-wide efforts to utilize innovative restoration techniques, including conservation finance options such as blue carbon credits. Habitat restoration efforts will focus primarily on mangrove forests, oyster reefs, coastal dunes, and (or) other relevant living shoreline habitats. New restoration techniques, case studies, and resources will be shared through a variety of formats. The CTP will assist the stewardship and research sectors with efforts to apply for external funding for restoring mangrove die-off areas. Staff also facilitate conferences that encourage collaboration among restoration practitioners and academic researchers, and they host training workshops that share best practices and new techniques for mangrove restoration.

Goal 2: [HUMAN CONNECTIONS] Connections among people and resources in the Reserve are understood and enhanced.

Objective 2.1 Cultural resources within Rookery Bay are identified and conserved.

Action: Collaborate with partners to provide cultural resource training. Training will be offered in cultural resource management through a collaboration with the Florida Public Archaeology Network and Rookery Bay Reserve's stewardship staff. This may include a Florida Archaeological Resource Management certification workshop and (or) sharing information about the ongoing efforts to protect cultural resources with the Reserve.

Objective 2.2 Natural resources protection is enhanced by improved communications between scientists and stakeholders.

Action: Implement information exchanges within the natural resource management community. The CTP will work on collaborative grants and continue facilitating groups such as the Collier County Shorebird Alliance. CTP staff will also facilitate collaborative projects researching management issues important to the natural resource community. These collaborative science projects will emphasize working with managers of land adjacent to, and water watersheds connected to, Rookery Bay Reserve. Additionally, working with the Reserve's stewardship or research staff, the CTP will assist with hosting meetings for regional working groups such as the Southwest Florida Interagency Fire Management Council and Florida Natural Areas Inventory when requested.

Action: Facilitate collaborative working groups to address environmental issues along the coast. The CTP will continue to facilitate the Greenscape Alliance working group or other relevant groups as they develop. Such efforts will involve product development, such as class resources or hosting new workshops, along with networking. The Greenscape Alliance will continue to recruit new members as it has since its inception in 2009. A particular emphasis will be on recruiting from the private sector to gain fresh insight and a wider variety of perspectives.

Objective 2.3 Southwest Florida communities understand the socioeconomic values of local ecosystems.

Action: Host training sessions for decision-makers on ecosystem services and socioeconomic indicators. As Rookery Bay Reserve does not have staff with expertise in these areas, the CTP will work with partners from other NERRs of the Gulf of Mexico, along with Gulf of Mexico Alliance, NOAA, various universities, or other appropriate organizations to offer such training. Understanding how the Reserve and other natural coastal areas benefit human communities is key to communicating their value to decision-makers and the public. The CTP aims to provide training to aid environmental professionals in quantifying and communicating ecosystem services for mangroves, oyster reefs, seagrasses, marshes, and other key coastal habitats of southwest Florida.

Action: Collaborate with social scientists to understand community values of estuaries. The CTP will engage with the social science community and enhance relationships with universities to increase social science work within Rookery Bay Reserve. The CTP will strive to establish relationships with social scientists through networking with Florida Gulf Coast University (FGCU), Florida International University (FIU), and Florida State University and by attending relevant conferences such as the Social Coast Forum. These relationships will allow CTP to communicate research needs from community leaders and managers. The research will center on improving the understanding of how the southwest Florida community values estuaries. This will help improve the effectiveness of conservation education and communication programs and will help align conservation strategies with community priorities.

Action: Collaborate with partners to establish socioeconomic indicators to develop a monitoring program. The CTP will foster relationships and connect partners with appropriate community stakeholders to provide input for a socioeconomic monitoring program. Funding opportunities will be sought to support developing a monitoring program. CTP staff will continue to assist the Harte Research Institute (Texas A&M University) with a Gulf-wide project that includes the installation and use of a socioeconomic indicator monitoring kiosk at the Environmental Learning Center. This work will be contingent on securing additional funding and working with partners.

Goal 3: [RESILIENCE] Strong science-to-management connections ensure that ecosystems and communities across the Gulf of Mexico are resilient and adaptable to environmental changes and episodic events.

Objective 3.1 Communities are engaged through collaborative projects to monitor and manage effects of coastal watershed change.

Action: Provide technical assistance to collaborative working groups to address coastal resilience. Assistance may include organizing new groups, joining existing efforts, or expanding existing efforts to address impacts from sea level rise, increased flooding, and increased storm frequency and intensity. Within southwest Florida, several resilience endeavors are being developed. Such efforts will be appropriate to current circumstances and will not be duplicative. Work may include expanding existing working groups resulting from a study by the University of Florida to model sea level rise and associated change within Collier County. The CTP's relationship with FIU will be utilized, when possible, to share lessons learned and best practices between these two parallel groups.

Action: Enhance collaborative relationships with the CTPs of other reserves through attending conferences, workshops, and digital meetings. This may include partnering with the other Gulf of Mexico NERRs to apply for regional external grants that meet the needs of decision-makers. The CTP will also continue to regularly organize conference calls with the CTPs from the other two Florida NERRs. If possible, staff will visit other NERRs to attend or assist with workshops at these other sites.

Objective 3.2 Coastal practitioners use observations of ongoing change to support proactive management actions for future conditions and events.

Action: Provide training on new technology, techniques, and tools to monitor, model, and adapt to environmental changes. The CTP will work with Rookery Bay Reserve's research sector and NOAA's Office for Coastal Management and other appropriate partners to adopt or develop new training workshops that will provide these skills. Needs-assessment results will inform topic selection to ensure that stakeholders receive appropriate training in these areas.

Action: Provide training on Rookery Bay Reserve monitoring data applications and lessons learned. CTP staff will include plans or data from the Sentinel Site Application Module 1 (SSAM-1) program in at least one training event in the next five years. This work will be completed by partnering with staff from the research and stewardship departments to share lessons learned as the Reserve establishes its sentinel site program. Other data collected by the Reserve may be included in training events as appropriate. These may include water quality data from the System-Wide Monitoring Program (SWMP) or results from monitoring of sea turtle nesting, shorebird populations, fish species assemblages, and shark nurseries.

Objective 3.3 Rookery Bay Reserve serves as a living laboratory to understand how change impacts ecosystems and ecosystem services.

Action: Enhance training opportunities relevant to extreme storm management and response tools and applications. Partnerships with NOAA and the Federal Emergency Management Agency will be enhanced to provide training on new tools and applications developed for hurricane response and recovery. The CTP will work with the research sector and other partners to share ongoing investigations on the impacts of hurricanes on mangrove-dominated ecosystems and their subsequent recovery via a research symposium. Funding will be sought to foster collaborative work with Jobos Bay NERR in Puerto Rico to offer this type of training and symposium.

Goal 4: [OUTREACH] Value of the coastal environment drives informed stewardship actions.

Objective 4.1 Residents and visitors have a greater awareness of Rookery Bay Reserve and understand how to protect it.

Action: Host communication skills workshop for target audiences. The CTP will seek external funding and partnerships to offer workshops that enable environmental professionals to improve their science communication skills. These may include training on best practices for scientific presentations to non-technical audiences, communicating an effective message to elected officials, or relate to sharing results from studies on ecosystem services or socioeconomic benefits. Communication skills may also include training on writing grant proposals or facilitating collaborative groups. These training sessions will be dependent on the availability of funding to hire contractors to provide the workshops, as the CTP staff currently lack the expertise necessary to develop and deliver these training sessions.

Objective 4.3 Stakeholders and partners apply science-based knowledge to make informed decisions.

Action: Provide educational events for elected officials and community leaders. To provide up-to-date scientific information and build relationships, the CTP will continue to organize educational events, such as Legislative Day, for elected officials and community leaders. Legislative Day is typically a full-day event that includes field trips, discussions with staff, and interaction with key stakeholders of Rookery Bay Reserve. This allows elected officials and their staffers to experience the Reserve firsthand and learn about relevant environmental issues from a science-based perspective. For this event, state and federal elected officials representing the communities of Collier County are invited. The CTP will continue to work with leadership groups such as Leadership Collier and Greater Naples Leadership to host their annual Environment Day event and their externship opportunities for students and alumni. For these events, CTP staff work closely with the education, stewardship, and research sectors to share information about their respective programs.

Action: Host science-based workshops for business audiences. Over the next five years, the CTP will expand workshops targeting private business owners. CTP staff periodically offer lectures and field trips when requested. Grant funding or new partnerships are sought to help develop and deliver new programs

to key business owners and staff. These programs may include a course on coastal processes and sea level rise for real estate professionals, living shorelines for marine contractors, or resilient building for construction managers. If appropriate, continuing education units may be issued through the Florida Department of Business and Professional Regulation.

Action: Provide Best Management Practices training for landscape professionals. The CTP will continue the Project Greenscape partnership program with other agencies, contingent on continued grant funding. Classes will be offered in English and Spanish to better serve the landscape professional community in south Florida. This program will continue to offer the Green Industries Best Management Practices certification workshop. Additional courses offered provide continuing education credits through the Florida Department of Agriculture and Consumer Services; Florida Nursery, Growers and Landscape Association; International Society of Arboriculture; and other relevant organizations. Workshops will be offered on stormwater pond management, invasive plant management, mangrove trimming and regulations, and other topics as informed by future needs assessments and direction from the Greenscape Alliance.

Action: Implement a needs assessment of coastal decision makers. Rookery Bay Reserve's CTP will survey coastal decision-makers to collect input on topics for training workshops during select workshops. When workshops include target audiences that the CTP wants to increase or maintain engagement with, the class evaluation will include a short needs assessment for training topics. These responses will be compiled in a central database and summarized annually. Additionally, within a five-year period, the CTP will conduct a more comprehensive needs assessment that includes either one-on-one or focus group interviews to gain a more in-depth understanding of decision-maker needs. The results from this needs assessment will be summarized in a written report and used to inform the next management plan update.

CHAPTER 8.

VOLUNTEER PROGRAM



Volunteers at Rookery Bay Reserve help educate 4th grade Estuary Explorers

Rookery Bay Reserve's Volunteer Program engages a diverse group of over 250 people who contribute over 16,000 hours annually to advancing the Reserve's mission. The Reserve depends greatly on the expertise and dedication of volunteers who contribute to all departments. Volunteers have a passion for the Reserve and take pride in the work they do. In return, the Reserve assists volunteers in gaining life-enhancing experiences, ample opportunities for growth, and enjoyable social contact with other like-minded individuals.

Objectives and Strategies

Objective

Attract, nurture, and retain a volunteer workforce with a diversity of interests and talents who augment all aspects of Rookery Bay Reserve's programs.

Strategies

- Recruit and retain a volunteer corps to help accomplish program goals and objectives.
- Create a positive, open, and inclusive environment where all volunteers are encouraged to participate.
- Facilitate opportunities for volunteers to gain knowledge of coastal ecology and other subject areas needed to augment programs and operations.
- Ensure that volunteers are well trained for the tasks they take on and feel valued and appreciated.
- Provide ongoing feedback to volunteers, fostering supportive growth in their positions.
- Survey volunteers annually to gather data on how to improve training, recruitment, retention, recognition, and collaboration with FORB.
- Enable and encourage staff to provide feedback on their volunteers to the volunteer coordinator.

Volunteer Positions

Volunteers fill many roles and accomplish many tasks at Rookery Bay Reserve. They greet visitors, process admissions, answer phones, and conduct the programs at the Environmental Learning Center, including guided trail walks, touch tank, and cart programs. They assist the Reserve's aquarist with feeding fish and helping with regular maintenance of aquariums, and they assist the water quality manager with monthly water sample collections. The volunteers assist the Reserve's Research and Monitoring Program with sea turtle monitoring, shore bird surveys, juvenile shark monitoring, and fish trawling. The Reserve's elementary and high school programs all require volunteer assistance (volunteer recruitment strategies are discussed below). Volunteers assist the facilities department with many tasks such as painting, repairs, grounds work, and regular maintenance. All special events and outreach are supported by volunteers. The Reserve's volunteers are year-round and seasonal residents of the communities surrounding the Reserve as well as students from local high schools and from local Universities such as Florida Gulf Coast University (FGCU).



Hands-on learning at the touch tank

Volunteer Recruitment

Volunteers are recruited to Rookery Bay Reserve in a variety of ways. At the high school level, the volunteer coordinator shares information with guidance counselors from nearby schools, and the counselors convey the volunteering opportunities to the students. High school students are available most often on Saturdays and during summer break. The Reserve works with FGCU's Service Learning Department and is listed as an approved agency for students to fulfill volunteer hours that are mandated by FGCU. FGCU allows the volunteer coordinator to post any upcoming orientation meetings or special volunteer requests to the student body through their student newspaper and social media. The Reserve is also invited to semi-annual Service Learning Fairs on campus. Student volunteers can be short-term or longer-term volunteers if fulfilling a course requirement. Some students have been successfully placed as interns in a variety of the Reserve's departments. Groups of students also perform monthly trail maintenance work, which provides an excellent opportunity for them to learn about invasive plants while providing the resource management team with support.

Recruiting methods in the local community include placing free advertisements in the local papers and establishing relationships with activities directors of local gated communities to inform residents of volunteer opportunities. All outreach events and talks at Rookery Bay Reserve provide information about the Volunteer Program. The Reserve is registered with the local Retired and Senior Volunteer Program and have received some volunteers from this agency. Volunteers are also recruited by word-of-mouth from other volunteers, who do a great job of spreading the word.

Volunteer Training

New volunteers are trained by staff and experienced volunteers. The most intensive volunteer training is for docents. Rookery Bay Reserve's Education Department has created a series of required training classes for new volunteers who wish to lead programs in the Environmental Learning Center as well as current volunteers who wish to be cross trained on additional programs. These training sessions are offered monthly along with Volunteer Orientation and will continue during the next five years. Other departments of the Reserve provide job descriptions and minimum requirements for volunteers interested in assisting them. Task-specific training is provided to the volunteers to instill confidence to perform their tasks independently or as a team.

A safe and welcoming environment is provided at the Environmental Learning Center. All volunteers of the Environmental Learning Center, Visitor Services, and interpreters are regularly updated through newsletters and meetings for Rookery Bay Reserve strategies to provide the best customer service as well as safety protocols and procedures. Learning Center volunteers stay up to date on their first aid and CPR training.

Evaluating Volunteers

Rookery Bay Reserve's staff are requested to provide the volunteer coordinator with feedback as to whether a given volunteer is meeting their needs and is a good fit. If a task is not a good match for the skills and interests of a volunteer, efforts are made to find a better-suited position.

Docents are provided with more feedback than other volunteers. They are required to attend training sessions, shadow current volunteers, and perform a program for a staff member of the Education Department for final approval before conducting programs for visitors. Staff of the Education Department and the volunteer coordinator are increasing their efforts to join docents on their programs each season to evaluate and provide helpful comments and suggestions for improvement. The increased efforts in

evaluating volunteers now include the periodic use of a formal Volunteer Evaluation form based upon the service hours of each volunteer.

Rewarding Volunteer Involvement

Rookery Bay Reserve hosts volunteer appreciation events twice yearly. These events include an end-of-season volunteer appreciation barbeque each March that are held at the Environmental Learning Center. Volunteers are acknowledged for length of service and number of hours volunteered and are rewarded with pins signifying important milestones. A volunteer appreciation luncheon is conducted by the Reserve each August for the summer volunteers. The luncheon is held offsite and awards volunteers with pins in recognition of important milestone hours.

A series of online articles titled the Volunteer Spotlight is another way Rookery Bay Reserve recognizes exceptional volunteers. This series of articles highlight a given volunteer and summarize the contributions made to the Reserve by the volunteer. This series is published in the Reserve's volunteer newsletter and is featured on Rookery Bay Reserve's Volunteer webpage: <https://rookerybay.org/make-a-difference/volunteer/>. This is done quarterly and is planned to continue. Daily connections between volunteers and staff, building relationships, and regularly thanking volunteers in person are part of the warm and encouraging environment at the Reserve.

Volunteer Program-Related Objectives and Actions

Goal 1 [ECOSYSTEMS] Habitats and species within the Reserve exhibit long-term integrity, function, and biodiversity.

Objective 1.1 Ecological conditions are monitored to understand trends and drivers of change.

Action: Ensure that volunteers support monitoring efforts by recruiting and qualifying candidates for this type of work. New volunteer candidates must undergo an on-boarding process, including an orientation class followed by training that is specific to their area of interest. Volunteers help support the Reserve's fisheries research programs (shark research and trawling programs), sea turtle monitoring, shorebird surveys and monitoring, and Team OCEAN monitoring.

Action: Share all milestones and research data in the Environmental Learning Center through updated exhibits, publications. Keep volunteers updated on any new data and incorporate the information into their docent training.

Objective 1.2 Habitats are enhanced to support vulnerable species through science-led management activities.

Action: Ensure that volunteers are trained and qualified to support science-led management activities. The Volunteer Program will achieve this by communicating with staff on the type of assistance and the requirements they expect from volunteers and providing a volunteer who is a good fit for the work. Volunteers assist with data collection in Reserve programs, including invasive plant removal (trail maintenance), sea turtle monitoring, shark research, and Team OCEAN monitoring activities.

Action: Provide up-to-date data for visitors by keeping Rookery Bay Reserve publications up-to-date and available. Docents will be provided with new data for interpretation.

Action: Team OCEAN will provide on-the-water outreach services to boaters on how to best protect sensitive species. These volunteers receive ongoing required training and updates through the Team OCEAN newsletter.

Goal 2: [HUMAN CONNECTIONS] Connections among people and resources in the Reserve are understood and enhanced.

Objective 2.1 Cultural resources within Rookery Bay Reserve are identified and conserved.

Action: Trained and qualified volunteers will relay educational messages and findings to visitors. Training classes are in place that will provide these updates. Volunteer docents, trail guides, Team OCEAN, and outreach volunteers disseminate this information to visitors and the community.

Objective 2.3 Southwest Florida communities understand the socioeconomic values of local ecosystems.

Action: Encourage trained and qualified volunteers to participate in community outreach programs educating the general public. A monthly outreach training class provides instruction and guidance to ensure volunteers provide accurate information with confidence and have all the latest updates.

Goal 3: [RESILIENCE] Strong science-to-management connections ensure that ecosystems and communities are resilient and adaptable to environmental change and episodic events.

Objective 3.1 Communities are engaged through collaborative projects to monitor and manage effects of coastal watershed change. The public is invited to lectures by staff who provide annual updates on these changes.

Action: Train volunteers to support Rookery Bay Reserve research and monitoring. A list of qualified volunteers is provided to the Research and Monitoring Program and updated monthly.

Action: Recruit volunteers to participate in collaborative projects. Current volunteers as well as new recruits are notified of collaborative projects in which they can assist.

Objective 3.3 Rookery Bay Reserve serves as a living laboratory to understand how change impacts ecosystems and ecosystem services.

Action: Strengthen how visitors learn about the latest research in the Environmental Learning Center and encourage volunteer interpreters to give programs with this information. Information is provided through the Education Department to the learning center docents through specific and required training classes

Goal 4: [OUTREACH] Value of the coastal environment drives informed stewardship actions.

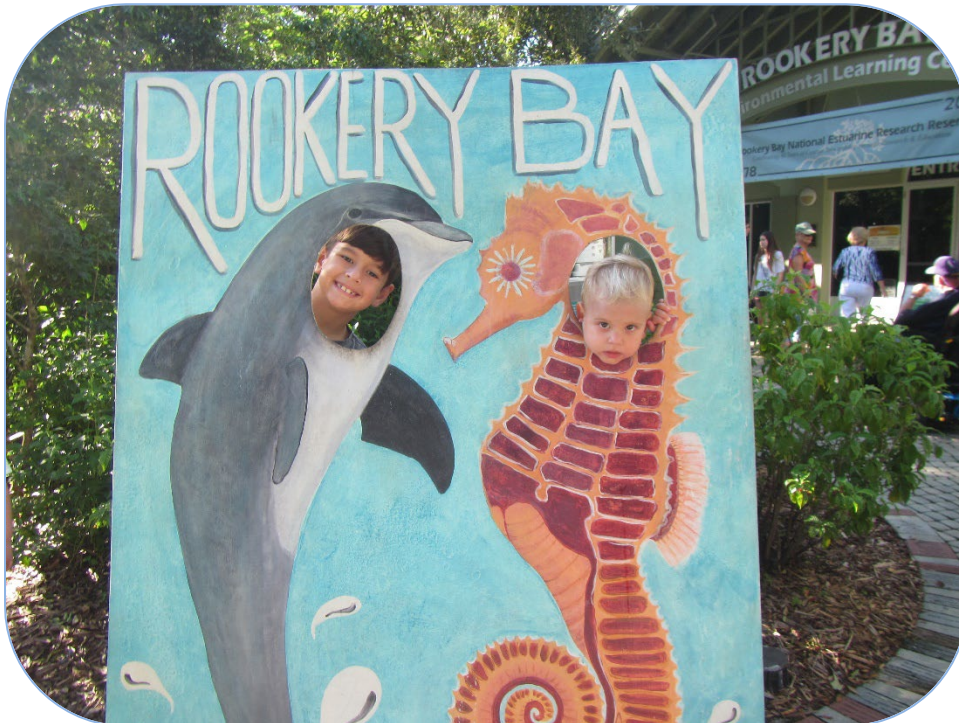
Objective 4.1 Residents and visitors have a greater awareness of Rookery Bay Reserve and understand how to protect it.

Action: Enhance the visitor experience at the Environmental Learning Center using the latest technology. Continue to provide tools such as iPad kiosks to make registration for volunteer programming easier and more convenient. Additional interactive exhibits are developed and included as needed.

Action: Utilize Team OCEAN to provide on-the-water education for boaters to protect Rookery Bay Reserve habitats and species. Team OCEAN also engages in outreach at local marinas and other venues that reach boaters.

CHAPTER 9.

COMMUNICATIONS PROGRAM



Rookery Bay Reserve's Communications Department strives to promote the Reserve and put current, science-based information into the hands of many audiences using a wide assortment of strategies.

Communications Program Context

Rookery Bay Reserve's Communications Department focuses its efforts primarily on the local community and the southwest Florida region. Digital communication tools enable the program to reach target audiences of full-time and seasonal residents across Florida and beyond as well as visiting tourists. Priority audiences include a variety of Reserve land and water user (e.g., boaters) groups, potential attendees of events and programs at the Environmental Learning Center, and the local media. Non-local target audiences include other National Estuarine Research Reserves (NERRs), researchers, and academics. The Communications Department raises awareness about activities at the Reserve, such as educational lectures, prescribed fires, and postings for beach-nesting birds and sea turtles. These activities have a direct impact on users of the Reserve.

Communications Program Capacity

The Communications Department currently includes one full-time staff, with an intern whenever possible. The program uses the Florida Department of Environmental Protection's (DEP's) GovDelivery, an online communications tool, to send information to large numbers of subscribers, including regional media outlets, environmental professionals, and volunteers. The Communications Department also works closely with Friends of Rookery Bay (FORB) to ensure the accuracy of the information in their monthly member newsletter about Rookery Bay Reserve activities. One of the most important communications tools is the FORB website, www.RookeryBay.org, which serves as a clearinghouse for information ranging from press releases and research findings to information on local wildlife and field notes. The department also uses social media (e.g., Facebook, Twitter, Instagram) for conveying information about day-to-day activities and providing links to the website.

Communications Program Delivery

The Communications Department works with staff to relay accurate and timely information derived from their work. When available, news (such as on the System-Wide Monitoring Program problem) and success stories (such as from the Teachers on the Estuary workshop) are shared online via social media, the website, and with managing partners. Each year the Communications Department works with staff to compile data for the "By the Numbers" infographic, which is printed and displayed in the Environmental Learning Center as well as shared electronically. In addition, the Rookery Bay Review is a newsletter printed semi-annually and mailed to key stakeholders, with support from Florida DEP.

Efforts are also made to replicate or share messages derived from managing partners to Environmental Learning Center visitors and other individuals electronically.

The Communications Department strives to ensure that residents and visitors to the region are aware of Rookery Bay Reserve and its mission to serve as a local authority for accurate, science-based information. Over the next five years, it is the department's goal to increase awareness among residents and visitors of the Reserve and help them better understand the importance of healthy estuaries.

Currently during the COVID pandemic, the Communications Department has worked together with other Rookery Bay sectors to create virtual programming. Partners in tourism have helped to get the word out via e-mail marketing, social media, and e-calendars. In addition, Florida DEP and the NERR Association have supported live-streaming events by promoting them with larger audiences. Such a large number of

people who tuned-in to the Reserve's live-streaming events as a result of COVID-19 pandemic, has showed the importance of reaching out to the community in this format.

Communications Program Future Needs and Opportunities

A needs assessment conducted by the Coastal Training Program (CTP) has made it clear that more information on scientific topics such as climate change is needed throughout the community. The Communications Department regularly seeks information on these topics (available through National Oceanic and Atmospheric Administration [NOAA] and Florida DEP) to share whenever possible. Scientific information is translated into simpler terms, when necessary, so it can be clearly understood by the general public.

Over the next five years, an increase in the program's marketing budget should allow additional funding for developing new exhibits for the Environmental Learning Center. The new exhibits should not only bring new visitors to the Center, but also encourage return visits.

Communications Program Related Objectives and Actions

Goal 1: [ECOSYSTEMS] Habitats and species within the Reserve exhibit long-term integrity, function, and biodiversity.

Objective 1.1 Monitor ecological conditions to understand trends and drivers of change.

Action: Share monitoring data on the website. In addition to ensuring the local community is aware that Rookery Bay Reserve staff are engaged in long-term monitoring programs, effort is made to provide links to the data for user groups, including boating and fishing enthusiasts, natural resource managers, and researchers. In addition, website articles and social media posts draw special attention to trends or anomalies that are detected and identified by research staff, ultimately resulting in the community seeing the Reserve as an objective and reliable source of scientific information.

Objective 1.2 Enhance habitats through science-led management activities to support vulnerable species.

Action: Communicate activities to the public and to managing partners. Land management and research activities are ongoing year-round and often have a direct impact on the local community. For example, large-scale restoration projects and prescribed fires are a few instances in which the Communications Department assists, through public service announcements or advertising public meetings. Such communications help ensure the community is aware of these activities as far in advance as possible to avoid surprises, inconvenience, or confusion. Press releases, feature stories, and social media campaigns can be very helpful in spreading the word and keeping the community informed of changes in their landscape. In addition, the Communications Department provides notice of any accomplishments and success stories through various inside media opportunities, such as Florida DEP's website, NOAA's website, the NERR System website, and the NERR Association websites. Major accomplishments since the approval of the previous management plan are summarized in Appendix D.3.

Goal 2: [HUMAN CONNECTIONS] Connections among people and resources in the Reserve are understood and enhanced.

Objective 2.1 Cultural resources within Rookery Bay Reserve are identified and conserved.

Action: Ensure exhibits reflect current cultural resources and protective efforts. Southwest Florida's rich history is often unknown by members of the local community. Working with the stewardship department,

the Communications Department works to ensure that the Environmental Learning Center exhibits tell an accurate story about cultural resources on Rookery Bay Reserve lands and protective efforts underway by staff.

Action: Highlight cultural resources and protective actions the community can take on websites and social media. With support from FORB, a website dedicated to the Rookery Bay Reserve provides numerous opportunities to communicate complicated information. Website articles and social media campaigns help recognize the importance of preserving local history. Newsletter articles, feature stories, and educational lectures promote archaeological partnerships and cooperative activities underway to better understand and catalog cultural resources.

Objective 2.3 Southwest Florida communities understand the socioeconomic values of local ecosystems.

Action: Communicate the economic and social value of Rookery Bay Reserve and healthy estuaries and coast to the public. Feature stories and social media posts are used by the Communications Department to illustrate positive benefits resulting from community engagement and to encourage greater involvement among the local community. Video production is also used as an effective way of telling this story and encouraging citizen engagement. Graphics production, such as the Reserve's "By the Numbers" infographic, posters in the Environmental Learning Center and graphic splashes on partner websites, are just a few of the ways the Communications Department engages audiences and encourages them to value natural resources managed by the Reserve. Communications also works with FORB to encourage community members to go out into the Reserve and see it firsthand with a guided ecotour via kayak or a variety of boat tours offered within the Reserve.

Goal 3: [RESILIENCE] Strong science-to-management connections ensure that ecosystems and communities along the Gulf Coast are resilient and adaptable to environmental changes and episodic events.

Objective 3.1 Communities are engaged through collaborative projects to monitor and manage effects of coastal watershed change.

Action: Engage people and groups through social media. When a collaborative project or habitat restoration is undertaken, the Communications Department uses social media and public relations as effective ways of encouraging community engagement.

Action: Communicate watershed change findings through various media by press release, posting on the News section of the website, and through social media.

Objective 3.3 Rookery Bay Reserve serves as a living laboratory to understand how change impacts ecosystems and ecosystem services.

Action: Share information about how episodic events impact ecosystems by engaging visitors at the Environmental Learning Center. This will be done through lectures, including the popular lunch and learn lectures series, and after-hours science night gatherings.

Goal 4: [OUTREACH] Value of the coastal environment drives informed stewardship actions.

Objective 4.1 Residents and visitors have a greater awareness of the Reserve and understand how to protect it.

Action: Update content for exhibits and websites as needed. The Communications Department works with visitor services and Environmental Learning Center staff to develop content for exhibits in the Environmental Learning Center. These exhibits typically include basic information about a given species or habitat and detailed information about Rookery Bay Reserve's role in managing and/or monitoring it. The content includes a "stewardship tip" for visitors to consider incorporating into their everyday lives to minimize their impact on the species or habitat. Updates to exhibits and websites are planned to continue as needed for the next five years.

Action: Continue use of social media to raise awareness of natural resource issues. Website articles and social media posts draw special attention to trends or interesting discoveries that are detected and identified by research staff. The online content ultimately results in the community seeing Rookery Bay Reserve as an objective and reliable source of scientific information.

Action: Promote visitation to the Environmental Learning Center. The Communications Department will continue to promote visitation to Rookery Bay Reserve's Environmental Learning Center and drive traffic to programs, events, and ecotours. Advertisements and event listings are placed in printed publications, including regional lifestyle magazines, tourist publications, and maps. Events are also publicized widely through online publications and partners' online event calendars. Effort is made to reach out to local communities through their community relations and activities staff, who usually pass along the Reserve's literature to their residents. Also, the Communications Department will continue to work with local media and reporters to promote events, activities, and work of staff members at the Reserve. These efforts are planned to continue into the next five years and should help draw new visitors to the Environmental Learning Center.

Objective 4.3 Stakeholders and partners apply science-based knowledge to make informed decisions.

Action: Produce and disseminate Rookery Bay Review. Rookery Bay Review is a bi-annual publication of the Rookery Bay Reserve. Studies by Reserve staff and visiting scientists shine a spotlight on changing conditions and trends in the Reserve. However, without stories, data are just numbers. The Communications Department identifies and shares connections between people and the results of these research projects through field notes and website articles. Such efforts help facilitate a sense of place for members of the community. Community members are encouraged to appreciate keeping the Reserve in its natural condition for its value to the research community as well as for aesthetics, ecotourism, and quality of life. These field notes and articles are compiled into the Rookery Bay Review publication. Newsletter articles and feature stories of the Rookery Bay Review sometimes reference the ways episodic events impact the habitats and wildlife of the Reserve and the people living around the Reserve. Many of these products are made available for visitors to the Environmental Learning Center to learn how the Reserve staff and the surrounding communities can benefit from these studies.

CHAPTER 10.

RESOURCE PROTECTION PLAN (STEWARDSHIP PLAN)



Surveillance and Enforcement

Rookery Bay National Estuarine Research Reserve's natural resources are protected by a myriad of federal and state laws. The Reserve's stewardship coordinator and aquatic preserve manager is the principal staff member to directly address any visitor-use-related law infractions by alerting the local wildlife enforcement staff and regulatory divisions of the Florida Department of Environmental Protection (DEP), South Florida Water Management District (SFWMD), and the U.S. Army Corps of Engineers (Corps). The Reserve's stewardship staff and Team OCEAN (Ocean Conservation Education Action Network) program staff monitor water and land in the Reserve to document any misuse of or disturbance of natural resources within the Reserve. Local citizens also play a key role in alerting Reserve staff to potential abuses of protected natural resources. However, Reserve staff or local citizens do not directly enforce state or federal laws. Such laws are enforced by law enforcement staff and those of regulatory agencies.

Surveillance and enforcement capacities: The staff and strategies dedicated to surveillance needed for enforcing the management authorities to ensure appropriate uses of the Reserve include:

- Rookery Bay Reserve Manager (Program Administrator)
 - Stewardship Coordinator and Aquatic Preserve Manager (Environmental Specialist III)
 - Stewardship Program staff
 - Environmental Specialist II (2 staff)
 - Environmental Specialist I (2 staff)

The main office for Collier County's Florida Fish and Wildlife Conservation Commission (FWC) law enforcement division is located within the Reserve on Shell Island Road. This provides local law enforcement patrol and response with the Reserve. This location is also high visibility which reduces unauthorized resources impacts. The docks at Shell Island Road have dedicated slips for FWC wildlife officer vessels. This location gives officers close access to high visitation areas such as Keewaydin Island. The FWC Captain and the Reserve Manager meet regularly to discuss current and upcoming issues. FWC wildlife officers also work closely with the Collier County Sheriff's Office marine units and with Marco Island and Naples police departments to proactively protect Reserve resources, enforce manatee zones, enforce fishing regulations, and protect public safety.

Team OCEAN volunteers are trained to observe possible resource impacts such as trespassing in a Critical Wildlife Area, disturbance to nesting sea turtles and beach-nesting birds and will intervene either through education and outreach or contact FWC law enforcement.

Managers of each of the three NERRs in Florida also serve as regional managers overseeing multiple other aquatic preserves in their region. This is in addition to the regional manager in southeast Florida. This management structure advances the ability of Florida DEP's Office of Resilience and Coastal Protection (RCP) to manage its sites as a part of the larger statewide system.

Natural resources within Rookery Bay Reserve fall under the authority of a variety of Florida Administrative Code (F.A.C.) rules and statutes. Some of the key rules are listed below.

State Management Authority

The following state management actions are important in helping protect the Florida aquatic environment and in the context of aquatic preserve management (see Chapter 2 for a full review):

- 1966
 - Estero Bay Aquatic Preserve created by the Internal Improvement Trust Fund (the Trustees)
- 1967
 - Randall Act (Chapter 67-393, Laws of Florida) passed by the Florida legislature
 - Florida legislature provided statutory authority for proprietary control over state lands (Section 253.03, Florida Statute [F.S.])
 - Florida government moratorium on the sale of submerged lands to private entities
 - Creation of an Interagency Advisory Committee for protection and management of state-owned submerged lands
- 1968
 - Article II, Section 7 of the Florida Constitution revised for policy of conservation and protection of natural resources and areas of scenic beauty, abatement of air and water pollution
 - Interagency Advisory Committee recommended establishment of 26 aquatic preserves
- 1969
 - The Trustees established 16 aquatic preserves and adopted a statewide system for the preserves (additional aquatic preserves were adopted through 1989)
- 1975
 - Florida Aquatic Preserve Act enacted as Chapter 75-172, Laws of Florida (later becoming Chapter 258, Part II, F.S.)
- 1981
 - Conceptual State Lands Management Plan adopted by the Trustees

Rookery Bay Reserve has a close partnership with U.S. Fish and Wildlife Service's (USFWS's) Ten Thousand Islands National Wildlife Refuge (NWR). Some of the lands managed by Ten Thousand Islands NWR overlap with those managed by the Reserve. In the areas of overlap, the NWR staff manage areas above mean high water, while the Reserve staff manage areas below mean high water unless asked to assist in some other way. Also, where the boundaries of the NWR overlap with those of the Reserve, both the lands and waters have an additional federal layer of protection. Rookery Bay Reserve's methods of administration with Ten Thousand Islands NWR are included in Appendix A.7.1. The Ten Thousand Islands NWR's management plan (Comprehensive Conservation Plan) and NWR's related resource protection strategies can be found at <https://catalog.data.gov/dataset/ten-thousand-islands-national-wildlife-refuge-comprehensive-conservation-plan>.

Resource Protection Challenges

Rookery Bay Reserve's goal is to minimize adverse environmental impacts from land use while restoring the ecosystem services. Changes in land use within the Reserve's watershed and adjacent coastal lands and waters have resulted in significant environmental changes within the Reserve. Urban development and agricultural land use within the Reserve's watershed and their associated impacts on freshwater inflows to the Rookery Bay and Ten Thousand Islands estuaries remain among the most significant threats to the ecological integrity of the Reserve. These impacts include alterations to the volume and timing of freshwater with a resulting negative impact on natural salinity regimes within the estuary. Land uses in

upstream portions of the Reserve's watershed can contribute pollutants that degrade its water quality. Such pollution can be linked to the leaching of septic tanks and the use of pesticides and fertilizers. Areas of the Reserve and watershed which remain on septic systems include Isles of Capri, Goodland, and many areas of unincorporated Collier County.

Coastal development along Collier County's shoreline continues to occur, although at a lesser rate than it had in previous decades. The reduction of coastal development activities is due in part to improved regulatory protection for coastal wetlands and land acquisition by local, state, and federal partners for long-term conservation. Much of this anticipated change in coastal land use is related to trends in redevelopment within the cities of Naples and Marco Island.

As illustrated in the Collier County Future Land Use Map (see Figure 21, see also <https://www.colliercountyfl.gov/home/showdocument?id=91411>), the geographic framework for growth in Collier County is established by the Future Land Use Element (Future Land Use Element as of Ordinance No. 2019-39 adopted November 12, 2019). This element is central to planning for protection and management of natural resources, public facilities, coastal and rural development, housing, and community character and design. The purpose of the Future Land Use Element is to guide decision-making by Collier County on regulatory, financial, and programmatic matters pertaining to land use.

Projections by the Collier County government anticipate continued growth in the next 10 years in the eastern Naples area, especially east of State Road 951 (Collier Boulevard) and along U.S. 41 (Tamiami Trail) east of the boundaries of conservation land such as Collier-Seminole State Park and Picayune Strand State Forest. These urban-designated areas where continued growth is anticipated are adjacent to the eastern and northern boundaries of Rookery Bay Reserve. The Collier County Comprehensive Plan presents criteria for development of county lands and provides a map (see Figure 21 below) with recommendations for land use.

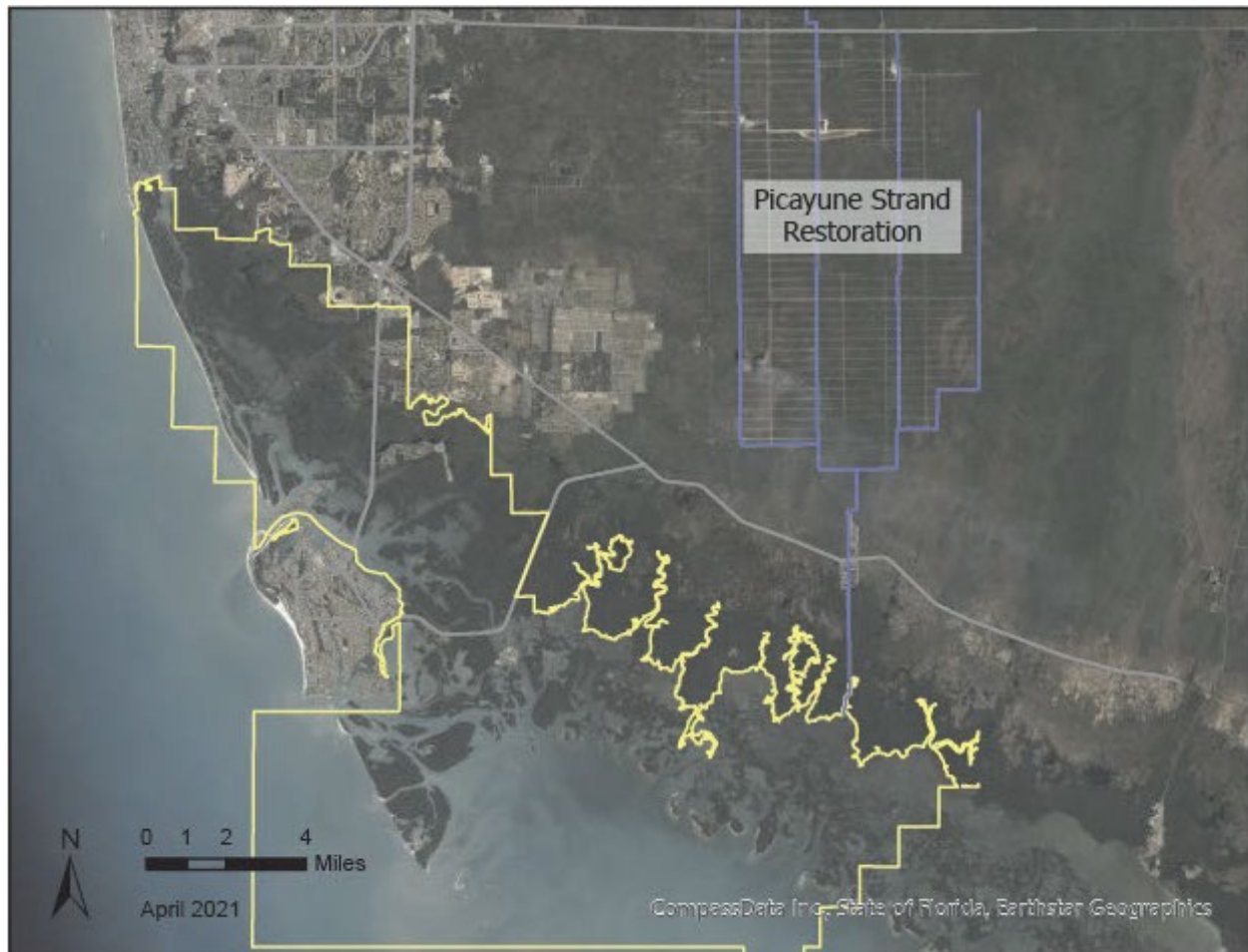


FIGURE 22: MAP OF THE PICAYUNE STRAND RESTORATION PROJECT NORTHEAST OF ROOKERY BAY RESERVE

Note: The canals associated with the Picayune Strand Restoration Project are shown as blue lines. Rookery Bay Reserve is outlined in yellow.

The restoration involves plugging 48 miles (77 km) of canals, removing 260 miles (418 km) of crumbling roads, and constructing three major pump stations, all of which will restore more than 55,000 acres (222.6 km²) of natural habitat. Wetlands will be restored in Picayune Strand and in adjacent public lands, including the Fakahatchee Strand Preserve State Park, Florida Panther National Wildlife Refuge (NWR), and Collier Seminole State Park by reducing over-drainage, while restoring a natural and beneficial sheetflow of water to the Ten Thousand Islands NWR. When completed, the project will restore historic water flows that benefit coastal estuaries by reducing large salinity fluctuations due to freshwater flowing from the Faka Union Canal into the estuaries, recharge the aquifer, and protect the water supply while maintaining current levels of flood protection.

Agriculture represents another major land use within Rookery Bay Reserve's watershed, with extensive farmlands also located in the Rookery Bay watershed. Due to changes in real estate values during the last 20 years, there has been a significant shift in land use from agriculture to residential development.

The Belle Meade area (Figure 23 below), north and inland of Rookery Bay Reserve, is a large part of the watershed feeding into the northern half of the Reserve. The Big Cypress Basin Board of SFWMD manages a large system of stormwater conveyance infrastructure that is also connected into Collier County's

system of stormwater management canals. This larger system of canals plays a significant role in providing the waters needed for the Reserve to meet its historic freshwater needs and to sustain healthy estuarine habitats. In particular, these hydrologic changes have significantly impacted the water quality and living resources in Naples Bay and the Reserve. The construction of the Golden Gate Canal in the 1960s increased the surface area of the Naples Bay watershed from about 10 square miles (26 km²) to over 120 square miles (311 km²) and decreased the surface area of the Rookery Bay watershed by approximately the same amount.

The Belle Meade area (Figure 23) is the subject of a large-scale restoration project that is managed by Collier County and funded by the Gulf Coast Restoration Trust Fund of the RESTORE Act paid by BP and other companies responsible for the Deepwater Horizon oil spill. The Collier County Comprehensive Watershed Improvement Plan is a series of linked surface water management projects with the objectives of more natural freshwater inflows, both volume and timing and salinity patterns and ecology of Naples Bay, Rookery Bay, and the Belle Meade area of Picayune Strand State Forest. Florida DEP's Office of Resilience and Coastal Protection, and Rookery Bay Reserve, are co-signatories to permits for the project along with Collier County. Recommendations, hydrologic modeling results, and other data from Rookery Bay Reserve provided key guidance for the planning and design of this Collier County Comprehensive Watershed Improvement Plan. It is important to note that completion of this project, as currently designed, will depend on obtaining private inholding and further governmental approvals.

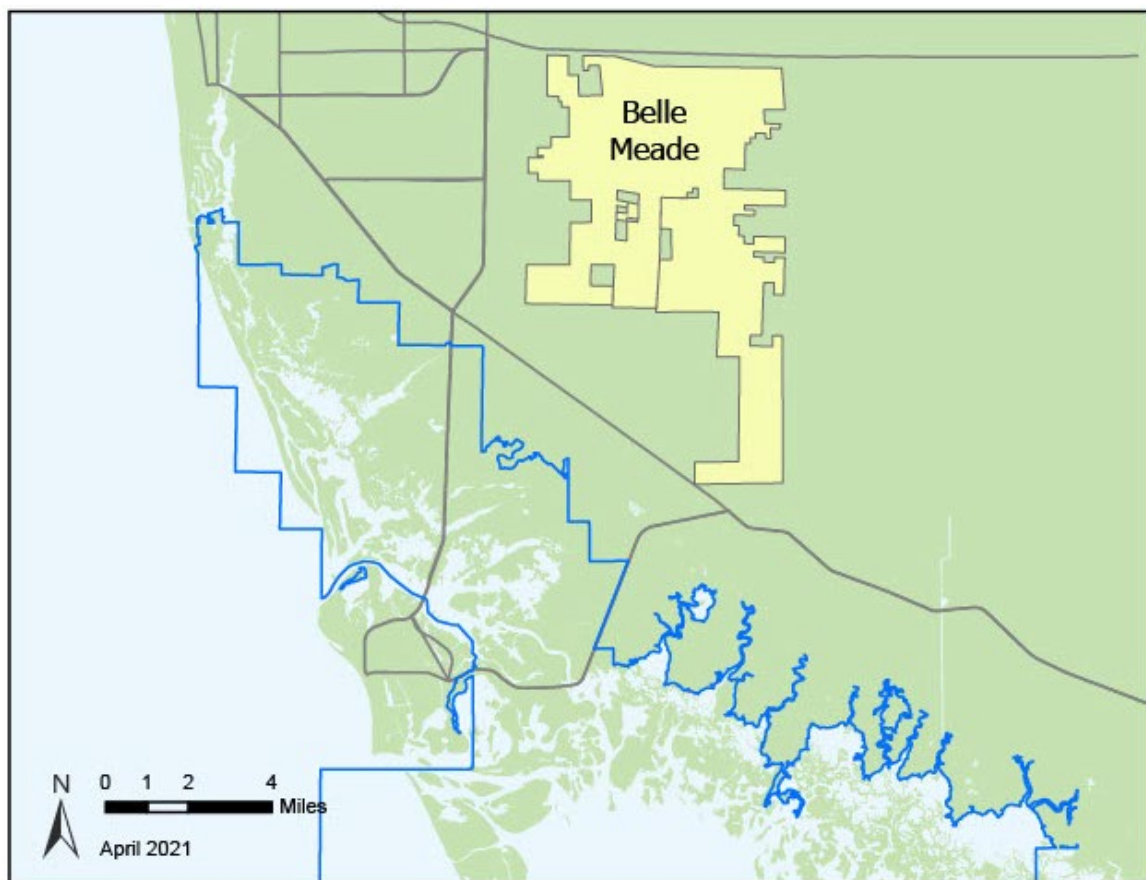


FIGURE 23: MAP OF BELLE MEADE NORTH OF ROOKERY BAY RESERVE

Note: Belle Meade is shown in yellow fill. Rookery Bay Reserve is outlined in blue.

Rookery Bay Reserve's stewardship coordinator/aquatic preserve manager reviews applications submitted to local regulatory agencies regarding projects within or adjacent to the Reserve. Such projects may have negative direct or cumulative impacts on the natural resources managed by the Reserve. The Reserve's aquatic habitats are also protected through various Florida state statutes such as Outstanding Florida Waters (Chapter 62-302.700, F.A.C.) as well as minimum flows and levels regulations and others. Prohibited activities include prop-scarring in sea grass beds; collecting of flora or fauna without a permit; and cutting, carving, injuring, mutilating, moving, displacing, or breaking off any water-bottom formation or coral. The Reserve provides many GIS data-layers to the U.S. Coast Guard, the Florida Fish and Wildlife Research Institute, and other entities ensuring that online maps, as well as available mapping and navigation software application include identification of areas managed by Rookery Bay Reserve, including its associated aquatic preserves, and locations of sensitive habitats such as seagrass beds. Additionally, the use of certain types of fishing nets, such as gillnets, are also prohibited. There are many fishing regulations applicable to Rookery Bay Reserve waters and the regulations are enforced.

The Reserve's two aquatic preserves have been made accessible to the appropriate mosquito control district. The Reserve and associated aquatic preserves are considered highly productive and environmentally sensitive areas. By policy of Florida DEP since 1987, the aerial application of mosquito adulticide is not allowed, but the spraying of larvicide, and the truck-mounted spraying of adulticide in public use areas is typically allowed. Mosquito control plans temporarily may be set aside under declared threats to public or animal health, or as a result of applicable emergency proclamation by the Florida governor. Mosquito control plans are typically proposed by local mosquito control agencies when treatment of public lands is warranted. Rookery Bay Reserve staff work closely with local mosquito control district staff to insure appropriate, comprehensive, and effective treatments are used for mosquito control within managed areas.

Aerial spraying of pesticides for mosquito control within Rookery Bay Reserve's watershed, if conducted improperly, could have a significant impact on non-target arthropods such as crabs, shrimp, and insects. To address this possibility, the Reserve's staff have built a decades-long partnership with the Collier Mosquito Control District that is still strong today. Mosquito control within the Reserve is highly discouraged as it conflicts with the intent of the designation of the Reserve to protect and study natural coastal and mangrove ecosystems representative of the biogeographic regions and estuarine types within the United States. Reserves are protected for long-term research, monitoring, education, and coastal stewardship. Any proposed mosquito control within the Reserve would have to demonstrate no impacts to ecosystem process as well as wildlife and insect populations. Staff from the Reserve and Collier Mosquito Control District periodically visit one another to provide activity updates and to discuss any concerns they may have. This interagency partnership also fosters the sharing of common science and data that improve the abilities of both agencies in addressing the needs of the local natural resources and the local community.

Resource Protection Objectives and Actions

Rookery Bay Reserve has a fundamental capacity to support overarching resource protection goals and objectives. The cross-sectoral collaborative work culture present at the Reserve ensures a strong support and commitment to such goals and objectives. The following specific goals and objectives are from the Reserve's 2021–2026 strategic plan. Manifested in this plan is the Reserve's dedication to a strong science-to-management connectivity tying all goals together and driving all the work conducted by staff.

Goal 1: [ECOSYSTEMS] Habitats and species within the Reserve exhibit long-term integrity, function, and biodiversity.

Objective 1.1 Ecological conditions are monitored to understand trends and drivers of change.

Action: Monitor the effects of prescribed fire (For more details, see Appendix B.6 Prescribed Fire Plan).

Fire accomplishes many functions vital to the South Florida ecosystem. This includes influencing the physical and chemical environment; regulation of dry-matter production and accumulation; control of plant species and communities; determining wildlife habitat patterns and populations; influencing insects, parasites, and fungi populations; regulation of the number and kinds of soil organisms; and affecting evapotranspiration patterns and waterflow (Wade et al. 1980). In the presence of a prescribed fire (planned burn) regime, ecosystem health is improved and reestablishes the N-cycle which exists in unavailable forms in the absence of fire. To obtain the optimal results of a prescribed burn (planned burn), the desired ecosystem condition or desired outcome of the fire must be considered. Short and long-term monitoring will determine if post burn conditions have been reached without compromising ecosystem health and sustainability.

Action: Monitor the effects of invasive species control and removal efforts.

Short-term (5-year) actions:

- Currently, invasive plant treatment areas are re-visited 90 days after treatment to determine the efficacy of control measures. Areas that have less than 95% control are re-treated. Treatment units are surveyed roughly every 3–5 years as needed to determine priority treatment areas for funding.
- The Reserve is currently in the process of re-mapping habitats. Information on invasive species density and distribution will be helpful in determining priority areas and species. Furthermore, resource management units should be visited every one to three years to track any changes in invasive species coverage and composition.
- Predation rates of sea turtle nests by invasive species are currently being monitored and management methods are implemented accordingly.

Action: Work with partners to monitor changes. Rookery Bay Reserve is in the process of re-mapping habitats in conjunction with several partners. Habitat maps will include invasive plant species density and composition and can be compared to invasive species densities from previous mapping efforts. The Reserve is also partnering with Conservancy of Southwest Florida in monitoring trends in Burmese Python (*Python bivittatus*) populations and feral Hog (*Sus scrofa*) predation rates on sea turtle nests. On a larger scale, the Reserve is involved in the Southwest Florida Cooperative Invasive Species Management Area (CISMA), a partnership of land managers and shareholders across southwest Florida. The CISMA serves as a platform for sharing information on invasive species, including trends in populations and alerting members to new invasive species in the area. This cooperative monitoring allows land managers to respond more quickly to new invasive species challenges and share best management practices. Future



possibilities include working with the University of Florida and the Southwest Florida Amphibian Monitoring Network to monitor Cane Toad (*Rhinella marina*) populations in and around the Reserve.

Short-term (5-year) actions:

- Visit treatment areas 90 days after treatment to determine success.
- Survey treatment units as needed to determine invasive plant density and treatment need.
- Monitor number of sea turtle eggs and nests predated by invasive animals and coordinate management accordingly.

Long-term (10-year) actions:

- Partner with other stakeholders to monitor trends of priority invasive animals.
- Work with CISMA and other land managers to monitor changes in invasive species populations and exchange information on best management practices for invasive species removal.
- Re-map Reserve habitats, taking note of invasive plant species density and species composition.
- Survey each management unit every 1–3 years for invasive plant species density and composition.
- If possible, partner with the University of Florida and Southwest Florida Amphibian Monitoring Network to monitor Cane Toads within the Reserve development boundary.

Action: Participate in continued monitoring of priority FWC and USFWS species.

Long-term (10-year) actions:

- Staff will work in cooperation with federal and state agencies to protect listed species such as the Florida Manatee, American Crocodile (*Crocodylus acutus*), Gopher Tortoise (*Gopherus polyphemus*), Loggerhead Sea Turtle (*Caretta caretta*) as well as varied species of protected bird species. Rookery Bay Reserve staff have been trained and authorized by USFWS to recover dead and injured manatees and are trained and authorized by FWC and NOAA's National Marine Fishery Service for documenting other mammal species that may strand at the Reserve.
- The Reserve staff have participated in the rescue and recovery of over 100 manatees that were either sick, injured, or dead during the past 25 years, including the 1996 and 2018–2019 red tide mortality events. The Reserve has a strong and ongoing partnership with FWC and will continue to assist as directed and requested by FWC.

Action: Staff and Team OCEAN support monitoring efforts to protect sensitive species. Stewardship staff will partner with Team OCEAN to support and train volunteers in monitoring public access and visitor use.

Long-term (10-year) actions:

- The long-term collection of visitor-use data, and data from related impacts, is crucial to identifying any increase in protections that may be needed for particular habitat areas and species utilizing these habitats. The Critical Wildlife Area designation by FWC, for example, requires extensive data documentation specifying the types and levels of visitor-use impacts to determine whether a particular area is eligible for designation.

Objective 1.2 Habitats are enhanced to support vulnerable species through science-led management activities.

Action: Manage habitats with prescribed fire. Due to fragmentation of pyrogenic communities and suppression of natural fire regimes, there has been a change in the species composition of plants and animals and their diversity. Many plant and animal species have evolved under a regime of habitat disturbance and regrowth (in the case of plants) brought on by periodic fire. Prescribed fire (planned burns) can be one of the most cost effective and versatile tools for land managers. At Rookery Bay Reserve, prescribed fires are used to manage and maintain local and regional diversity of plant and animal communities, which in turn helps increase native faunal diversity in the southwest Florida region as a whole. Prescribed fires also help protect life and property in the urban interface from damage.

Action: Utilize invasive species removal program to manage Reserve habitats. Rookery Bay Reserve staff have been involved in habitat restoration through invasive plant control for over 25 years. Control has been accomplished through staff and volunteer efforts, as well as contractual services using both hand clearing and heavy equipment, depending upon the site conditions.

Due to changes in funding and personnel, most invasive plant management is currently funded through FWC's Invasive Plant Management Section (IPMS). CISMA and student volunteers are also occasionally involved, and Friends of Rookery Bay (FORB) funding is available for smaller projects. In the past, funding and personnel have also been acquired through:

- AmeriCorps volunteers
- USFWS grants
- CARL funds
- NOAA National Marine Fisheries Service grants
- Earthwatch grants
- Department of Corrections work crews
- Mitigation and violation funds
- In-house workdays
- Contributions from private landowners

Currently, in-house projects are limited to small manageable areas, such as the Unit 10 mitigation area and the southern tip of Keewaydin Island, or areas where invasive grasses dominate (e.g., Shell Island Road, Snook Ponds area). FORB funding is used to hire contractors for controlling invasive species in small to medium-sized areas, such as Unit 3A and the "Road to Nowhere." The areas with the greatest infestations and largest areas are generally funded through IPMS contracts.

Rotation intervals between treatments have largely been determined by availability of funding and density of invasive plants in each management unit. The decrease in available funding after the 2008 recession has limited Rookery Bay Reserve's ability to properly control invasive plants in all units, and several units, such as Unit 1/Meli Tract and Unit 32/Cannon Island, have since reverted to their initial invasive species-dominated condition. Further effort must be made into researching grant opportunities. Based on ground observations, a 3- to 4-year rotation between treatments would be ideal. Treatment efforts for the Ten Thousand Islands are coordinated with Ten Thousand Islands National Wildlife Refuge.

Control efforts for invasive animals tend to be smaller scale than efforts for invasive plants due to a current lack of effective management techniques for use in natural areas. Many current techniques, such as the

use of insecticides or rodenticides, were developed for use in greenhouses, ports of entry, and residential areas, and are likely to cause undue damage to native species if used in natural areas. Furthermore, a significant subset of southwest Florida's invasive/exotic animals are largely found in urbanized areas and may not be causing significant damage to the Reserve's habitats. Efforts thus far have focused on larger animals causing significant problems for which effective management strategies have been developed.

Feral Hogs (along with native and naturalized nuisance mammals) are controlled in conjunction with USDA Wildlife Services. Most efforts are concentrated on Keewaydin Island, where significant depredations on sea turtle nests occur. Rookery Bay Reserve is currently exploring the possibility of securing funding to extirpate Hogs within an area bounded by urbanized areas, the Gulf of Mexico, and quality habitat for Florida Panther habitat east of the Reserve.

The Reserve has been partnering with Conservancy of Southwest Florida in ongoing Burmese Python research and management. Pythons are fitted with radio transmitters and the snakes are tracked by biologists. During the breeding season for Burmese Pythons, transmitter-tagged pythons lead biologists to more pythons, which are then removed.

Black Spiny-tailed Iguana control is being conducted on Keewaydin Island in partnership with FWC and several private individuals.

Long-term (10-year) actions:

- Treat invasive plants in upland portions of the Reserve whenever staff and budget constraints allow.
- Manage feral Hogs in partnership with Conservancy of Southwest Florida and USDA Wildlife Services.
- Work with FWC and private individuals to control Black Spinytail Iguana (*Ctenosaura similis*) on Keewaydin Island.
- Explore possibilities for further invasive plant management funding to keep the entire Reserve in maintenance condition.

Short-term (5-year) actions:

- Work with USDA and other stakeholders to remove feral Hogs from areas west of CR-92 (San Marco Road).
- Support Conservancy of Southwest Florida's python research and management on Reserve lands.

Action: Implement natural resource adaptive management protocols that are based on relevant monitoring and research. The Stewardship sector will work with the Research sector to identify questions pertinent to observed habitat and species conditions within Rookery Bay Reserve that are exhibiting signs of stress or degradation. These questions will serve as the basis for the development of research hypotheses that will then drive the formation of research projects and related data collection. Answers from resulting relevant research activities will in-turn guide the formulation of and adaptation of natural resources management actions. Research resources will be leveraged not only from within the Reserve's own staff but also from myriad research partners from universities, NGOs, city and county municipalities, federal agencies, and other state agencies.

Long-term (10-year) actions:

- A Coastal Zone Management funded research project is being conducted by the University of Florida contracted to survey and assess visitor use within Rookery Bay Reserve, and the two associated aquatic preserves, and develop a scientific protocol and assessment tool to determine ongoing visitor use levels.
- Reserve staff are partnering with USGS to monitor assess the effects of changing surface elevations within stressed areas of mangrove forested wetlands.
- Reserve staff are partnering with the Jobos Bay NERR and Florida International University to assess and compare the effects of hurricane events on the resilience of natural resources within each Reserve, as well as, assessing the resilience of each Reserve's local communities.

Action: Coordinate management of disturbance-sensitive species, such as nesting birds, with FWC.

Long-term (10-year) action:

- The Reserve's Stewardship and Research staff are partnering with FWC, Ten Thousand Islands National Wildlife Refuge, National Audubon Society, Florida Audubon, and Conservancy of Southwest Florida. These partnerships ensure the ongoing monitoring and data collection for various species of sea birds and shorebirds, sea turtles, and marine mammals vulnerable to various anthropogenic and natural stressors. These data collection efforts are integral to the development of strategic research efforts and natural resource management actions key to the improvement of environmental conditions stressing vulnerable habitats and species.

Goal 2: [HUMAN CONNECTIONS] Connections among people and resources in the Reserve are understood and enhanced.

Objective 2.1 Cultural resources within the Reserve are identified and conserved.

Action: Search for new sites using existing anecdotal data, aerial imagery, and GIS/LiDAR to locate possible unknown sites. In the short-term, Reserve staff will identify funding and partnering opportunities with the Florida Public Archeological Network, local universities, and other entities to collect comprehensive LiDAR data and aerial imagery to assess for presence of any unidentified cultural sites.

Action: Collect new information about known cultural resources and sites.

Short-term (5-year) actions:

- Identify funding opportunities and submit proposals for funding of currently planned projects to partner with Florida International University.
- Assess geologic and benthic indicators around known Calusa sites in the Ten Thousand Islands and track cultural associations and activities.
- Reserve staff will develop video and digital educational materials to be shared with local archeological and cultural history museums, schools, and the general public.

Action: Update cultural resource assessments as needed (vulnerability, status updates).

Short-term (5-year) actions:

- Review post-Hurricane Irma rapid assessments that were conducted and prioritize needed response actions as related to any sites vulnerable to future hurricane events or to future erosion or degradation.

- Assess the cultural resource sites in any future Reserve-wide comprehensive vulnerability assessments conducted.

Action: Engage with partners to expand knowledge of known and unknown cultural sites throughout the Reserve. The Reserve will search for sources of funding and potential partnerships to explore development of trainable software and modeling tools to create and run models to assess available aerial imagery for the presence of unidentified cultural sites.

Objective 2.2 Natural resources protection is enhanced by improved communications between scientists and stakeholders.

Action: Participate in collaborative working groups to exchange information and provide input regarding the Reserve's watershed. The Reserve will continue working closely with a multitude of partners including serving on various technical advisory groups and other collaborative efforts. The Reserve's involvement focuses on the provision of the Reserve's vast site-based natural resources ecological and biological experience and knowledge to any projects or inquiring entities seeking such specialized knowledge.

Short-term (5-year) actions:

- Comprehensive Everglades Restoration Project: Picayune Strand Restoration Project (Monitoring Advisory Group, RESTORE)
- North Belle Meade Restoration Project (Collier County Comprehensive Watershed Improvement Project)

Action: Engage with partners to explore innovative funding opportunities for the Reserve's habitat restoration projects. In the short- and long-term Reserve staff will generate competitive and innovative proposals and engage with a variety of partners to explore innovative funding opportunities.

Such partners will include:

- o The Friends of Rookery Bay
- o Restore America's Estuaries
- o The Bonefish & Tarpon Trust
- o The Florida Aquatic Preserve Society
- o National Fish and Wildlife Foundation
- o USFWS
- o National Oceanic and Atmospheric Administration (NOAA)
- o Various universities (Florida International University, Florida Gulf Coast University, University of South Florida, University of Central Florida, and others).

Objective 2.3 Southwest Florida communities understand the socioeconomic values of local ecosystems.

Action: Share information regarding the importance of prescribed fire. In the long-term, the Reserve's Stewardship team will work closely with the CTP, Education, the ELC Display Design Team, and RBR PIO to provide up-to-date scientific information and yearly prescribed fire information. With the help of CTP, Stewardship will continue to give educational events and updates for local housing developments surrounding the Reserve, about the Reserve's prescribed fire program.

Goal 3: [RESILIENCE] Strong science-to-management connections ensure that ecosystems and communities across the Gulf of Mexico are resilient and adaptable to environmental changes and episodic events.

Objective 3.1 Communities are engaged through collaborative projects to monitor and manage effects of coastal watershed change.

Short-term (5-year) actions:

- Build partnership with the University of Florida's Archie Carr Center for Sea Turtle Research to identify a funding source to remove tree stumps from the beaches of Keewaydin Island and possibly other islands within the Reserve's boundary. This effort is to remove physical hinderances blocking usage of beach-front habitats to sea turtle nesting activities and enhance said beach-front areas.

Long-term (10-year) actions:

- Seek funding and partnerships to update the existing vegetative-habitat GIS map and the existing submerged resource map for the Reserve. Updating these maps will provide valuable insights into change-trends over time. This effort would also provide guidance toward possible habitat migration trends and related management actions necessary for loss-prevention.
- Seek funding to conduct a Reserve-focused natural resource and built-infrastructure Vulnerability Assessment.

Action: Inform management agencies of Reserve resources via research and social science tools.

Action: Provide input regarding development projects being proposed within the Rookery Bay Reserve watershed.

Objective 3.2 Coastal practitioners use observations of ongoing change to support proactive management actions for future conditions and events.

Action: Collaborate with partners to utilize adaptive management techniques to increase resilience. In the short term, the Reserve will work with the Bonefish & Tarpon Trust to explore possible funding opportunities for which the Bonefish & Tarpon Trust will supply any needed matching funds to get projects to a shovel-ready status. Such funding would allow for project planning, engineering, and permitting. Scopes of work and cost specifications have already been proposed and finalized for the hydrologic assessments, restoration, and wildlife crossings at Marco Shores and at Shell Island Road. Finalized proposals will be submitted to any applicable funding opportunities.

Action: Prioritize management actions based upon sensitivity and vulnerability of habitats and species.

Short-term (5-year) actions:

- Identify partners to determine and assess factors of vulnerability for habitats and species.
- Reserve staff will seek funding opportunities to support the development of an in-depth vulnerability assessment of the Reserve.
- The Reserve will continue to partner with local universities and various other entities that have ongoing efforts assessing vulnerabilities and trends affecting resiliency to ongoing environmental changes such as climate change and sea level rise.

- Identify natural resource habitat restoration projects and seek funding to bring these projects to shovel-ready status (permitting, planning, design, hydro-dynamic modeling, mitigation). For any restoration projects already shovel-ready seek funding for construction.
 - Fruit Farm Creek Mangrove Restoration Project is already shovel-ready with funding in place through the Florida Fish and Wildlife Conservation Commission (FWC). Reserve staff have renewed the permits and this project is now in the construction phase.
 - Seek funding to replace/rebuild the Brigg's boardwalk on Shell Island Road in the Reserve. This visitor access point provides a much-needed interpretive access opportunity to educate visitors about the sensitivity and importance of Florida Scrub habitat.
 - Griffin Road Stormwater Improvement Project: Partner with Collier County to establish an easement or other mechanism (possible land swap) to facilitate the construction of stormwater infrastructure to clean, hold, and spread received area stormwater into the northern part of the Reserve.
 - Identify research needs and habitat restoration/enhancement needs as related to American Crocodiles (especially focus on current active nesting sites).
 - Strengthen partnership with the Naples Botanic Garden including enhancement of ongoing efforts to collect genetic materials (seeds) from protected and/or rare plant species that are not presently well-represented in worldwide botanic garden seed banks.

Long-term (10-year) actions:

- Prioritize natural resource habitat restoration projects not presently at a shovel-ready status and seek funding to bring said projects to shovel-ready status (permitting, planning, design, hydro-dynamic modeling, mitigation). For any restoration projects already shovel-ready, seek funding for construction. After obtaining shovel-ready status, seek full construction funding for said projects and construct once funded.
 - Henderson Creek Flatwoods Hydrologic Restoration and Road Access enhancement Project: This project is in the process of becoming shovel ready. Once this project is shovel ready, seek funding for restoration and construction.
 - Marco Shores Lake Road Hydrologic Restoration Project: Estimates for costs to bring to shovel ready status has been obtained and Reserve staff are seeking funding opportunities and partnerships to get this project off the ground.
 - Shell Island Road Hydrologic Restoration Project: Estimates have been obtained for costs to bring this project to shovel-ready status; Reserve staff are seeking funding opportunities and partnerships to get this project off the ground.
 - Collier Boulevard Hydrologic/Mangrove Restoration Project: Seek funding to bring this project to shovel ready status (permitting, planning, design, hydro-dynamic modeling, mitigation).
 - Identify future sites/habitats suitable for assessment and restoration of related hydrology and habitats. Conduct research to identify and define stress factors and related stress indicators.
 - Assess suitability of installing a back flow preventer at identified locations to increase habitat protection and resiliency against future severe storm events and flooding.
 - Identify and define needs related to the establishment of minimum flows and levels designation (minimal for dry season flows into Henderson Creek) for the Reserve and

pursue an official Water Reservation for Henderson Creek and/or other sites within the Reserve or that feed into the Reserve.

Action: Rookery Bay Reserve will work with local governments and interested partners to develop adaptive and proactive coastal management solutions.

Monitoring and Evaluation Plan Strategies

The NERR System provides a mechanism for addressing scientific and technical aspects of coastal management problems through a comprehensive, interdisciplinary, and coordinated approach. Rookery Bay Reserve's Research and Monitoring Program, including the development of baseline information, forms the basis of this approach. NERR research and monitoring activities are guided by national plans that identify goals, priorities, and implementation strategies for these programs. This approach is used in combination with the education and outreach programs to help ensure the availability of scientific information. This scientific information has long-term, system-wide, consistency and utility for managers and members of the public to use in protecting or improving natural estuarine processes. Additionally, one of the more active and mature outreach and monitoring programs here at Rookery Bay Reserve is the volunteer-based Team OCEAN program that serves to augment and build upon foundation agency staff work and ensures that the Reserve is more comprehensively meeting its mission.

The State of Florida requires a periodic Land Management Review of all state-managed lands. Section 259.036, F.S. requires a periodic on-site review of conservation and recreation lands titled in the name of the Board of Trustees to determine (1) whether the lands are being managed for the purposes for which they were acquired and (2) whether they are being managed in accordance with their land management plan adopted pursuant to Section 259.032, F.S. In cases where the managed areas exceed 1,000 acres (4.0 km²), such a review must be scheduled at least every five years. In conducting this review, a statutorily constructed review team "shall evaluate the extent to which the existing management plan provides sufficient protection to threatened or endangered species, unique or important natural or physical features, geological or hydrological functions, or archaeological features. The review shall also evaluate the extent to which the land is being managed for the purposes for which it was acquired and the degree to which actual management practices, including public access, are in compliance with the adopted management plan."

The land management review teams are coordinated by Florida DEP's Division of State Lands and consist of representatives from Florida DEP's Division of Recreation and Parks, the Florida Forest Service (Florida Department of Agriculture and Consumer Services), FWC, the local government in which the property is located, the Florida DEP district in which the parcel is located, the local soil and water conservation district or jurisdictional water management district, a conservation organization member, and a local private land manager.

Each Land Management Review Report is divided into three sections. Section 1 provides the details of the property being reviewed as well as the overall results of the report. Section 2 provides details of the Field Review, in which the Review Team inspects the results of management actions on the site. Section 3 provides details of the Land Management Plan Review, in which the team determines the extent to which the Management Plan provides for and documents adequate natural and recreational resource protection.

Finally, each report may also contain an appendix that lists individual team member comments. This is a compilation of feedback, concerns, or other thoughts raised by individual team members, but not necessarily indicative of the final consensus reached by the Land Management Review Team.

Rookery Bay Reserve's Land Management Review was conducted in 2019, and the full report can be found in Appendix E.6. The following recommendations resulted from the review:

1. The team commends the staff for tirelessly seeking additional funding opportunities to further the conservation, restoration, and mission of Rookery Bay Reserve.
2. The team commends the staff for their dedicated prescribed fire program despite challenges such as nearby residential areas, smoke-sensitive roads/powerlines, and limited resources.
3. The team commends the staff for continued efforts to enrich the park's resources by fostering community outreach/relationships.
4. The team commends Rookery Bay Reserve staff for their knowledge and consideration of the recommendations set forth in the reports of cultural resource surveys conducted on Reserve lands.

NOAA recently conducted an evaluation of Rookery Bay Reserve's adherence to Section 312(a) of the Coastal Zone Management Act for the period February 2011 to September 2019 (see Appendix E.8 for the full evaluation report).

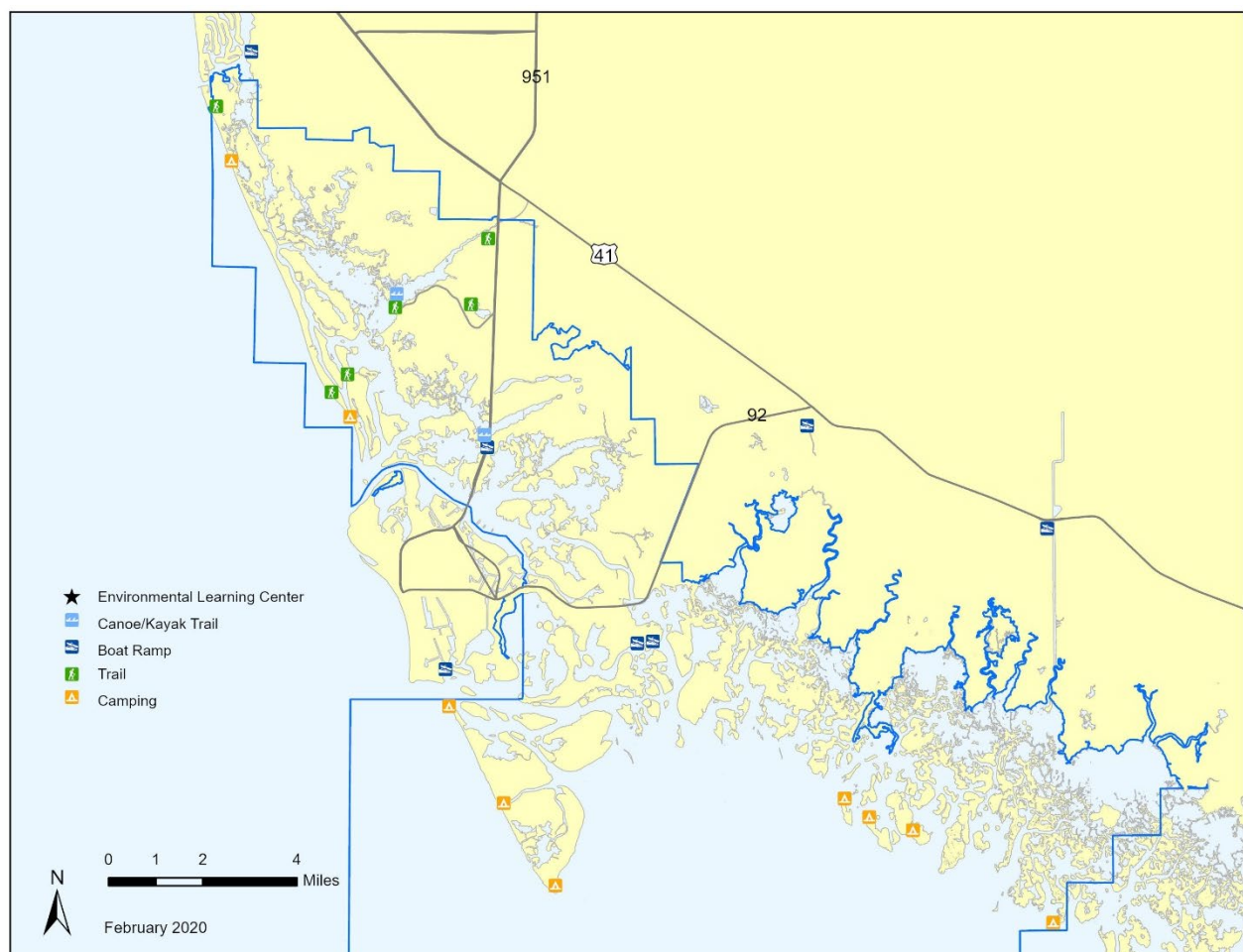


FIGURE 24: PUBLIC ACCESS LOCATIONS WITHIN ROOKERY BAY NATIONAL ESTUARINE RESEARCH RESERVE

Public Access and Visitor Experience Opportunities

As of 2020, Rookery Bay Reserve comprised 110,000 acres (445.2 km²) of state-managed lands and coastal waters. The Reserve is considered the westernmost extension of the Everglades ecosystem and includes large contiguous tracts of pristine mangrove forests and important examples of undeveloped barrier islands. Adjacent coastal communities include Naples and Marco Island.

Key public access points include Rookery Bay Reserve's Environmental Learning Center facility, five public boat ramps, Shell Island Road, and associated hiking trails. The Environmental Learning Center was established in 2004 and is located at 300 Tower Road in Naples. The Environmental Learning Center includes a two-story visitor center, research laboratories, and administrative headquarters. The five public boat ramps are maintained by Collier County (i.e., Collier Boulevard, Goodland, Caxambas Pass, Port of the Islands, and Naples Bay). Figure 24 (above) shows key locations that provide public access to Rookery Bay Reserve.

Access to Rookery Bay Reserve by water is via the inland waterway as far north as Naples and running south around Marco Island to Goodland and the Ten Thousand Islands. Access from the east is via Henderson Creek, Blackwater River, and Faka Union Canal. Entry from the Gulf of Mexico is via Gordon Pass, Hurricane Pass, Big Marco Pass, and Coon Key Pass. There are several marinas and boat ramps that facilitate recreational boat access to the Reserve.

Approximately 10 miles (16 km) south of Naples, major road access to Rookery Bay Reserve includes Interstate 75 to the north and east and U.S. 41 (Tamiami Trail). County Road 951 (Collier Boulevard) divides eastern and western portions of the Reserve as it runs from North Naples to Marco Island. Tower Road, off Collier Boulevard, provides vehicle access to the Reserve's Environmental Learning Center and Headquarters. Shell Island Road provides vehicle access to a field station and fleet operations facility.

Public Access Challenges

Recently observed trends involving visitor use within Rookery Bay Reserve include an increasing frequency of the following activities:

- Overnight camping in all barrier beach habitats within the Reserve, with a significant increase noted in the Ten Thousand Islands including Cape Romano, Kice Island, White Horse Key, and Gullivan Key;
- Large-scale, multi-day sanctioned events on barrier islands involving large numbers of people; the accompanying activities include overnight camping, fires, vendors, concerts, catering, and races;
- Eco-tour boat operations using vessels capable of carrying up to 40 passengers and involving shell-collecting, marine-mammal observing, and wildlife viewing on Keewaydin Island, Cape Romano, and elsewhere in the Ten Thousand Islands;
- Overnight anchoring of sailing and power vessels within the Reserve's waters, often for extended periods of time (e.g., Goodland, Dollar Bay north entrance to Rookery Bay, and Hurricane Pass);
- Use of Keewaydin Island by boaters during holidays and after events such as the annual Great Dock Canoe Race;
- Mortality of wading birds associated with entanglement with monofilament fishing line;
- Feeding and harassment of marine mammals, especially dolphins and manatees.

- Use of helicopters and fixed-wing aircraft for aerial tours of the Reserve, as well as drone use (Florida DEP's drone use policy is in Appendix B.5);
- Unauthorized use of all-terrain vehicles and other off-road vehicles for recreation and poaching of wildlife and plants;
- Vehicle collisions with wildlife on Shell Island Road.
- Increased disturbance of wildlife and bird nesting and resting areas by the public and ecotour operators including photographers.

These trends are expected to continue as the local population increases, requiring a significant expenditure of Rookery Bay Reserve's limited resources to provide for sufficient protection of wildlife and Rookery Bay Reserve's natural resources and to preserve the wilderness experience for visitors. Staff and volunteers continue to note periodic human disturbances at bird nesting or resting areas in the Reserve, although the frequency and intensity of disturbances at the ABC Islands and Rookery Bay CWA's have diminished significantly due to the establishment of FWC Critical Wildlife Areas. Access and recreational use of barrier island beaches within the Reserve, such as at Keewaydin Island and Cape Romano, represent a key economic contribution to the local community. Camping activity by boaters is increasing, including the frequency, number, and duration of overnight campers using beach sites within the Reserve. However, increasing numbers of uneducated visitors can have impacts on wildlife and habitats. Examples and effects of incompatible use associated with intensive beach use by boaters and campers include loss of wildlife from unleashed dogs, impacts to nesting and hatching sea turtles, damage to wetlands and beach habitats by collecting firewood, and the deposition of human waste and trash. There is increasing evidence of human conflicts from cumulative impacts from camping and recreational use.

Public Access Objectives and Actions

Goal 1: [ECOSYSTEMS] Habitats and species within the Reserve exhibit long-term integrity, function, and biodiversity.

Objective 1.1 Ecological conditions are monitored to understand trends and drivers of change.

Action: Stewardship staff and Team OCEAN support monitoring efforts to protect sensitive species.

Stewardship staff will partner with Team OCEAN to support and train volunteers in monitoring public access and visitor use. Data from these monitoring efforts will be used to help assess impacts to environmental conditions within Rookery Bay Reserve. Visitor-use surveys throughout the Reserve will help identify and monitor high-use areas throughout the year to improve how the Reserve manages threatened and endangered species. The Reserve will use adaptive management methods to eliminate, avoid, or reduce potential adverse impacts to these natural resources. Surveys will include several daily, weekly, monthly, and annual surveys from boat, land, and aerial flights. Tools for data collection will include the ArcGIS spatial analytical software extensions Collector and Survey123. Stewardship and Team OCEAN staff will work with local, state, and federal laws to establish appropriate policies for public access and visitor use that ensure protection of important natural and cultural resources. This collaboration will also include conducting visitor outreach efforts to convey use policies and the need for them. Stewardship and Team OCEAN staff will also work cooperatively with partner agencies and law enforcement to provide enforcement. Tasks associated with this goal consist of the following:

- Take an annual inventory of public access sites and signage.
- Install updated signage at public access locations throughout the Reserve as needed.
- Conduct boater-use surveys to monitor boating activities throughout the Reserve.

- Conduct camping surveys throughout the Reserve to identify and monitor public use of lands.
- Install counting systems at Shell Island Road to track vehicle usage.
- Review regulatory policies on concessions within Reserve boundaries.
- Continue monitoring to allow the Reserve to evaluate the progress and, if needed, adaptively adjust strategies to achieve the desired objective.
- Post boundary locations and management regulations and install fencing where possible and appropriate.

Goal 4: [OUTREACH] Value of the coastal environment drives informed stewardship actions.

Objective 4.1 Residents and visitors have a greater awareness of the Reserve and understand how to protect it.

Action: Rookery Bay will develop a permitting system for organized events within the Reserve that may have natural resource impacts or are commercial enterprises. There currently are no specific permitting processes for sanctioned events other than language in Chapter 18-23.007(2), F.A.C. Historically, various large events have manifested organically through social networks by word of mouth and have had no official entity responsible for the planning and logistical management of such gatherings. Such organically manifesting events without central guidance or responsible management have resulted in large social gatherings that posed potential environmental issues stemming from a lack of bathroom facilities and trash receptacles. This lack of facilities can have negative effects on local habitats and protected species surrounding the venue. Additionally, unpermitted and unmanaged large social events may result in unsafe conditions for participants. Rookery Bay has the authority under Chapter 18-23.007 to close areas of the Reserve due to impacts from public use and to protect public safety.

Chapter 18-23, F.A.C., guides management of the Reserve and provides rules that support enforcement of resource protection. Specifically, Chapter 18-23.007, F.A.C., prohibits or limits sanctioned events and delegates Florida DEP as the permitting authority for such events, including sanctioned organized events held within the Reserve. The permitting vehicle, to be termed a “Permit for Sanctioned Events,” will be generated along with guidance language that describes various types of large events that may be permitted to occur within upland areas of the Reserve.

Land Acquisition Plan

Priority Areas Acquisition Strategy

Tract Acquisition Strategy

Rookery Bay Reserve is deemed a ‘substantially complete’ managed area under the Florida Forever land acquisition program. Therefore, acquiring additional lands is a low priority for the State of Florida. However, as inholdings and strategic parcels become available, the Reserve will request that the Division of State Lands consider acquiring such lands. Areas of interest to Rookery Bay Reserve are shown in Figure 25. The Reserve will continue to pursue all possible county, state, and federal fee-simple land acquisition programs for funding as well as less-than-fee programs. The Collier County conservation program, Conservation Collier, seeks to identify, acquire, manage, and transfer ownership of or consolidate properties that support at least two of the following qualities: rare habitat, aquifer recharge, flood control, water quality protection, and (or) listed species habitat. The Reserve has developed a partnership with the Trust for Public Land (TPL) to explore less-than-fee options for strategic conservation. TPL’s Conservation Finance Team advises governments on conservation funding and helps to design, pass, and implement measures that dedicate new public funds toward the acquisition of lands for conservation.

In 1979, the current Division of State Lands was created within the Florida Department of Natural Resources, a predecessor agency to Florida DEP. The same year, the legislature substantially amended Chapter 253, F.S., pertaining to the use and management of state lands and created the Conservation and Recreation Lands (CARL) program to replace the Environmentally Endangered Lands (EEL) program. CARL and its successors were eventually codified in Chapter 259, F.S. 1981 saw the establishment of the Save Our Coast (SOC) program, which augmented the Land Acquisition Trust Fund (LATF) to focus on coastline purchases. CARL eventually subsumed the responsibilities of both SOC and LATF.

The Preservation 2000 Program commenced in 1990 to fund the CARL program and other acquisition initiatives. Preservation 2000 was intended as a 10-year program and was succeeded by the Florida Forever Program at the end of its course. Florida Forever has replaced CARL and continues to provide for the evaluation of land for acquisition and inclusion within the boundaries of Florida's three NERRs. (See Figure 25 for future land acquisition areas and the boundaries of the local lands of the CARL program.)

Fee-simple land acquisition activities, as directed by the six areas of focus listed below, will provide an additional watershed protection to the submerged lands of Rookery Bay Reserve, as well as enhancing the protection of the Reserve's upland natural and cultural resources. The areas of focus for land acquisition, listed below, must be adaptable to changing times. Land costs, land availability, funding availability, and associated requirements are constantly in flux, requiring this land acquisition plan to be flexible. Also, state and federal budget and legislative and policy changes may warrant a need for adaptation.

Therefore, the areas of focus listed below, and spatially shown in Figure 25 as proposed land acquisitions, are open to adjustment as needed and as warranted by changes in any of the above-mentioned factors. Flexibility in adapting to changes within the land market and by government agencies requires that adaptive management techniques be utilized. Additions to the acquisition list may be considered at any time as long as the parcels under consideration meet one or more of the areas of focus listed below. All parcels proposed for acquisition will be subject to NERR System regulations once they are acquired. Acquisition of lands to the Reserve's boundaries encompasses areas that represent either additions to the existing core area or to the buffer zones for key land and water areas.

There are six areas of focus providing aid in directing land acquisition activities:

1. Protection, preservation, and restoration of watershed systems to ensure adequate availability, amount, quality, and timing of water flows within the Reserve's historic watershed.
 - a. Identification and prioritization of parcels crucial for the preservation and (or) restoration of flow-ways and sheetflow necessary for required water conveyance.
2. Protection, preservation, and restoration of natural habitats and species.
3. Fostering of compatibility between built and natural systems.
 - a. Providing compatibility with existing shoreline protection structures such as jetties, T-groins, and hardened shorelines.
 - b. Establishment of urban interface buffer-zones providing for timely and safe land management activities that give protection for natural resources and the human communities they border.
 - c. Identification and prioritization of parcels crucial for the preservation and (or) restoration of wildlife corridors.

4. Sea level rise (SLR) planning for land acquisition in response to habitat shifts and wetland migration.
 - a. Increase community resiliency through the protection of public health and safety from problems associated with coastal hazards affecting community resources (natural and man-made) including shifting shorelines and damage from storms and storm surge.
 - b. Reduce the public financial burden caused by the destruction of, or damage to, coastal property.
 - c. Plan for shifting shorelines and sand formations, and the inland migration of buffering estuaries, and wetland communities.
5. Funding availability plays a large role in the prioritization of land acquisition. The prioritization of funding opportunities may be influenced by multiple factors, which include affordability and special requirements associated with specific funding sources.
 - a. Targeted parcels available at low prices and (or) those under foreclosure or for donation to the State of Florida warrant a higher priority for acquisition.
 - b. Some funding, such as NOAA's Coastal and Estuarine Land Conservation Program, is not available for properties that include one or more structures.
 - c. Price thresholds for purchases require the property cost to fall within a certain price range. The engagement of entities such as TPL requires that they can only help facilitate land purchases that equal at least \$2 million dollars. As a result, entities that own multiple parcels allow for purchases that can meet the requirement for engaging TPL's assistance in acquisitions. Thus, multiple parcels owned by the same entity are given certain priority status for purchase.
6. The presence of culturally important sites on land parcels affords that parcel a higher degree of priority for purchase, especially if the site is threatened by development or erosion.

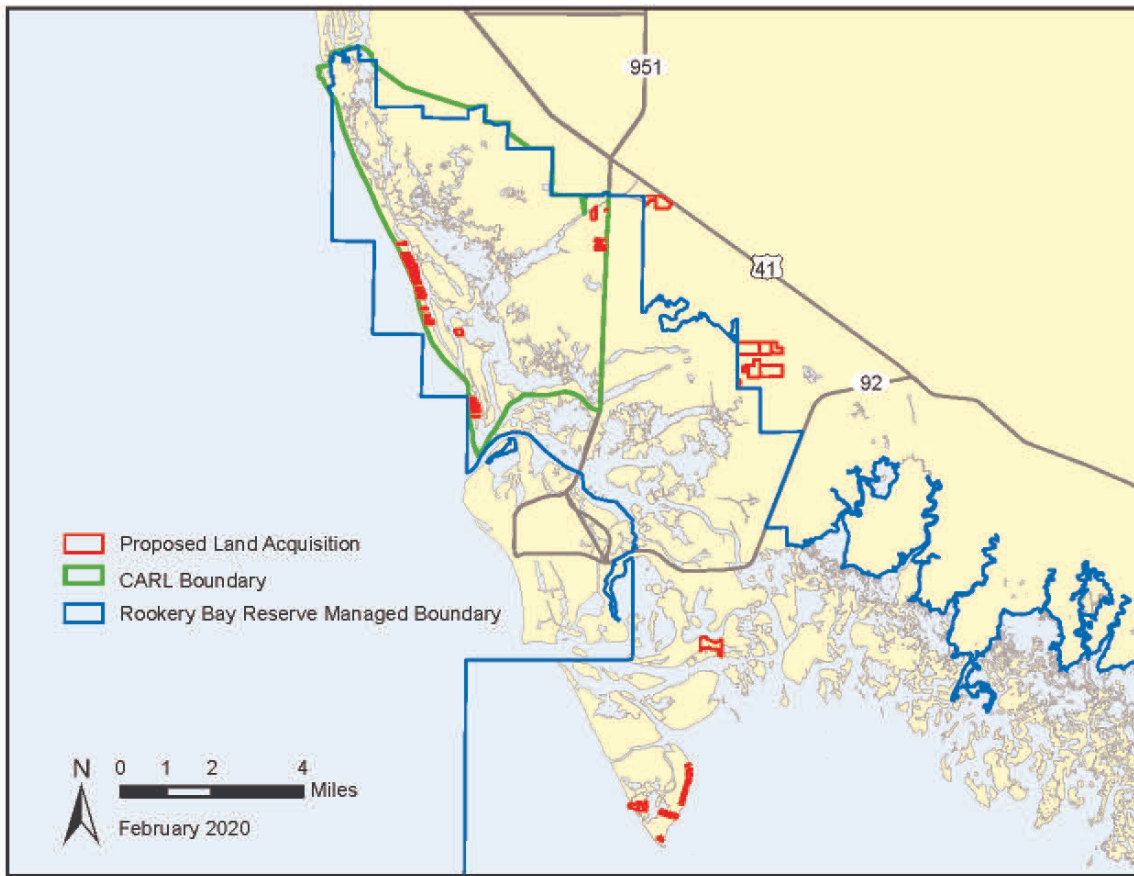


FIGURE 25: PROPOSED FUTURE LAND ACQUISITION AREAS IN AND AROUND ROOKERY BAY NATIONAL ESTUARINE RESEARCH RESERVE

Preferred Methods for Establishing State Control

All lands (uplands and submerged) that are either state-owned or leased to the state and to Rookery Bay Reserve are subject to the enforceable rules under the F.A.C. Because NERRs manage uplands in addition to sovereign submerged lands within aquatic preserves, they must follow the provisions of Chapters 18-2, 18-23, and 18-24, F.A.C. Chapter 18-2 establishes policies concerning use of uplands owned by the Trustees and managed by state entities. Originally codified in 1996, this rule expands upon the guidelines set forth in the Conceptual State Lands Management Plan (see Appendix A.3 for the Conceptual State Lands Management Plan). It requires that uses of uplands be compatible with the public interest and mandates that direct and indirect impacts and cumulative effects be considered as part of the public interest determination. Enforcement of 18-23 is carried out by various law enforcement entities including FWC and Collier County Sheriff's Office and through the enforcement office of the Florida DEP Regulatory South District office. Rookery Bay Reserve staff work closely with these enforcement entities and communicate to them as any resource protection concerns needing attention arise.

Fair Market Value Estimates

Fair market values are subject to a multitude of factors including overall real estate market, local and national economic conditions, presence of wetlands, surrounding land use, appraisals, and planning issues such as zoning. With an ever-fluctuating market, prices are subject to rapid change and, thus, an effort

was not made in this management plan to estimate fair market value for any parcels in this plan. However, before a parcel is proposed for acquisition by the State of Florida or other entity, Florida DEP conducts a review and an appraisal based upon current real estate markets to ensure that such an acquisition would be a wise use of taxpayer funds.

The Florida DEP Division of State Lands supports the land acquisition, disposition, and management activities of the division by contracting with independent appraisers throughout the state for appraisal services. The purpose of these appraisals is to obtain an unbiased opinion of the overall value of the property to be purchased or sold or the values of easements, leases, conservation easements, or special-purpose properties.

The Division of State Lands maintains a list of state-certified appraisers who meet the requirements to perform appraisals for the division and the Board of Trustees of the Internal Improvement Trust Fund (Governor and Cabinet). The Division of State Lands assists in the process of acquiring environmentally sensitive land; obtaining appraisals is a part of the land acquisition process to ensure that market value is reflected in appraisal reports.

Estimated Acquisition Timeline

Since Rookery Bay Reserve is ‘substantially complete’ under Florida Forever, any land acquisition will be opportunistic. The Reserve can accept donations of land and will continue to monitor the market for any potential targeted lands that are offered for sale.

Resource Manipulation Plan

Rookery Bay only conducts direct land management on lands within the ‘core area’ or the official boundary of the Reserve. Rookery Bay does not conduct any land management in ‘buffer zones’ adjacent to the Reserve; therefore, a separate Resource Manipulation Plan was not developed.

Prescribed Fire Plan

Goal 1: [ECOSYSTEMS] Habitats and species within the Reserve exhibit long-term integrity, function, and biodiversity.

Objective 1.1 Ecological conditions are monitored to understand trends and drivers of change.

Action: Prescribed fire (planned burn) effects are monitored. Fire accomplishes many functions vital to the south Florida ecosystem. The functions that fire provides include influencing the physical and chemical environment; regulation of dry-matter production and accumulation; control of plant species and communities; determining wildlife habitat patterns and populations; influencing insects, parasites, and fungi populations; regulation of the number and kinds of soil organisms; and affecting evapotranspiration patterns and waterflow (Wade et al. 1980). Fire exclusion can have a profound effect on soil nutrients. For example, fire exclusion can lead to a change in the amount, distribution, and availability of ecosystem carbon and nutrient pools (especially nitrogen). In the presence of a prescribed fire regime, ecosystem health is improved, and the nitrogen cycle is reset. Nitrogen exists in mostly unavailable forms in the absence of fire. To obtain the optimal results of a prescribed fire, the desired ecosystem condition or desired outcome of the fire must be considered based upon habitat type, natural fire return intervals, fuel loading, and proximity to development (urban interface).

Understanding current ecosystem conditions is important when preparing for a prescribed fire so that optimal burning techniques can be used to achieve desired ecosystem conditions. Short- and long-term

monitoring will determine if post-burn conditions have been reached without compromising ecosystem health and sustainability.

2020–2025 fire-effect monitoring activities include:

- Pre- and post-burn photo points: goal of 6 months and 1 year using Collector for ArcGIS
- Immediate post-burn evaluation, within 1 week
- One-year post-burn evaluation

Habitat mapping and ground-truthing

- Unmanned aerial vehicles (drones) pre- and post-fire flights to determine burn and intensity coverage
- Monthly live-fuel moisture collection
- Vegetation transects

Objective 1.2 Habitats are enhanced to support vulnerable species through science-led management activities.

Action: Use prescribed fire to manage Rookery Bay Reserve habitats.

Long-term (10-year) action:

- Due to fragmentation of pyrogenic communities and suppression of natural fire regimes, there has been a change in flora and fauna species composition and diversity. Many plant and animal species have evolved under a regime of habitat disturbance and regrowth brought on by periodic fire. Prescribed fire can be one of the most cost-effective and versatile tools for land managers. In the Reserve, prescribed fire is used to manage and maintain local and regional diversity of flora and fauna communities. Prescribed fire also protects life and property from damage in the urban interface. Prescribed fire plans are prepared annually based upon natural fire return interval, historical burn record, fuel loading, local weather conditions, invasive plant management, and available resources including equipment and staff from assisting agencies.

Goal 2: [HUMAN CONNECTIONS] Connections among people and resources in the Reserve are understood and enhanced.

Objective 2.3 Southwest Florida communities understand the socioeconomic values of local ecosystems.

Action: Share information regarding the importance of prescribed fire.

Long-term (10-year) action:

- The Stewardship Team will work closely with the CTP, Education, and Communication departments to provide up-to-date scientific information and yearly prescribed fire information. With the help of CTP, the Stewardship Team will continue to conduct educational events and issue updates for local housing developments surrounding Rookery Bay Reserve regarding the prescribed fire program.

Invasive Species Control Plan

Goal 1: [ECOSYSTEMS] Habitats and species within the Reserve exhibit long-term integrity, function, and biodiversity.

Objective 1.1 Ecological conditions are monitored to understand trends and drivers of change.

Action: Effects of invasive plant control and removal efforts are monitored. Currently, invasive plant treatment areas are revisited 90 days after treatment to determine the efficacy of control measures. Areas that have less than 95 percent control are re-treated. Treatment units are surveyed roughly every three to five years as needed to determine priority treatment areas for funding.

Long-term (10-year) actions:

- Visit invasive plant treatment areas 90 days after treatment to determine success.
- Survey treatment units as needed to determine invasive plant density and treatment needs.

Action: Work with partners to monitor changes. Rookery Bay Reserve is in the process of re-mapping habitats in conjunction with several partners. Habitat maps should include invasive plant species density and composition that can be compared to invasive species densities from previous mapping efforts.

Rookery Bay Reserve is also partnering with FWC and Conservancy of Southwest Florida (CSF) in monitoring trends in Burmese Python (*Python bivittatus*) populations as well as with the U.S. Department of Agriculture (USDA) for feral Hog (*Sus scrofa*) predation rates on sea turtle nests and control plans.

On a larger level, Rookery Bay Reserve is involved in the Southwest Florida Cooperative Invasive Species Management Area (CISMA), a partnership of land managers and shareholders across southwest Florida. CISMA serves as a platform for sharing information on invasive species, including trends in populations and alerting members to new invasive species in the area. This cooperative monitoring allows land managers to respond more quickly to new invasive species challenges and to share best management practices.

Short-term (5-year) actions:

- Partner with other stakeholders to monitor trends of priority invasive animals.
- Work with CISMA and other land managers to monitor changes in invasive species populations and exchange information on best management practices for control and removal.
- Monitor the number of sea turtle eggs and nests that are predated and coordinate management accordingly. If possible, partner with the University of Florida (UF) and Southwest Florida Amphibian Monitoring Network to monitor invasive reptile and amphibian populations within the Reserve.

Goal 1: [ECOSYSTEMS] Habitats and species within the Reserve exhibit long-term integrity, function, and biodiversity.

Objective 1.2 Habitats are enhanced to support vulnerable species through science-led management activities.

Action: Utilize invasive species removal program to manage Rookery Bay Reserve habitats. Reserve staff have been involved in habitat restoration through invasive plant control for more than 25 years. Control has been accomplished through staff and volunteer efforts, as well as contractual services using both hand-clearing and heavy equipment, depending upon site conditions.

Most invasive plant management is funded through FWC's Invasive Plant Management Section. CISMA and student volunteers are also occasionally involved, and FORB funding is available for smaller projects. In the past, funding and staff were also acquired through:

- AmeriCorps volunteers
- USFWS grants
- NOAA National Marine Fisheries Service grants
- Department of Corrections work crews
- Mitigation and violation funds
- In-house workdays
- Contributions from private landowners

These efforts are also heavily influenced by local conditions, species treated, rapid response to new species infestations, staffing, funding, access, fire return interval, hurricanes, and other considerations such as hydrologic restoration. Currently, in-house projects are limited to small manageable areas or areas where the dominant invasive species are grasses. The largest areas and areas with the greatest infestations are generally funded through FWC's Invasive Plant Management Section contracts. Rotation intervals between treatments have largely been determined by the availability of funding and the density of invasive plants in each management unit. Based on ground observations, a 3-to 4-year rotation between treatments would be ideal. Treatment efforts for the Ten Thousand Islands are coordinated with the Ten Thousand Islands NWR.

Feral Hogs (along with native and naturalized nuisance mammals) are controlled in conjunction with USDA Wildlife Services. Most efforts are concentrated on Keewaydin Island where significant depredations on sea turtle nests occur. Rookery Bay Reserve is partnering with FORB and USDA to extirpate Hogs within an area bounded by urbanized areas, the Gulf of Mexico, and County Road 92.

Rookery Bay Reserve has been partnering with FWC, the SW Florida CISMA, and CSF in ongoing Burmese Python research and management for over a decade. Reserve staff work with FWC and CISMA to share knowledge and information. The Reserve also provides resources such as, equipment, knowledge, facilities, venues for meetings, and staff-time from the Reserve's Stewardship Coordinator serving on the FWC/UF-led interagency Burmese Python Management planning. A statewide management plan is expected by the end of 2020. Additionally, the Reserve's partnership with CSF continues with support in the form of data, staff assistance when needed, and the sharing of equipment and other resources. The CSF python research team continues their work catching and outfitting specific sex and age classes of pythons with radio transmitters. Some captured Burmese Pythons are tracked in order to learn more about the natural history of this species in south Florida, as well as being tracked as "Sentinel" snakes to lead the team to other snakes for removal from the wild population.

Black Spinytail Iguana control is being conducted on Keewaydin Island in partnership with FWC and several private individuals.

Short-term (5-year) actions:

- Work with FWC and private individuals controlling Black Spinytail Iguanas on Keewaydin Island.
- Work with USDA and other stakeholders to remove feral Hogs from areas west of County Road 92 (San Marco Road).

Long-term (10-year) actions:

- Treat invasive plants in upland portions of the Reserve within staff and budget constraints.

- Manage feral Hog populations in partnership with FWC, CSF, and USDA Wildlife Services.
- Support FWC and CSF's Burmese Python research and management on Reserve lands.

Goal 2: [HUMAN CONNECTIONS] Connections among people and resources in the Reserve are understood and enhanced.

Objective 2.1 Cultural resources within the Reserve are identified and conserved.

Action: Search for new cultural resource sites. This will entail the use of such resources as existing anecdotal data, aerial imagery, and GIS/LiDAR data to locate possible unknown sites.

In addition, effort will be given to actively collect new information about known cultural resources and sites.

Action: Update cultural resource assessments as needed. Cultural resources will be assessed as to their level of vulnerability and their current status (condition).

Action: Engage with partners to expand knowledge of known and unknown cultural sites throughout the Reserve. Such partners may include state and federal agencies, county and city municipalities, and non-governmental entities/non-profits.

Long-term (10-year) action: Work with CISMA and other land managers to monitor changes in invasive species populations and to exchange information on best management practices for invasive species control and, where practical, removal.

Objective 2.2 Natural resources protection is enhanced by improved communications between scientists and stakeholders.

Action: Participate in collaborative working groups to exchange information and provide input regarding the Reserve's watershed. Working groups should encompass multiple partners including state and federal agencies, county and city municipalities, the CISMA partnership of land managers, as well as non-governmental entities/non-profits. Goals should be the identification and sharing of landscape-level watershed hydrologic needs and concerns.

In addition to working groups, Rookery Bay Reserve partners directly with other stakeholders in the region, including Ten Thousand Islands NWR, CSF, and Naples Botanical Garden.

Short-term (5-year) action: Rookery Bay Reserve staff partner with Collier County staff and SFWMD-Big Cypress Basin staff to identify a variety of watershed-related needs involving the timing, amount, and quality of water entering the Reserve's watershed.

Action: Engage with partners to explore innovative funding opportunities for the Reserve's habitat restoration projects. Actively participate in the Southwest Florida Estuarine Restoration Team. Develop partnerships with the goal to facilitate and implement restoration projects that will address identified watershed issues and needs. Also, identify and pursue funding opportunities addressing identified needs.

Short-term (5-year) action: Rookery Bay Reserve staff have identified priority restoration needs and have submitted related one-pagers to be posted and shared by the Southwest Florida Estuarine Restoration Team to aid in finding future funding opportunities.

Objective 2.3 Southwest Florida communities understand the socioeconomic values of local ecosystems.

Action: Share information regarding the importance of prescribed fire and management of invasive/exotic species of plants and animals.

Long-term (10-year) action: Rookery Bay Reserve staff partners with all sectors in the NERR to ensure effective sharing of information regarding prescribed burns as well as the importance of invasive/exotic species control. Stewardship staff work with Education staff to provide information about prescribed burns with adjacent communities as well as their homeowners associations. Stewardship staff also work with Education sector staff to provide current prescribed fire information for Reserve programming and use in local schools' teaching curriculums.

Action: Share information regarding the importance of protecting and enhancing habitats for native species while also sharing reasons why non-native species are injurious and should be controlled and removed.

Long-term (10-year) action: Rookery Bay Reserve staff partner with all sectors in the NERR to ensure the most comprehensive and effective sharing of information regarding the importance of enhancing habitats for native species while also sharing information as to the importance of control measures for invasive/exotic species. Information is shared with adjacent communities and homeowners associations. Stewardship staff work with Education sector staff to provide current and new information related to the Reserve's ongoing efforts to manage invasive/exotic species of flora and fauna.

Goal 3: [RESILIENCE] Strong science-to-management connections ensure that ecosystems and communities all along the coast of the Gulf of Mexico are resilient and adaptable to environmental changes and episodic events.

Objective 3.1 Communities are engaged through collaborative projects to monitor and manage effects of coastal watershed change.

Action: Research and social science tools are used to inform management of Rookery Bay Reserve resources. Invasive species control techniques used at the Reserve are informed by current best management practices. Practices are disseminated by CISMA, UF, USDA, and other organizations. Reserve staff attend CISMA's annual meeting, where scientists present their latest findings on invasive species and new control methods. The Reserve also functions as a living laboratory for ongoing research on Burmese Pythons and Cane Toads. Reserve staff have made several sample plots to determine the efficacy of different treatment methods on invasive plants.

Long-term (10-year) actions:

- Function as a living laboratory for invasive species management and research.
- Keep up to date with the latest science and management techniques through CISMA and other educational and collaborative organizations.

Objective 3.2 Coastal practitioners use observations of ongoing change to support proactive management actions for future conditions and events.

Action: Prioritize management actions based upon sensitivity and vulnerability of habitats and species. While all habitats in Rookery Bay Reserve provide important ecosystem services, protection and restoration activities should begin with species-rich habitats (i.e., tropical/coastal hammocks, swamp

forests, submerged aquatic vegetation, oyster bar, hard bottom, and tidal flat); habitats containing a high proportion of endemic species (scrub and scrubby flatwoods); or habitats in danger of destruction or degradation (shell mounds, beaches, coastal strand, and seagrass beds). The Reserve records observations of listed species for each habitat type, and these data will be updated with future observations. A summary of these observations is included in Appendix B.4.1. The Florida Natural Areas Inventory ranks habitats according to current threats.

Invasive plant management activities occur regularly on Keewaydin Island, scrub habitat along Shell Island Road, and on Sam Williams Island. These and other priority coastal areas are shown in Figure 26. The priority habitats that make these areas important for management are shown in Figure 27. All these areas have high densities of sensitive species and habitats. Rookery Bay Reserve recently completed the removal of invasive plants shading areas of federally threatened American Crocodile nests. While areas of tropical hammock on Cannon Island and Little Marco Island have been treated regularly in the past, changes in grant funding opportunities have meant that these areas are no longer regularly treated.

Feral Hogs (along with other invasive and nuisance mammals) are removed in conjunction with USDA Wildlife Services. Most efforts are concentrated on Keewaydin Island, where significant depredations on sea turtle nests occur. Black Spiny-tail Iguanas are also regularly removed from Keewaydin.

Long-term (10-year) actions:

- Feral Hogs and other predators are removed from areas with high sea turtle nesting activity.
- Black Spiny-tail Iguanas are removed from Keewaydin Island, an area with a high density of sensitive habitats and listed species.
- Keewaydin Island, Shell Island Road, and Sam Williams Island all contain high densities of sensitive habitats, and listed species and are regularly treated for invasive plants.
- Invasive plants are removed from areas of federally threatened American Crocodile nests.

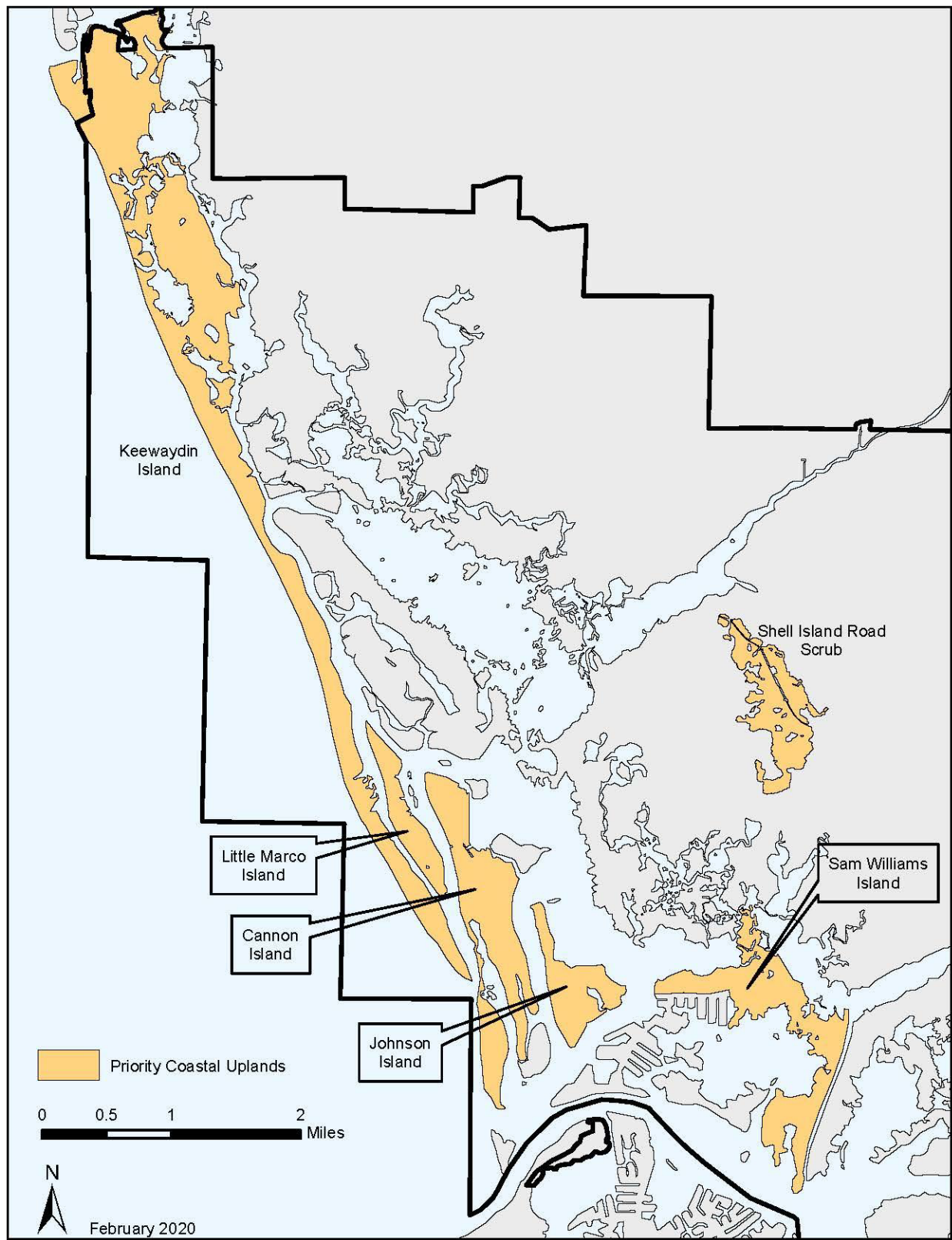


FIGURE 26: PRIORITY COASTAL UPLAND AREAS OF ROOKERY BAY NATIONAL ESTUARINE RESEARCH RESERVE

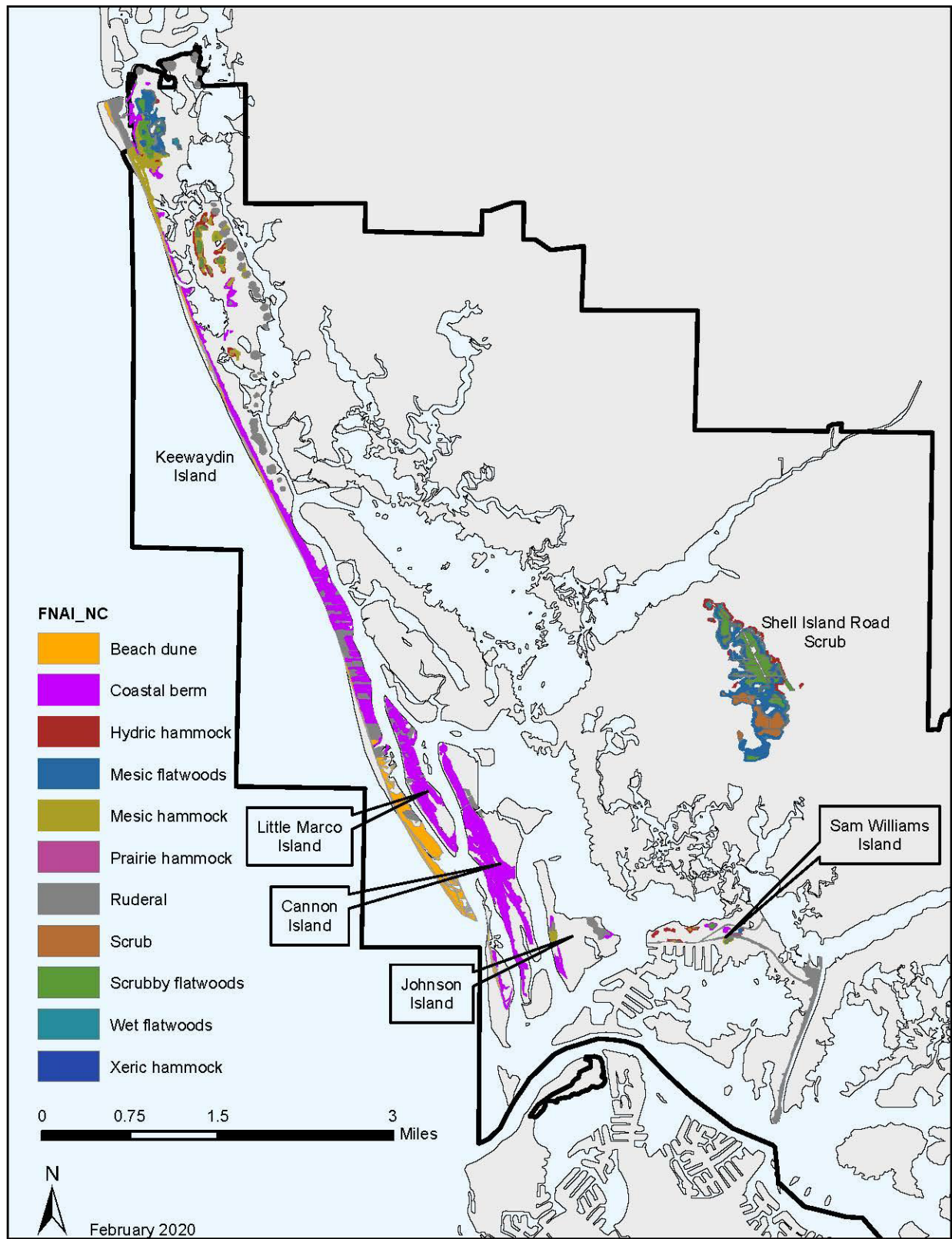


FIGURE 27: PRIORITY COASTAL UPLAND HABITATS OF ROOKERY BAY NATIONAL ESTUARINE RESEARCH RESERVE

Permitting and Approval Requirements

Any activity that includes ground disturbance must first be approved by Florida DEP's Acquisition and Restoration Council as part of the management plan approval process. Any activity, including habitat restoration or manipulation, that dredges or fills-in wetlands or waterbodies is subject to relevant Corps, Florida DEP, and SFWMD permitting requirements. Rookery Bay Reserve shall obtain all necessary permits prior to any habitat restoration activities taking place that may affect wetlands or waterbodies.

All activities that take place involving a state or federally listed or protected species may require approval and specific permitting from USFWS, National Marine Fisheries Service, or FWC. This may include sea turtle nest caging, sea turtle stranding recovery, bird banding and tagging, fish tagging. Before any activities such as these take place, Rookery Bay Reserve shall obtain all necessary permits, and staff tasked with these responsibilities must follow all permitting requirements and maintain any required training or education.

As part of the NOAA Operational Award that Rookery Bay Reserve applies for annually, the NOAA liaison reviews each application to determine compliance with National Environmental Policy Act (NEPA). The NOAA liaison offers feedback on any NEPA requirements and Best Management Practices. The Reserve also follows all Species Conservation Guidelines for listed species as determined by the USFWS and the National Marine Fisheries Service.

Current and Potential Stewardship Partners

- **Florida International University (FIU):** The stewardship program partners with FIU on many areas including survey, research, and management of cultural resources.
- **Florida Gulf Coast University (FGCU):** Rookery Bay Reserve's stewardship coordinator continues to participate with NOAA's Adaptation of Coastal Urban and Natural Ecosystems project when possible.
- **Florida Fish and Wildlife Conservation Commission (FWC):** The stewardship program partners extensively with the local FWC law enforcement regarding visitor-use issues. The program also partners with FWC's Aquatic Habitat Conservation and Restoration Section regarding several funding opportunities. The stewardship program partners with FWC regarding invasive species of flora and fauna and with FWC's Marine Mammal Stranding and Rescue team regarding marine mammal strandings.
- **South Florida Water Management District (SFWMD):** The stewardship program has a strong partnership with SFWMD regarding the planning and implementation of the CERP Picayune Strand Restoration Project. This program also partners closely with the Big Cypress Basin Board regarding surface water management issues affecting Reserve lands and watersheds.
- **U.S. Department of Agriculture (USDA):** The stewardship program has partnered with USDA for control of invasive plants through the introduction of biological control agents as well as working with USDA staff for management of feral Hogs on Reserve land.
- **U.S. Fish and Wildlife Service (USFWS):** The stewardship program regularly partners with USFWS staff involving funding needs through USFWS's Coastal Program. This program also partners extensively with staff of Ten Thousand Islands NWR.

- **Collier County Government:** The stewardship program is partnering with Collier County staff for many projects. Examples include watershed planning and management, watershed hydrologic restoration projects (Belle Meade, County Road 892 [Goodland Drive]), and various stormwater management projects in the northern half of the Reserve.
- **Conservancy of Southwest Florida:** (CSF) The stewardship program has a long and strong partnership with CSF on many projects including invasive species control (Burmese Pythons, Cane Toads, other amphibians and reptiles), Fruit Farm Creek Hydrologic Restoration Project, sea turtle monitoring on Keewaydin Island, nuisance mammal control, SLR and habitat monitoring for change, and Gopher Tortoise (*Gopherus Polyphemus*) monitoring. CSF also provides considerable knowledge and history relating to various local, state, and federal policy issues including those related to the Deltona Settlement Agreement. CSF serves as the initial point of contact for the Deltona Settlement Agreement's five environmental signatories and works closely with all parties to resolve issues when they arise.
- **Coastal Resources Group:** The stewardship program has had a long-standing partnership with the Coastal Resources Group, especially regarding restoration of hydrology to facilitate recovery of dead and dying areas of mangrove forest.
- **U.S. Geological Survey (USGS):** The stewardship program has participated with USGS for many years on projects that involve monitoring for the effects of SLR on water levels, water quality, mangrove forests, general vegetative habitat change and the installation of infrastructure, and planning for the start-up of the Reserve's Sentinel Site Program.
- **National Oceanic and Atmospheric Administration (NOAA):** The stewardship program partners frequently with NOAA in many ways, such as with the Sentinel Site program and habitat mapping and efforts to document changes in habitats. Stewardship also provides certain species monitoring data to NOAA and participates in many programs that provide funding for a variety of projects in the Reserve.
- **Friends of Rookery Bay (FORB):** The stewardship program and FORB continue to partner in many ways to strengthen the Reserve's ability to carry out its mission. This program supplies up-to-date information to FORB on stewardship projects so FORB can better inform and educate the local community. Stewardship also partners with FORB on many grants where FORB serves to receive and manage funding to support the Reserve's natural resource management needs. FORB also raises funds internally from the local community to support various land management projects at the Reserve.
- **UF's Institute of Food and Agricultural Sciences (IFAS):** The stewardship program has partnered in many ways with UF IFAS over the years. UF provides invasive species knowledge and support to the local Collier County IFAS extension agent and Florida Sea Grant staff.
- **Naples Botanical Garden:** The stewardship program is currently partnering with Naples Botanical Garden regarding native plant monitoring, seed collection, and eventual population enhancement of various threatened and endangered plants within the Reserve. Naples Botanical Garden often supports the Reserve by supplying specific knowledge regarding certain native plant species as needed.
- **Cooperative Invasive Species Management Area (CISMA):** The stewardship program has been instrumental in starting the local southwest Florida CISMA. This program partners heavily with

the group regarding a wide variety of issues and projects focusing on the identification, monitoring, and control and eradication of invasive species of flora and fauna.

- **Prescribed Fire Training Center:** The Prescribed Fire Training Center provides much needed yearly support to the Reserve's prescribed fire program. Every year, the Prescribed Fire Training Center provides a team of experienced wildland firefighters to participate in training courses. In turn, Rookery Bay Reserve serves as their classroom. Both groups benefit immensely from this strong long-time partnership that helps the Reserve meet its yearly prescribed fire goals.
- **Audubon Florida and Audubon of the Western Everglades:** These two regionally important conservation organizations partner strongly with Rookery Bay Reserve's stewardship program through provision of staff and time to help with bird species monitoring and related ecological health. They also provide considerable knowledge and history relating to various local, state, and federal policy issues. These Audubon organizations also assist with history and knowledge related to various Deltona Settlement Agreement issues whenever needed.
- **National Park Service:** The stewardship program has had a long-standing strong relationship with Everglades National Park and Big Cypress National Preserve related to prescribed fire and the sharing of resources and knowledge. The Reserve also partners with these agencies on visitor-use issues that affect Reserve land that borders Everglades National Park. Additionally, Everglades National Park has cooperated with the Reserve on various projects related to Burmese Pythons.
- **City of Naples:** The stewardship program has partnered with the City of Naples on many projects ranging from habitat restoration to invasive species management. This program continues to participate in many watershed-wide planning and management projects.
- **City of Marco Island:** The stewardship program continues to partner with the City of Marco Island on a variety of projects and issues including hydrologic restoration, invasive species monitoring and control, and issues surrounding freshwater needs for citizens of the city, as well as the continued health of the Reserve's natural resources.
- **Collier Mosquito Control District:** The stewardship program partners actively with Collier Mosquito Control District for the exchange of knowledge, monitoring for any detrimental effects resulting from mosquito control efforts, and the conducting of scientific projects related to control efforts within the Reserve.
- **Florida Public Archaeology Network:** The stewardship program actively partners with this citizen-based network on a variety of cultural-resource-related projects including use of ground-penetrating radar to assess the status of historic cemetery plots, various archaeological site assessments, mapping, excavation, and research. Partnership projects include post-hurricane assessments of all the Reserve's known historical sites and the provisioning of management recommendations related to possible detrimental effects from storms.
- **U.S. Army Corps of Engineers (Corps):** The stewardship program has partnered actively for decades with the Corps, especially as related to the CERP Picayune Strand Restoration Project. Of course, the regulatory arm of the Corps also provides permits to the Reserve related to a variety of past and ongoing projects.

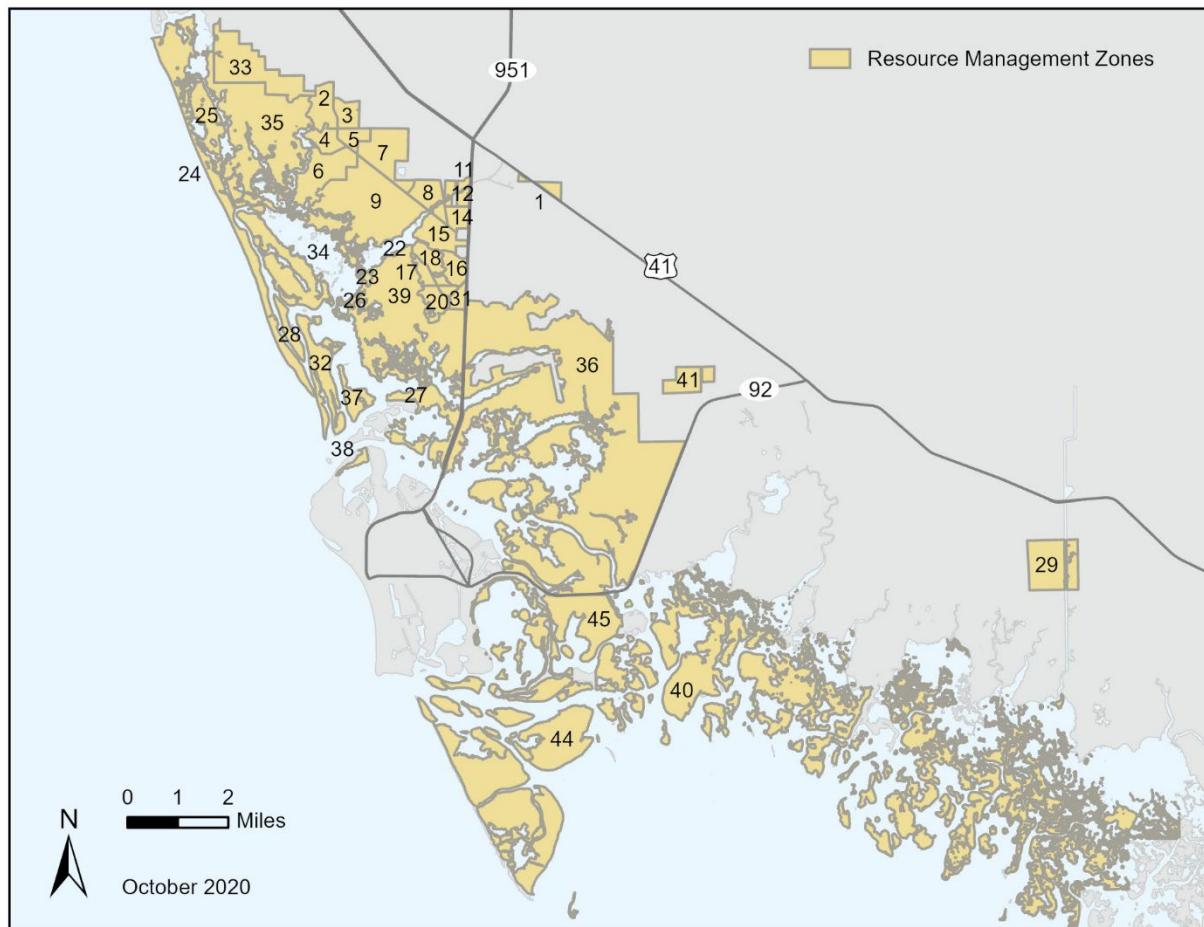


FIGURE 28: RESOURCE MANAGEMENT ZONES OF ROOKERY BAY NATIONAL ESTUARINE RESEARCH RESERVE

(The identification and delineation of Natural Resource Management Zones is critical to Rookery Bay Reserve’s management planning process. These established zones allow for optimized and effective planning, prioritization, and implementation of resource management strategies and actions. Resource Management Zones are areas with defined common characteristics and qualities, for which there are related management needs and expectations for management.)

Impacts of Activities & Monitoring and Evaluation Strategies

When resources are manipulated by human activity, opportunities exist for unintended ecological disturbance. All resource manipulation activities within Rookery Bay Reserve’s Resource Management Zones are closely monitored through a variety of methods to assess intended and unintended consequences that might result from resource manipulation and research activities. These Resource Management Zones are shown in Figure 28 above. These zones allow the Reserve to combine invasive plant control and prescribed fire rotations for integrated pest management. Monitoring efforts allow corrective actions and therefore ensure that key Reserve resources are protected. The Reserve currently has no plans for expanding the core area. Monitoring methods include:

- GIS habitat mapping and ground-truthing (for upland and submerged resources).
- Photo points strategically placed within the Reserve’s Resource Management Zones.
- Drone aerial imagery using multiple spectral capabilities to assess pre- and post-restoration changes.

- System-Wide Monitoring Program infrastructure assessing water quality.
- Sentinel Site Infrastructure assessing accretion/erosion processes as related to habitat change data from vegetation plots.
- Hydrologic modeling assessing pre- and post-restoration hydrologic conditions.
- Sediment coring and sampling to assess water and organic content. Lead-210 and cesium-137 isotopic analysis to determine sediment decay rates.
- Acoustic tagging and sensors to provide automated tracking of migrating and moving fish populations to assess population dynamics and habitat usage.
- Installation of Motus wildlife automated telemetry array tracking system infrastructure to take part in hemispheric studies of migrating species of birds, bats, and other small flighted migratory wildlife.

Restoration Plan

Goal 3: [RESILIENCE] Strong science-to-management connections ensure that ecosystems and communities along the coast of the Gulf of Mexico are resilient and adaptable to environmental changes and episodic events.

Objective 3.2 Coastal practitioners use observations of ongoing change to support proactive management actions for future conditions and events.

Action: Prioritize management actions based upon sensitivity and vulnerability of habitats and species

Action: Rookery Bay Reserve will partner with government and non-government agencies and interested partners to develop adaptive and proactive coastal and sediment management approaches. This will include areas in and adjacent to the Reserve including Sand Dollar Island and Tigertail Beach and the lagoon on Marco Island. These actions will support, restore, and maintain important habitats that are key to multiple life stages of imperiled species such as certain species of beach-nesting birds.

Prioritization Process and Criteria

Priority has been given to larger sites in habitats that perform vital ecosystem services where funding is readily available. Larger contiguous areas of land and water receive priority status due to system integrity vulnerabilities. Restoration of larger ecologically stressed areas of land and water provide greater ecological stability, from a systems perspective, than adjacent and nearby smaller areas that may also be vulnerable and stressed for varying reasons. Priority is also given to areas of land and water with ecosystems that provide vital services such as filtration, soil stability, and protection from disastrous storm (hurricane) activity such as wind and tidal surge and inundation. Rookery Bay Reserve will manage related ecotones through prescribed fire and invasive species control to preserve and enhance wildlife habitat value.

Priority Restoration Projects

Restoration areas within Rookery Bay Reserve (shown in Figure 29) denote specific habitats that are targeted for individual restoration project activities tailored to address specific habitat restoration needs. Those habitat types having a broader systems-wide effect on overall biodiversity will be targeted for restoration. It is important to note that the restoration target condition for any habitat is not to restore to a pre-existing pristine state. This is because all areas within the Reserve have been anthropogenically impacted and changed to a point that a “pristine” condition is not attainable. Instead, the objective of

habitat restoration at the Reserve is to return the majority of natural functions to a given habitat where such functions had previously been lost or degraded.

Priority Habitats: The habitat types chosen to be priority are those habitats that are particularly rare and (or) more vulnerable to natural forces such as SLR (saltwater intrusion, erosion, episodic storm events), as well as anthropogenic forces like roads, dredge and fill, and changes resulting from landscape-level hydrologic restorations. Additionally, areas are also prioritized if they are home to threatened or endangered species of flora (such as certain species of tillandsias and orchids) or fauna (especially keystone species such as Gopher Tortoise).

- Priority habitat types are:
 - Cypress strand and freshwater swamp
 - Mangrove forest
 - Florida scrub
 - Tropical hardwood hammock
 - Shell-mound

Restoration Projects

Fruit Farm Creek: The top restoration priority for Rookery Bay Reserve is a large mangrove die-off area immediately south of Fruit Farm Creek and County Road 92 (San Marco Road) on Marco Island (see Figure 29 below). The area consists of three die-off areas totaling 64 acres (0.26 km²) and an additional 159 acres of degraded mangroves. Previously a black mangrove (*Avicennia germinans*) forest, the die-off sites are now largely muck with a few snags and degraded areas are visibly stressed. Construction of San Marco Road restricted the natural tidal flushing of the area, leading to mangrove stress and death. Construction has started to install culverts and ditches to restore natural tidal flushing to the area. Previous experiences with similar projects have shown that restoration of tidal flushing is sufficient for natural mangrove recruitment and recolonization of a degraded area. The die-off areas will be monitored for mangrove recruitment after installation of culverts. Rookery Bay Reserve has partnered with FWC and the City of Marco Island for this project. In 2021, FWC contracted with a firm to begin restoration of the interior creeks. By the end of 2022, the City of Marco Island anticipates installing the culverts under San Marco Road.

Griffin Road (Unit 7E): This is a former agricultural field that has since become overgrown with Brazilian pepper (*Schinus terebinthifolia*) and other invasive plants. Testing has revealed the presence of significant concentrations of heavy metals in the soil, making restoration to pine flatwoods problematic. Rookery Bay Reserve and Collier County are currently planning to convert a portion of the 43-acre (0.17 km²) site into a stormwater treatment area.

Henderson Creek Hydrologic Restoration Project: Rookery Bay Reserve is consulting with FWC's Aquatic Habitat Conservation and Restoration Section on rerouting Trash Road (Units 7 and 8) to restore the natural sheetflow to these units. Modeling has shown that Trash Road acts as a flow-way for water during the wet season, altering the amount and timing of water delivered to the surrounding wet flatwoods and marshes. The proposed restoration is named the Henderson Creek Flatwoods Hydrologic Restoration Project. Current plans include rerouting Trash Road along an existing berm and filling in the old footprint of the road, thus restoring the natural sheetflow of the area. Since the berm for the new road is along the Reserve's boundary with an adjacent development, the road would no longer be impacting sheet flow

between natural areas. Rookery Bay Reserve has received funding for Phase 1 of this project which including modeling, engineering, design and permitting.

Powerline Road: Associated with the Trash Road restoration project is the widening and fortifying of several low-water crossings along the adjacent Powerline Road. Since Powerline Road is on a grade, it acts as a block for water flowing into the nearby marshes from housing developments to the north. There are currently seven low-water crossings on the grade, but they are too small for the amount of water in the marshes. As new housing developments are built, new stormwater outflows into Rookery Bay Reserve will exacerbate this problem. Proposed changes include widening several of the crossings and replacing the existing gravel and geoweb substrate with a sturdier concrete honeycomb structure. Staff will note any changes to the surrounding marshes over the course of this project. Rookery Bay Reserve has received funding for Phase 1 of this project which including modeling, engineering, design and permitting.

Cannon, Sea Oat, and Dickmans islands: Several areas of Rookery Bay Reserve require large-scale invasive plant removal and possible replanting with native species. Dickmans Island, Cannon Island, and Sea Oat Island are heavily infested with mature Australian pine. The 11-acre (0.04-km²) bar connecting Cannon and Sea Oat islands has formed since the last property survey of the area and is still considered water by the Collier County Property Appraiser. Until Florida DEP can obtain a clear title to the area, restoration activities cannot begin. Dickmans Island, just south of Marco Island, is ringed by about 13 acres (0.05 km²) of mature Australian pine. Both of these areas will require a large-scale invasive plant treatment operation similar to that of the Keewaydin restoration project of 1998. With proper treatment of invasive plants (possibly combined with the replanting of native species), these two areas would revert to dune and coastal strand habitat. A possible funding source is FWC's Invasive Plant Management Section.

Marco Shores Lake Hydrologic Restoration Project: The man-made Marco Shores Lake (also known as Lake Marco Shores) is located on the north side of Mainsail Drive and runs along the entire length of the road, between Collier Boulevard (State Road 951) and Marco Island Executive Airport. On the eastern side of the airport tarmac is the Road-to-Nowhere. The purpose of this proposed project is to restore tidal connection to the Marco Shores Lake system and to allow Common Snook (*Centropomus undecimalis*), Tarpon (*Megalops atlanticus*), and other recreationally and commercially important fishes access to nursery habitat in this lake system during the rainy season. This project would also reconnect the lake to other more tidally active water bodies to the east beyond the north end barrier of the airport tarmac and along the Road-to-Nowhere. Additionally, installing a series of culverts or low-water-crossings along the Road-to-Nowhere would also restore a more natural tidal connection to both the north and south sides of this road and would enhance the connectivity of this hydrologic system as a whole. As climate change and sea level rise affect all estuarine areas, the resiliency of these systems to bounce back and adapt to these effects depends on the health of these systems. This proposed project will greatly improve the health and integrity of this area and increase not only the resilience of the natural resources but also the local community and its inhabitants. Rookery Bay Reserve has partnered with Bonefish Tarpon Trust (BTT) for this project. In 2021, BTT received funding from the National Fish and Wildlife Foundation for Phase 1 of this project.

Collier Boulevard Hydrologic Restoration & Wildlife Access Project: Estuarine and forested coastal freshwater wetlands were bisected by a roadway and road right-of-way before this area was purchased by the State of Florida and later coming under the management of Rookery Bay Reserve. The roadway and right-of-way comprise a major access route to Marco Island from Naples and other nearby communities. The roadway has blocked natural sheetflow and altered the hydrology of the forested wetland that existed decades ago before this road was constructed. Current hydrological and habitat

conditions are altered, and local mangrove forested habitats are under varying levels of stress. Hydrological modeling, as part of the engineering and design for this project, will determine to what extent hydrologic flow through existing culverts needs to be expanded and if additional culverts or raised (bridged) road expanses are needed. This proposed project would restore historic tidal regimes and connectivity to hundreds of acres of estuarine habitats on the west and east sides of Collier Boulevard between Henderson Creek and the S.S. Jolley Bridge connecting the area to Marco Island by the installation of multiple culverts along this stretch of road. This project would also include breaches or gaps, in the form of broad crested weirs along an abandoned railroad grade to accept and redirect point-source discharges to spreader swales. Elevated lichen lines indicate that the berm is seasonally breached with two to six inches of water along the length of the berm. The berm could be re-shaped to allow a better discharge pattern. The only existing breach in the berm is a 30-foot-wide excavated area west of the City of Marco Island's Reclaimed Water Production Facility.

Shell Island Road Hydrologic Restoration: Shell Island Road acts as a dam, impacting regular tidal cycles to local mangrove forests. To restore natural tidal regimes, additional double culverts are needed as well as the bridging of multiple sections of road, totaling 1.5 miles (2.4 km). The road itself also requires upgraded paving to a permeable surface and the additional construction of elevated wildlife crossings to provide safe-travel access for terrestrial wildlife in all upland areas, especially where scrub habitat harbors such protected species as Gopher Tortoise and Eastern Indigo Snake (*Drymarchon couperi*). As climate change and sea level rise affect all estuarine areas, the resiliency of these systems to bounce back and adapt to these effects depends on the health of these systems. This proposed project will greatly improve the health and integrity of this area and increase not only the resilience of the natural resources but also the wetland and upland areas of the Reserve. Rookery Bay Reserve has partnered with Bonefish Tarpon Trust (BTT) for this project. In 2021, BTT received funding from the National Fish and Wildlife Foundation for Phase 1 of this project.

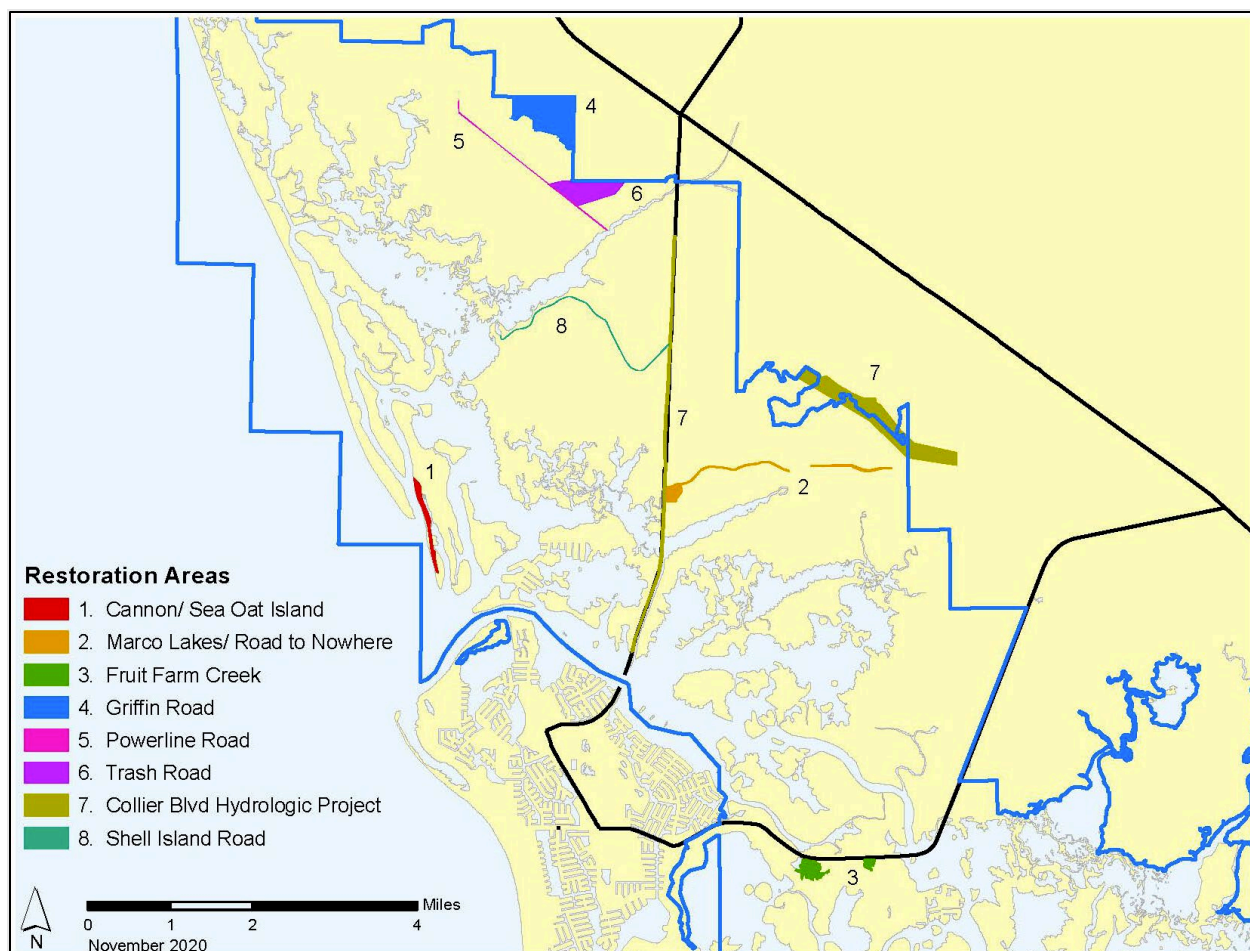


FIGURE 29: AREAS PLANNED FOR HABITAT RESTORATION AT ROOKERY BAY NATIONAL ESTUARINE RESEARCH RESERVE

CHAPTER 11.

FACILITIES PLAN AND CONSTRUCTION



Ten Thousand Islands Field Station at Goodland

The Facilities Team at Rookery Bay National Estuarine Research Reserve provides facilities and infrastructure support for staff, interns, visiting scientists, and the public to effectively implement its Research and Monitoring, Stewardship, Education, Outreach, and Coastal Training Program strategies. Rookery Bay Reserve is recognized as a regional center of excellence for innovative expertise in coastal natural resource management and conservation, research, monitoring and education, and advocacy of coastal stewardship through ecologically sensitive planning and construction of new or remodeled facilities. Locations of Rookery Bay Reserve facilities are shown in Figure 30 below.

The following describes existing facilities and proposed construction projects for Rookery Bay Reserve through fiscal year 2030.

Existing Facilities

Rookery Bay Reserve completed a Master Facilities Plan in 1996 with funding from the National Oceanic and Atmospheric Administration (NOAA).

1. The Administration Building was completed in 1996 and currently provides office space for the Reserve's director, administration, Coastal Training Program, Communications, Facilities, and Resource Management staff.
2. The Environmental Learning Center was completed in 2004 and is a two-story visitor center with four research laboratories, two classrooms, an auditorium, and office space for the Program manager, Education, Friends of Rookery Bay (the Reserve's Citizen Support Organization), Research, and Visitor Services staff. Future plans for the Environmental Learning Center are listed in Planned Facilities section below.
3. Reserve Field Stations:
 - a. The Shell Island Road laboratory building, which originally served as Rookery Bay Reserve's headquarters, is a 1,500-square-foot building completed in 1982. This building is five miles (8 km) southwest of the current headquarters and includes a classroom, a laboratory, and office space. Future plans include retrofitting the existing dock, adding at least two boat lifts, and adding a floating extension that will facilitate expanding research and education needs.
 - b. The Shell Island Road dormitory is a modular building added to this site in 1990 using NOAA funds. The building originally provided office space and a small classroom, but upon completion of the Environmental Learning Center in 2004 was renovated to provide four bedrooms and one bathroom to host up to 10 visiting investigators, interns, fire crew members, and other individuals working for the benefit of the Reserve. The lower level of the dormitory is a screened-in outdoor classroom that was renovated in 2018.
 - c. The Shell Island Road pole barn is a fenced-in compound for vessel maintenance and storage.
 - d. The Shell Island Road dock provides wet slips for the Reserve's vessels, a platform for water quality monitoring equipment, and educational opportunities for students conducting various water quality experiments.
 - e. The Briggs Center, located on state lands on Shell Island Road, was established in 1982 by the Conservancy of Southwest Florida (CSF). The building was recently donated to the Florida Fish and Wildlife Conservation Commission (FWC) and now serves as a field office for 21 marine law enforcement officers.

- f. The Ten Thousand Islands Field Station (also called the Goodland Field Station) was built in 1964 as a bridge tender's cottage and was acquired by the Florida Department of Environmental Protection (DEP) in 1985 as part of the Deltona settlement Agreement. The main building was demolished and rebuilt in 2021. This field station serves as a dormitory with three bedrooms and three bathrooms and can house up to eight visiting investigators and (or) interns. The field station is located just outside the small community of Goodland, approximately 10 miles (16 km) from Rookery Bay Reserve headquarters. The field station provides ready access to Cape Romano-Ten Thousand Islands Aquatic Preserve. A dock extension was completed in 2010 to allow increased boating operations.
 - g. The Cannon Island Field Station is on a barrier island and was acquired by the State of Florida in 1988 through Conservation and Recreation Lands (CARL) program funds. The existing three-bedroom house was previously renovated by Reserve staff with federal grant funds to establish a biological field station for use by Reserve staff, visiting investigators, and educational groups. In 2008, staffing levels at the Reserve were reduced in response to the recession, and the field station fell into disrepair. It is currently unoccupied and unusable.
4. Shell Island Road is a 3-mile-long (4.8-km-long) paved road providing vehicle access to Rookery Bay Reserve, FWC's field office, and the Shell Island Road Field Station. To enhance tidal flushing and sheetflow, 13 culverts and hydrologic restoration improvements were completed in 2009 through a partnership with Collier County and the U.S. Fish and Wildlife Service (USFWS). The road will require culvert maintenance and resurfacing within the next five years.
 5. The remains of the old Dearholt Facility, consisting of a dilapidated building and dock, are located at the west end of Shell Island Road, near Catclaw Lagoon. These structures are owned by CSF. The facility is adjacent to a gradual slope of submerged land at Catclaw Lagoon (where trespassing is currently not allowed) that, if managed by the Reserve, could be used by the public as a primitive boat launch to Rookery Bay. The Reserve has been working with CSF for several years to establish an agreement to transfer management of the building and dock, and the adjacent area of Catclaw Lagoon, from CSF to the Reserve.
 6. The Henderson Creek interpretive trails and boardwalk provide important opportunities for visitors to observe examples of important habitats within Rookery Bay Reserve, including mangrove wetlands, pine forests, and coastal scrub. Located across Henderson Creek from the Environmental Learning Center, the trails and boardwalk represent the second phase of the pedestrian bridge project that was completed in 2009.
 7. The pole barn storage facility adjacent to the Environmental Learning Center on Tower Road supports stewardship programs and facility maintenance needs.
 8. Capri Paddlecraft Park (a Tarpon Bay public access site) is at the corner of County Road 951 (Collier Boulevard) and County Road 952 (Capri Boulevard). A hydrologic and mangrove restoration project was completed in this area and it is now also a public recreation and educational area with a canoe/kayak launch on McIlvane Bay. This facility includes a parking area, covered pavilions, restrooms, interpretive kiosks, and other amenities. Future plans for this site include the installation of facilities for paddle sports rentals, guided tours, and information kiosks. This park is managed by Collier County. The Reserve will explore subleases to enhance ecotour activities without impacting wildlife or habitats or increasing intensity of use.

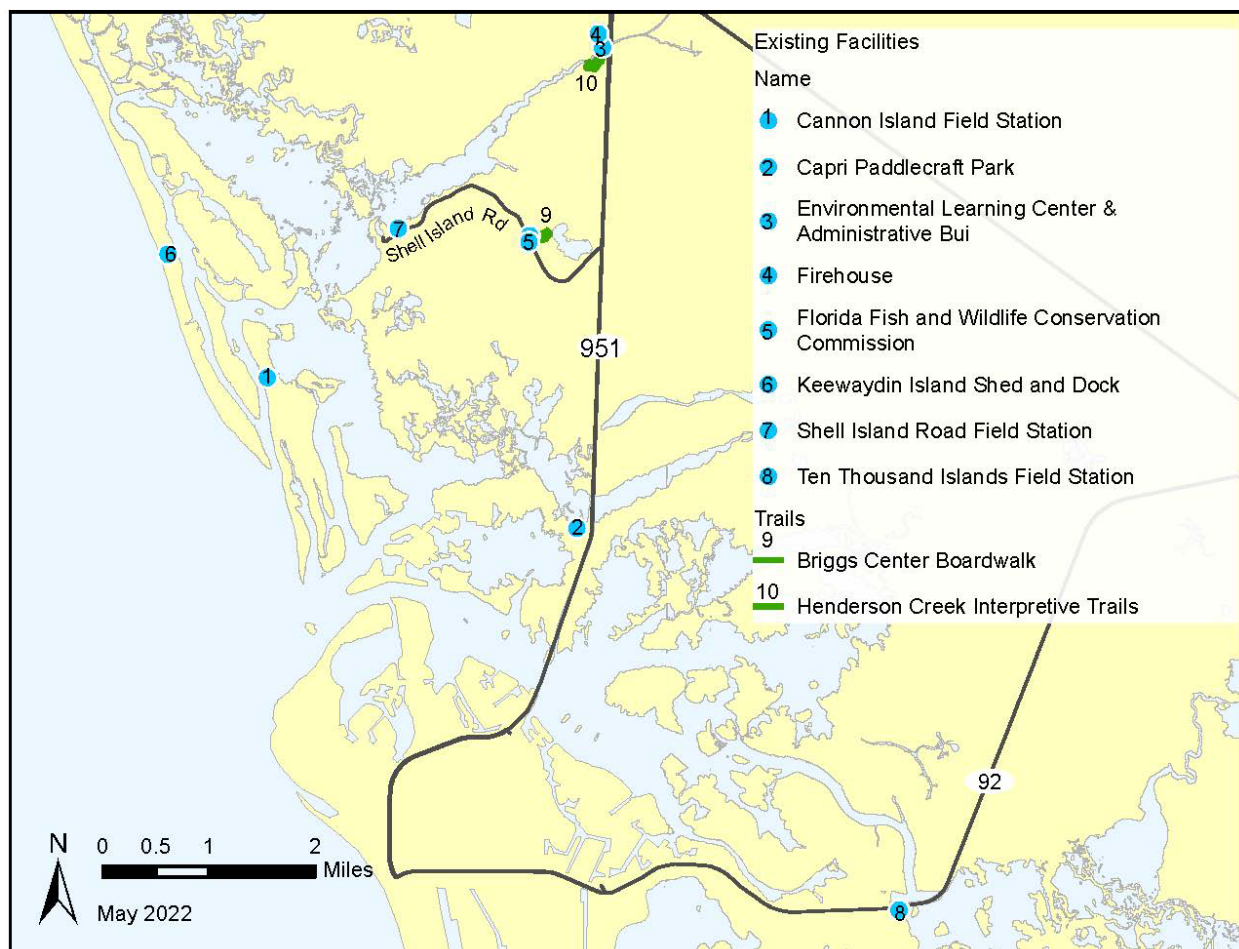


FIGURE 30: FACILITY LOCATIONS AT ROOKERY BAY NATIONAL ESTUARINE RESEARCH RESERVE

Facility Challenges and Gaps

1. In August 2013, a visioning workshop provided the opportunity for reserve staff and design professionals to collaborate on ideas to improve the use of available space in the Environmental Learning Center (ELC). The results of this effort are planning sketches that could serve as the foundation for renovating portions of the ELC to provide improved flow for admission ticketing, better space utilization for the gift shop, and a refresh of the exhibits. Subsequent brainstorming sessions have identified the need for additional office spaces, additional classrooms with updated audio, video, and lighting (AVL) and other technology, storage, and parking. The Reserve has increasing numbers of visitors and needs to add both staff and space to accommodate them to enhance the visitor experience at Rookery Bay Research Reserve.
2. The Reserve headquarters parking lot is difficult to navigate due to its layout and limited number of spaces. It is also difficult for the public to make their way through the parking lot safely since there are no designated walkways.
3. The Administration Building and ELC were constructed in 1996 and 2000, respectively. They are aging and, while the need to replace them within the next 10 years is not anticipated, the cost and personnel requirements for preventative maintenance will increase. Renovation projects are

required to ensure the Reserve realizes the full lifespan of the buildings and reaps the best possible return on investment.

4. In March 2019, Rookery Bay facilities were audited by a Bureau of Design and Construction Senior Architect to determine ADA compliance. An ADA transition plan has been developed for Rookery Bay which includes the following elements, which the Reserve anticipate completing, contingent upon funding, over the next five years:
 - a. The facility has five parking spaces labeled ADA out of a total of 101 spaces. Only two of the five spaces have access aisles that lead to a walkway to the building. The remaining three spaces are sized appropriately but need the access aisle adjacent to the space and need to connect to the walkway to the building.
 - b. The main counter at the front lobby is 38 inches high. Sales and service counters can be a maximum of 36 inches high, although check-writing surfaces should be no more than 34 inches high.
 - c. Access to the restrooms from the main lobby area was more restrictive than the Standards specify, as was the entry from the rear patio. Clearance between the privacy wall and opposite wall should be 48 inches. The primary entry had a 35-inch clearance, and the rear entry had clearances of 41 and 42 inches at areas that should have had 48 inches of clearance.
 - d. The threshold from the exhibits area to the rear patio was 1.5 inches high instead of the 0.5-inch height that is required. A floor mat currently helps make up that difference.
 - e. The door to the conference room adjacent to the lobby has only 31 inches of clearance instead of the 33 inches required.
 - f. The restrooms in the administration building have restricted access of 43 inches from the door to the screen wall instead of the required 48 inches.
5. In conjunction with renovations and improvements, solar power and other green infrastructure practices should be utilized. While these technologies are known to provide cost savings and a reduced carbon footprint, the upfront costs are usually more than standard building technologies. Funding dictates the method for projects and does not adequately consider return on investment or carbon footprint. This is a known gap in renovating existing and developing new facilities.

The acoustic properties of the ELC mezzanine and exhibit hall are such that sound from both spaces moves to the other space, rendering them loud and difficult to use. Sound engineering is required to evaluate the space and provide a solution to reduce sound interference between spaces

6. The AVL technologies in the ELC are dated and some components no longer function properly. Replacements and upgrades are needed to keep pace with modern technology. This would enhance the experience of visitors and staff in the auditorium.
7. The Shell Island Road Laboratory building was the original headquarters for the Reserve and was replaced by the current Administration Building and ELC. When the Shell Island Laboratory location was eliminated as Reserve headquarters, the telephone service was abandoned. But use of this facility continues and is increasing. This location currently has no phone or internet

connectivity. Providing high-speed internet would increase utility of this location by staff and visiting investigators.

Planned Facilities

Over the years, the Reserve has experienced large storm events, the impacts of sea level rise, and other environmental changes. As a result, all planned renovation and construction projects will, at their core, focus on increasing resilience for the built environment while utilizing sustainable materials and energy-efficient design.

1. Climate and Non-climate Stressors

a. Climate Stressors

- i. Climate change, sea-level rise, increased hurricane frequency and intensity, and storm surge.
- ii. All existing Reserve facilities are located appropriately for the Reserve's mission but are in close proximity to the water. The harsh conditions of saltwater exposure, heat, humidity, and rain take a toll, so consistent preventative maintenance is critical. Also, with the facilities in such close proximity to water, the Reserve's lack of dry floodproofing is an identified stressor.
- iii. Building codes have changed since construction of Reserve facilities and knowing there are more stringent codes meant to safeguard the structures is a stressor when faced with increased frequency and intensity of storms.

b. Non-climate Stressors

- i. Increasing visitation to the ELC as well as increased need and demand for the Reserve as a venue for workshops, conferences, and training places pressure on facilities management.
- ii. The novel coronavirus (SARS-COV-2) pandemic of 2020 has challenged operation of HVAC systems to maintain indoor air quality. This HVAC equipment is not designed to filter virus particles at the levels that may become future HVAC standards.

2. Facility Descriptions

a. Ten Thousand Islands Field Station at Goodland

- i. The Ten Thousand Islands Field Station (also known as the Goodland Dorm) has supported Rookery Bay Reserve's mission well since its acquisition in 1985. However, the need to conduct field work and support researchers and interns from this location has increased over the years. As such, the field station was demolished and rebuilt in 2020. Phase II of this project will include renovation and expansion of the existing field station dock to ensure it is compliant with ADA standards and an extension to the existing dock to accommodate additional vessels. A new fuel vault and fuel line out to the dock will be included with this expansion.

- b. Shell Island Road Dock Renovation and Extension. The Reserve plans to renovate the existing dock, including pilings and decking, to ensure it is compliant with ADA standards. The Reserve also plans to add boat lifts and an extension to the existing dock to accommodate additional vessels, including those of FWC's Division of Law Enforcement. With this expansion, a new fuel vault and fuel line out to the dock will be included.

- c. Additional Shell Island Road Dormitory. Rookery Bay Reserve often supports large numbers of visiting investigators and interns. Therefore, an additional dormitory capable of providing lodging for up to 12 people at a time is proposed to be built near the existing lab and dormitory. To reduce operational costs, Leadership in Energy and Environmental Design (LEED) certification for this facility should be incorporated.
- d. Keewaydin and Cannon Island Docks. Converting the current fixed docks at Keewaydin Island and Cannon Island to floating docks would facilitate safety and ease of use for all staff, volunteers, contractors, and EcoTour participants. It would also provide storm resilience as floating docks handle storm surge better than fixed docks.
- e. Environmental Learning Center Expansion and Revisions. This holistic project includes multiple components for revamping the Environmental Learning Center mezzanine exhibits to provide a more immersive experience for guests by highlighting the cultural richness of the area. This may include a mini-theater, soundproofing the ceiling and redesigning the education panels, and adding a resilience 'wave tank' to show the benefits of mangroves. Proposed expansions are:
 - i. Expanding up to 1,000 square feet (93 m²) the main entrance of the Environmental Learning Center and remodeling the guest ticketing area to improve traffic flow.
 - ii. Remodeling the front desk to better serve guests.
 - iii. Remodeling, and possibly relocating, the gift shop.
 - iv. Constructing an expansion to the Art wing to add 3,000 square feet (279 m²) of space for a larger classroom to accommodate up to 50 participants. This is intended to meet the increased demand for training.
 - v. Refreshing and (or) replacing current exhibits. These changes are needed to better align the exhibits with the current science in interpretation and technology and to ensure inclusivity for all audiences. Changes may include adding interpretive displays in both Spanish and Haitian Creole languages.
 - vi. Reimagining the placement, location, and (or) use of the large model of a Polka-dot Batfish (*Ogcocephalus radiatus*) at the front entrance.
- f. Hardened System-Wide Monitoring Program (SWMP) Infrastructure. Rookery Bay Reserve currently has five SWMP stations. These stations are placed on various types of pilings and are subject to piling wear, boat accidents, and storms. Hardening these stations with driven concrete pilings and surveyed and leveled sonde platforms would provide more accurate water level data and allow the stations to remain in place during storm events, capturing important water and meteorological data. All stations would also have added telemetry.
- g. Briggs Center boardwalk: This existing boardwalk is on Rookery Bay Reserve property along Shell Island Road. The boardwalk was, previously owned by CSF but ownership has recently been transferred to the State of Florida. This boardwalk is a worthwhile addition to the Reserve's public access facilities. The existing boardwalk requires maintenance and repairs if it is to be kept. However, a better investment may be to rebuild the entire boardwalk with additional extensions or overlooks to improve environmental interpretation.
- h. Visitor services facilities: It is anticipated for the Reserve to explore agreements with one or more service providers, concessionaires or the Friends of Rookery Bay. These locations may include the Environmental Learning Center and the Isles of Capri Paddlecraft Park. These agreements will provide greater public access to recreational and interpretive experiences beyond those currently available from the Reserve staff. Any additional visitor use infrastructure would be located

adjacent to existing facilities to minimize impacts to natural resources and intensity of visitor use. A study and a needs assessment will need to be undertaken to determine appropriate levels of public use and carrying capacities.

- i. Main campus storm hardening and climate resilience. The main campus of Rookery Bay Reserve at 300 Tower Road, Naples, Florida, is built along Henderson Creek, an estuarine tidal creek that is subject to storm surge. Recent updates to FEMA FIRM maps now indicate that the existing buildings are below Base Flood Elevation. Since the building was constructed, Collier County building code has added one foot of “freeboard” into all new building requirements. Raising the elevation of the existing administration building, research wing, and Environmental Learning Center would be challenging without demolition and reconstruction. The Florida Building Code has also changed since construction of the main campus. In order to ensure that these facilities are hardened to flood and winds from hurricanes, dry floodproofing retrofits and storm shutters will be installed.
- j. A joint Rookery Bay National Estuarine Research Reserve-Florida International University (FIU) center for research and education in support of the management of the Reserve would greatly improve the understanding of the coastal ecosystems of Collier County and provide research and educational support facilities for FIU to expand their solutions-oriented coastal education and teaching programs. Such a facility would provide classroom space for teaching coastal science and education classes to students at all levels from pre-K through PhD and beyond. It would house research and management staff who would actively seek extramural funding to support research and management of the southwest Florida coastline. The facility would include office space, indoor and outdoor laboratories with support for modern environmental research instruments and flowing seawater and culture spaces. It would also provide dormitory space to allow the facility to host research groups and visiting classes of up to 20 students to study and do research at Rookery Bay.

Rookery Bay Reserve staff will ensure that construction of new facilities and renovation or enhancement of existing structures will cause only minimal disturbance to natural resources. Sites for all new facilities have been selected in cooperation with regulatory officials from Florida DEP, South Florida Water Management District, and U.S. Army Corps of Engineers to minimize or avoid impact to native vegetation, surface waters, and wetlands. New and renovated structures will incorporate environmental technology as demonstration projects, where feasible, using solar cells, cisterns for collecting rainwater, composting toilets, and reverse-osmosis systems where municipal sources are not available.

CHAPTER 12.

ADMINISTRATIVE PLAN



The Environmental Learning Center at Rookery Bay Reserve

Background

Rookery Bay National Estuarine Research Reserve was designated in 1978 and is one of 30 National Estuarine Research Reserves (NERRs) established by the National Oceanic and Atmospheric Administration (NOAA) under the Coastal Zone Management Act. NOAA's Office of Coastal Management works with state agencies in developing a national network of NERRs. NOAA provides funding to eligible state agencies for the establishment and continued operation of reserves as well as funding for construction and land-acquisition activities. NOAA also provides program guidance and oversight, including review and approval of management plans, and conducts periodic evaluations to ensure operational consistency with NERR goals and objectives. The Florida Department of Environmental Protection (DEP) is responsible for the local administration and management of Rookery Bay Reserve and the three additional NERRs in Florida. The mission of the NERR System is to practice and promote stewardship of coasts and estuaries through innovative research, education, and training using a place-based system of protected areas. The Reserve is managed by a cooperative agreement between NOAA and Florida DEP's Office of Resilience and Coastal Protection (RCP), which serves as the lead state agency for Rookery Bay Reserve. The memorandum of understanding between NOAA and Florida DEP's RCP is in Appendix A.7.2.

Florida DEP's RCP administers on-site operations, hires staff, and reviews program content for Rookery Bay Reserve and the three additional NERRs in the state. RCP also manages the state's 41 aquatic preserves and partners with NOAA in the management of the Florida Keys National Marine Sanctuary. It uses information developed within the NERR program to improve management in its other marine and estuarine program areas of responsibility.

Successful implementation of Rookery Bay Reserve's goals and objectives outlined in this management plan is dependent on an effective administration and facilities strategy. The administrative framework must provide for adequate staffing and facilities, cooperation with other agencies, citizen support, and adequate funding.

Staffing

As of 2020, Florida DEP had 17 permanent positions at Rookery Bay Reserve funded by the State of Florida and NOAA, and an additional 9 contractual and 4 Other Personal Services (OPS) positions funded through state, local, and federal grants (Figure 31). The contractual staff include the System-Wide Monitoring Program (SWMP) manager and avian specialist, a SWMP technician, a facilities specialist, a GIS specialist, two education specialists, a volunteer coordinator, and a Coastal Training Program (CTP) coordinator. The

Other Personnel Services (OPS) staff includes an aquarist, education specialist, dock master, and maintenance mechanic. The staff at the Reserve are essential to its long-term progress in achieving management plan objectives. Florida DEP will pursue continued state and federal funding for staff support as needed during the 2022–2027 period. See Figure 31 for the staffing organization chart for the Reserve.

As part of the NERR System, Rookery Bay Reserve receives funding through an annual operations grant from NOAA that is based on an agreement that the Reserve shall participate in a variety of national programs associated with estuarine research, education, and stewardship. This grant requires participation in the SWMP to assess water quality, administration of the CTP for environmental professionals and coastal decision-makers, and participation in annual meetings to share knowledge and to facilitate effective administration of this state and federal partnership. In addition to the mission-critical annual meeting, this grant also requires participation by various program managers at sector-level meetings that are necessary for successful implementation of science-based adaptive management. Annual meetings also provide managers with guidance from NOAA on annual federal budget allocations, federal grant preparation, and various reporting requirements.

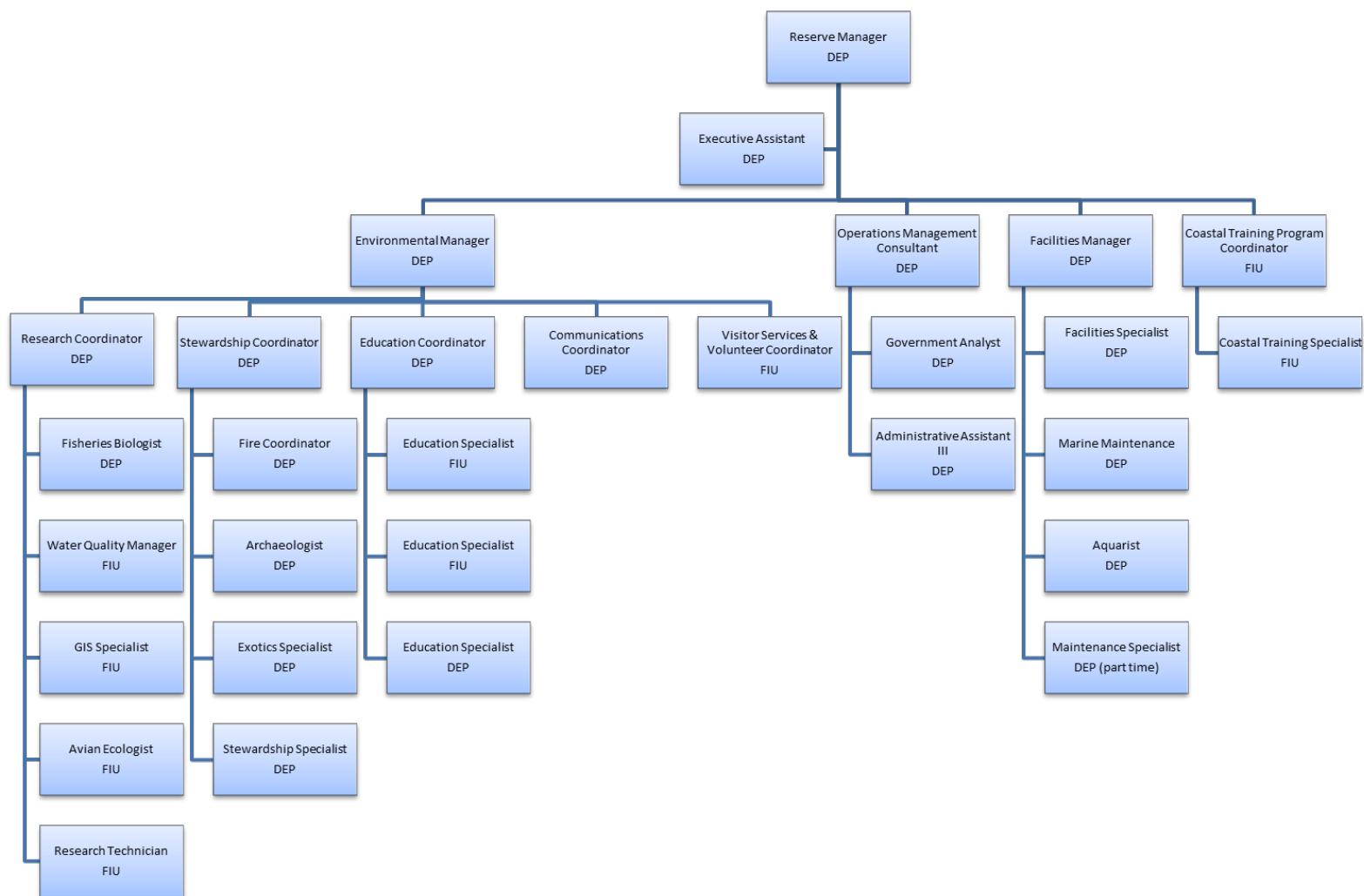


FIGURE 31: ORGANIZATIONAL FRAMEWORK AND STAFF FUNDING SOURCES AT ROOKERY BAY NATIONAL ESTUARINE RESEARCH RESERVE

Administration

Rookery Bay Reserve Director / Program Administrator (state-funded): Directs all Reserve programs in the implementation of management objectives; acts as liaison for state, federal, and local agencies in cooperative resource protection/management; serves as Florida DEP's RCP Regional Administrator for south Florida, including staffed field offices in Estero Bay, Charlotte Harbor, and Tampa Bay.

Assistant Manager / Environmental Manager (state-funded): Supervision of NERR sector program managers as well as Communications and Volunteer/Visitor Services and oversees and supports developing annual work plans; serves as the Friends of Rookery Bay liaison.

Operations Management Consultant II (state-funded): Provides supervision of administrative staff; oversees budget, grant, contract management, and network administration.

Executive Assistant (federally funded): Provides administrative support to the program administrator and manager; manages personnel for the region.

Government Analyst (state-funded): Provides administrative support for Reserve staff, including purchasing, property, and support.

Administrative Assistant III (state-funded): Responsible for purchasing and administrative support and for coordinating with Florida DEP's RCP and regional offices to implement needed training.

Research

Environmental Specialist III / Research Coordinator (state-funded): Coordinates the Reserve's Research and Monitoring Program and supervises research staff in on-site projects; works with visiting investigators.

Environmental Specialist II / Fisheries Biologist (state-funded): Conducts field surveying, sampling, and laboratory analysis for fish and other biological monitoring.

Research Technician I / GIS Specialist (federally funded/Florida International University [FIU] contract): Manages the Reserve's GIS data; assists with sea turtle monitoring and other research projects.

Lab Manager I / Water Quality Manager (federally funded/FIU contract): Manages SWMP and coordinates with other agencies on water quality data collection.

Sr. Laboratory Technician / Avian Specialist (federally funded/FIU contract): Monitors breeding, resident, and migratory shorebird and wading bird populations.

Sr. Laboratory Technician / Research Technician (federally funded/FIU contract): Assists the water quality specialist, assists monitoring programs, and supports visiting scientists.

Education

Environmental Specialist II / Education Coordinator (state-funded): Coordinates the Reserve's Education Program and coordinates with education staff and volunteers in implementing on-site and outreach programs.

Education Specialists- Two positions (federally funded/FIU contract): Conducts on-the-water and ELC school field trips, educational programming for visitors, and outreach programs in support of the Reserve's education objectives.

Education Specialist (local grant-funded/OPS): Conducts on-site field trips and outreach programs in support of the Reserve's education objectives. This position is currently funded by the Friends of Rookery Bay.

Visitor Services

Program Coordinator / Visitor Services and Volunteer Coordinator (federally funded/FIU contract): Manages the day-to-day operations of the Environmental Learning Center and recruits, manages, and trains volunteers.

Stewardship

Environmental Specialist III / Stewardship Coordinator (state-funded): Supervises resource management team; coordinates biomonitoring, restoration, watershed management, and land acquisition.

Environmental Specialist II / Resource Management Specialist (state-funded): Assists with prescribed-fire management, marine mammal rescue, invasive animal control, and resource management.

Environmental Specialist II / Resource Management Specialist (state-funded): This is the Reserve's cultural resources specialist. Assists with prescribed fire and resource management.

Environmental Specialist I / Resource Management Specialist (state-funded): Coordinates invasive plant control program. Assists with prescribed fire, invasive animal control, and resource management.

Environmental Specialist I / Resource Management Specialist (state-funded): Coordinates programs to address visitor use issues. Assists with prescribed fire, invasive species control, and resource management.

Communications

Communications Coordinator (state-funded): This position provides regional support in all written and verbal communication including a twice-annual newsletter, social media presence such as Facebook, Microsoft PowerPoint presentations, etc.

Facilities

Facilities Supervisor / Government Operations Consultant I (state-funded): Supervises maintenance staff; supports the Reserve in maintaining facilities, vehicles, vessels, and property.

Maintenance Mechanic / Facilities Specialist (state-funded): This position supports the Reserve with maintenance, landscaping, repairs, ongoing projects, and more.

Aquarist (federally funded/OPS): This position is responsible for all aquarium maintenance and repairs and for feeding the aquarium inhabitants.

Maintenance Mechanic / Dock Master(state-funded/OPS): Maintains the existing fleet of vessels used in support of ongoing research and education activities within the Reserve.

Maintenance Mechanic/Facilities Specialist (state-funded/OPS part time): This position supports the Reserve with maintenance, landscaping, repairs, ongoing projects, and more.

Coastal Training Program

Manager of Administrative Services/CTP Coordinator (federally funded/FIU contract): Supervises FIU contract staff, coordinates professional training, and facilitates stakeholder input events.

Training Support Specialist III / Coastal Training Specialist (local grant-funded/FIU contract): Assists the CTP coordinator to conduct professional training programs; delivers programs, projects, and services.

Anticipated Needs

Many of the strategies identified in this management plan will be implemented using existing staff and funding. However, additional staff or conversion of OPS to state full time employee (FTE) or FIU contract positions will greatly enhance the capacity of the Reserve to implement the objectives of the management plans as well as Florida DEP, RCP, and the NERR systems. Additional or full-time staffing will support expansion of existing programs. This would include positions such as:

- Additional positions, ES II's (Florida DEP FTE or FIU) on the Research and Stewardship team to support Sentinel Site program expansion as well as to support increased monitoring needs for oysters, SAV, wildlife, and vegetation. One additional ESII for each program.
- Additional positions, ES I and ES II, (Florida DEP FTE or FIU) on the Education team would support additional program requests from the Collier County School District.
- An additional Maintenance Specialist (Florida DEP FTE or FIU) for the Facilities team would support maintenance of all eight existing buildings, 11 vehicles, and 12 vessels.
- An additional Coastal Training Program Specialist (Florida DEP FTE or FIU) would help support increased demands for Rookery Bay CTP programming

The recommended actions, time frames, and cost estimates specified in this management plan will guide the Office of Resilience and Coastal Protection's (RCP) planning and budgeting activities over the period of this plan. These recommendations are based on the information that exists at the time the plan was prepared. A high degree of adaptability and flexibility must be built into this process to ensure that RCP can adjust to changes in the availability of funds, unexpected events such as hurricanes, and changes in statewide issues, priorities, and policies.

Statewide priorities for management and restoration of submerged and coastal resources are evaluated each year as part of the process for planning RCP's annual budget. When preparing RCP's budget, it considers the needs and priorities of the entire aquatic preserve program, other programs within RCP, and the projected availability of funding from all sources during the upcoming fiscal year. RCP pursues supplemental sources of funds and staff resources whenever possible, including grants, volunteers, and partnerships with other entities. RCP's ability to accomplish the specific actions identified in the plan will be determined largely by the availability of resources, which may vary from year to year. Consequently, the target schedules and estimated costs identified in Appendix D may need to be adjusted during the 10-year management planning cycle.

APPENDIX A. LEGAL DOCUMENTS

Appendix A. Legal Documents

A.1 / Executive Summary

Lead agency: Florida DEP's Office of Resilience and Coastal Protection (RCP)

Name of property: Rookery Bay National Estuarine Research Reserve

Location: Collier County, Florida

Total acreage: Approximately 110,000 acres (445.2 km²)

Area under Florida DEP's RCP lease: 37,344 upland acres (151.1 km²)

The table below is of the total acres under RCP Management Units by the Florida Cooperative Land Cover Map habitat types (GIS-derived)

Cooperative Land Cover Map Habitat	Acres Managed by RCP
Beach Dune	111
Coastal Berm	249
Cultural - Terrestrial	2594
Cypress	50
Dry Flatwoods	557
Estuarine	72659
Invasive/Exotic Plants	30
Mangrove Swamp	31064
Maritime Hammock	391
Marshes	164
Mesic Hammock	30
Mixed Hardwood - Coniferous Swamps	54
Other Coniferous Wetlands	620
Other Hardwood Wetlands	33
Prairies and Bogs	214
Salt Marsh	455
Sand Beach (Dry)	228
Scrub	44
Shell Mound	179
Spoil Area	154
Successional Hardwood Forest	123
Total	110,000

Lease/management agreement number: 3819

Designated use: Single use for conservation and preservation

Number of legislative or executive directives that constrain the use of the property: None

Management responsibilities: Florida DEP's RCP lead manager

Designation: National Estuarine Research Reserve (NERR)

Sublease(s): None

Encumbrances: There are reverter clauses on some parcels

Type of acquisition: Conservation and recreation lands, environmentally endangered lands, donations

Unique features: Ten Thousand Islands and Rookery Bay estuaries are the westernmost extent of the Everglades ecosystem. Habitats include extensive pristine mangrove-forested wetlands, undeveloped barrier islands, and some of the last remaining intact tropical hardwood hammocks and coastal scrub habitats in southwest Florida.

Archaeological/historical sites: Numerous prehistoric midden and historic sites

Management Needs

Ecosystems goal: Habitats and species within the Reserve exhibit long-term integrity, function, and biodiversity.

Human connections goal: Connections among people and resources in the Reserve are understood and enhanced.

Resilience goal: Strong science-to-management connections ensure that ecosystems and communities across the Gulf of Mexico are resilient and adaptable to environmental changes and episodic events.

Outreach goal: Value of the coastal environment drives informed stewardship actions.

Public use: Recreational boating, fishing, hiking, birding, camping, eco-tourism

Acquisition needs: Approximately 1,500 acres (6.1 km²)

Surplus lands: None

Public involvement: See Appendix C

Rookery Bay NERR Managed Areas (GIS-derived data)

Agency Breakdown	Area
Rookery Bay Aquatic Preserve:	58,076 acres (235.0 km ²)
Cape Romano-Ten Thousand Islands Aquatic Preserve (CRTTIAP):	51,470 acres (208.3 km ²) (includes 16,490 acres [66.7 km ²] managed by USFWS)
Uplands under RCP lease:	37,344 acres (151.1 km ²)
U.S. Fish and Wildlife Service (USFWS)	16,490 acres (66.7 km ²) (overlaps with Cape Romano-Ten Thousand Islands Aquatic Preserve)

Reserve Context

The Rookery Bay Reserve was designated in 1978 and is one of 30 reserves established by NOAA under the Coastal Zone Management Act (CZMA). The mission of the National Estuarine Research Reserve (NERR) System is to practice and promote stewardship of coasts and estuaries through innovative research, education, and training using a place-based system of protected areas. The Reserve is managed by cooperative agreement between NOAA and DEP's RCP, which serves as the lead state agency for the Reserve.

Rookery Bay Reserve spans approximately 110,000 acres (445.2 square kilometers) on Florida's Gulf coast south of Naples. The Reserve covers approximately 40% of the Collier County coastline, from Gordon Pass in Naples southward to the northwestern boundary of Everglades

National Park. Included in this area are two aquatic preserves: Cape Romano - Ten Thousand Islands Aquatic Preserve and Rookery Bay Aquatic Preserve. Significant land acquisition efforts funded by state and federal grants took place from the 1970s through the mid-2000s, but since that time state and federal funding for land acquisition has decreased. The ability to acquire more land has decreased further by residential developments that continue to be constructed in areas surrounding the Reserve. While Rookery Bay Reserve is not currently seeking a boundary addition, it continues to support efforts to acquire inholdings and strategic parcels as well as accept land donations whenever available.

Included within Rookery Bay Reserve are portions of the Ten Thousand Islands National Wildlife Refuge, which are managed under an agreement between DEP and USFWS. Additionally, Florida DEP leases approximately 3,700 acres of wetlands and submerged lands in the heart of the Reserve from National Audubon Society, and these areas are managed as part of the Reserve.

The majority of the 110,000-acre Rookery Bay Reserve is submerged habitats, coastal wetlands, and mangroves. Such habitats typify the West Florida subregion of the West Indian biogeographic region, including the subtropical west coast of Florida extending from Tampa Bay to the Florida Keys. The ecosystem at Rookery Bay and the Ten Thousand Islands is an excellent example of subtropical mangrove forested estuary. The coastal ecosystem within the Reserve has national and international significance as the western edge of the Everglades ecosystem, yet it is located adjacent to one of the fastest developing coastal areas in the United States. Habitats within the Reserve provide essential feeding and nesting grounds for a diverse assemblage of coastal and marine wildlife, including over 150 species of birds, 400 species of plants, and 228 species of fishes.

South Florida has experienced considerable habitat loss due to development and other land use changes. Extensive changes to south Florida watersheds have also taken place, due largely to the construction of roads and water conveyances such as canals and ditches. While such land use changes have been beneficial to human communities by reducing flooding and controlling water levels, these changes have also altered downstream estuaries by changing the quality, quantity, timing, and distribution of freshwater inputs.

As with the rest of south Florida, Rookery Bay Reserve and its watershed are influenced by landscape alteration; visitor use; episodic events such as storms, invasive species, climate change, and sea-level rise; and changes to natural fire regimes. These changes to the Reserve and its watershed may also facilitate invasion by exotic plants such as Brazilian pepper (*Schinus terebinthifolius*) and melaleuca (*Melaleuca quinquenervia*), which in turn can alter the landscape and change natural fire regimes. Other invasive species such as Burmese Python (*Python bivittatus*), tilapia such as *Oreochromis aureus* and *Pelmatolapia mariae*, and feral Hog (*Sus scrofa*) may also take advantage of these changes. Storms, including hurricanes, are also large-scale drivers of disturbance and habitat succession at the Reserve. Additional chronic stressors such as climate change are leading to sea-level rise and have the potential to impact natural communities within the Reserve as well as adjacent human communities. Multiple stressors such as these create complex challenges for habitat managers at the Reserve. Long-term investigation of these changes continues to be the backbone of the Reserve's ongoing monitoring, research, and stewardship programs. These programs include monitoring water quality, monitoring the health of fish and bird communities, invasive species control efforts, and the use of prescribed fire as a management tool. One of the priorities of all the Reserve's programs has been to utilize research, education, and training to effectively address coastal issues relevant to southwest Florida.

The economic value of sustaining the environmental health of Rookery Bay Reserve is significant to southwest Florida and is of great importance to the state as a whole. Tourism, sport fishing, and boating are among the most important industries in southwest Florida. Each injects millions of dollars in the Florida economy annually, and each is inextricably linked to the long-term protection and conservation of the coastal ecosystem within the Reserve. The Friends of Rookery Bay (FORB), a non-profit volunteer community-based organization, was established over 30 years ago in recognition of these values and to support the Reserve's mission.

Priority Coastal Management Issues

The Reserve's priority coastal management issues align with those addressed by the 2017–2022 NERR System strategic plan: environmental change, water quality, and habitat protection. In southwest Florida environmental change including sea level rise and increased storminess are of concern for both natural and human communities. The Reserve is in a unique position to address these issues through the connection to NOAA's established programs that focus on climate change, as well as the focus from the State of Florida to enhance coastal resilience. Water quality has long been a focus of work in the Reserve and is an important topic to local stakeholders in southwest Florida. Southwest Florida water basins are characterized by a mosaic of freshwater marshes, rivers, streams, agricultural areas, canals, neighborhoods, natural areas, mangroves, and saltwater marshes that form the watershed which drains into the Gulf of Mexico. Often these basins include increasingly urbanized areas which can lead to impacts to water quality. The long history of water quality monitoring and education about the importance of a healthy watershed to many audiences enables the Reserve to be a leader in addressing water quality issues in the region. Additionally, habitat protection is a key component of coastal resilience to environmental change and water quality issues. The stewardship and research sectors are an ideal partnership to test and assess innovative land management actions to protect and restore coastal habitats. Through these actions the Reserve addresses habitat protection issues and provides an example of land stewardship to other land managers in the region.

Reserve Programs Overview

The work of Rookery Bay Reserve staff is integrated across eight main departments consisting of the four core NERR sectors of research, stewardship, education, and coastal training combined with the departments of visitor services, communications, facilities, and administration. While each department has its own niche, most work is collaborative between two or more departments. The integrated approach at the Reserve facilitates adaptive management to accomplish the missions of the Reserve, Florida DEP, and NOAA as well as meeting the needs of the Reserve's stakeholders and partners. This management plan is framed by a strategic plan with four goals focused on ecosystems, human connections, resilience, and engagement. The individual program chapters within the management plan are guided by the strategic plan, creating a collaborative approach to achieve all four goals, which are based upon key objectives and strategies that address relevant issues. Such issues involve watershed management, protecting ecological functions, listed species and habitat management, ecosystem values, establishing science-to-management linkages, increasing community awareness and involvement, and promoting informed coastal decisions.

As of 2018, Rookery Bay Reserve has 30 full-time employees serving in coastal management, research, education, and training roles that directly support the goals and strategies outlined in this management plan. In 2016, the Reserve entered into a partnership with Florida International University (FIU) resulting in nine full-time staff now employed by FIU. Additionally, the Reserve provides office space and logistical support to a full-time biologist for Audubon Florida.

In addition to the long-term protection and management of 110,000 acres of valuable coastal habitats, the Reserve has a unique role in southwest Florida by serving as a living laboratory. In this role, the Reserve facilitates science that informs decision-making and provides a platform for environmental education and outreach. To accomplish this function, the Reserve works with many strategic partners such as Collier County, City of Marco Island, City of Naples, USFWS, South Florida Water Management District, Florida Park Service, Florida Forest Service, National Park Service, FIU and Florida Gulf Coast University, The Conservancy of Southwest Florida, Audubon Florida, and Mote Marine Laboratory. These partnerships are vital to the Reserve to help accomplish its mission goals.

A.2 / Code of Federal Regulations

National Estuarine Research Reserve Legal Requirements

15 Code of Federal Regulations Part 921 is available at the following link:

<https://www.ecfr.gov/current/title-15/subtitle-B/chapter-IX/subchapter-B/part-921>

A.3 / Acquisition and Restoration Council

Conceptual State Lands Management Plan

The Conceptual State Lands Management Plan by the Bureau of State Lands Management (1981) is available at the following link:

https://floridadep.gov/sites/default/files/FLDEP_DSL_OES_ConceptualStateLandsManagementPlan.pdf

A.4 / Aquatic Preserve Resolution

WHEREAS, the State of Florida, by virtue of its sovereignty, is the owner of the beds of all navigable waters, salt and fresh, lying within its territory, with certain minor exceptions, and is also the owner of certain other lands derived from various sources; and

WHEREAS, title to these sovereignty and certain other lands has been vested by the Florida Legislature in the State of Florida Board of Trustees of the Internal Improvement Trust Fund, to be held, protected and managed for the long-range benefit of the people of Florida; and

WHEREAS, the State of Florida Board of Trustees of the Internal Improvement Trust Fund, as a part of its overall management program for Florida's state-owned lands, does desire to insure the perpetual protection, preservation and public enjoyment of certain specific areas of exceptional quality and value by setting aside forever these certain areas as aquatic preserves or sanctuaries; and

WHEREAS, the ad hoc Florida Inter-Agency Advisory Committee on Submerged Land Management has selected through careful study and deliberation a number of specific areas of state-owned land having exceptional biological, aesthetic and scientific value, and has recommended to the State of Florida Board of Trustees of the Internal Improvement Trust Fund that these selected areas be officially recognized and established as the initial elements of a statewide system of aquatic preserves for Florida;

NOW, THEREFORE, BE IT RESOLVED by the State of Florida Board of Trustees of the Internal Improvement Trust Fund:

THAT it does hereby establish a statewide system of aquatic preserves as a means of protecting and preserving in perpetuity certain specially selected areas of state-owned land: and

THAT specifically described, individual areas of state-owned land may from time to time be established as aquatic preserves and included in the statewide system of aquatic preserves by separate resolution of the State of Florida Board of Trustees of the Internal Improvement Trust Fund; and

THAT the statewide system of aquatic preserves and all individual aquatic preserves established hereunder shall be administered and managed, either by the said State of Florida Board of Trustees of the Internal Improvement Trust Fund or its designee as may be specifically provided for in the establishing resolution for each individual aquatic preserve, in accordance with the following management policies and criteria:

- (1) An aquatic preserve is intended to set aside an exceptional area of state-owned land and its associated waters for preservation essentially in their natural or existing condition by reasonable regulation of all human activity which might have an effect on the area.
- (2) An aquatic preserve shall include only lands or water bottoms owned by the State of Florida, and such private lands or water bottoms as may be specifically authorized for inclusion by appropriate instrument from the owner. Any included lands or water bottoms to which a private ownership claim might subsequently be proved shall upon adjudication of private ownership be automatically excluded from the preserve, although such exclusion shall not preclude the State from attempting to negotiate an

arrangement with the owner by which such lands or water bottoms might be again included within the preserve.

- (3) No alteration of physical conditions within an aquatic preserve shall be permitted except: (a) minimum dredging and spoiling for authorized public navigation projects, or (b) other approved activity designed to enhance the quality or utility of the preserve itself. It is inherent in the concept of the aquatic preserve that, other than as contemplated above, there be: no dredging and filling to create land, no drilling of oil wells or excavation for shell or minerals, and no erection of structures on stilts or otherwise unless associated with authorized activity, within the confines of a preserve - to the extent these activities can be lawfully prevented.
- (4) Specifically, there shall be no bulkhead lines set within an aquatic preserve. When the boundary of a preserve is intended to be the line of mean high water along a particular shoreline, any bulkhead line subsequently set for that shoreline will also be at the line of mean high water.
- (5) All human activity within an aquatic preserve shall be subject to reasonable rules and regulations promulgated and enforced by the State of Florida Board of Trustees of the Internal Improvement Trust Fund and/or any other specifically designated managing agency. Such rules and regulations shall not interfere unduly with lawful and traditional public uses of the area, such as fishing (both sport and commercial), hunting, boating, swimming and the like.
- (6) Neither the establishment nor the management of an aquatic preserve shall infringe upon the lawful and traditional riparian rights of private property owners adjacent to a preserve. In furtherance of these rights, reasonable improvement for ingress and egress, mosquito control, shore protection and similar purposes may be permitted by the State of Florida Board of Trustees of the Internal Improvement Trust Fund and other jurisdictional agencies, after review and formal concurrence by any specifically designated managing agency for the preserve in question.
- (7) Other uses of an aquatic preserve, or human activity within a preserve, although not originally contemplated, may be permitted by the State of Florida Board of Trustees of the Internal Improvement Trust Fund and other jurisdictional agencies, but only after a formal finding of compatibility made by the said Trustees on the advice of any specifically designated managing agency for the preserve in question.

IN TESTIMONY WHEREOF, the Trustees for and on behalf of the State of Florida Board of Trustees of the Internal Improvement Trust Fund have hereunto subscribed their names and have caused the official seal of said State of Florida Board of Trustees of the Internal Improvement Trust Fund to be hereunto affixed, in the City of Tallahassee, Florida, on this the 24th day of November A. D. 1969.

CLAUDE R. KIRK, JR, Governor TOM ADAMS, Secretary of State

EARL FAIRCLOTH, Attorney General FRED O. DICKINSON, JR., Comptroller BROWARD WILLIAMS, Treasurer FLOYD T. CHRISTIAN, Commissioner of Education DOYLE CONNER, Commissioner of Agriculture and Constituting the State of Florida Board of Trustees of the Internal Improvement Trust Fund.

A.5 / Florida Statutes

The following Florida Statutes are applicable to Rookery Bay Reserve. These statutes are available at the following link:

http://www.leg.state.fl.us/statutes/index.cfm?App_mode=Display_Index&Title_Request=XVIII#TitleXVIII

Florida Statutes, Chapter 253: State Lands

Florida Statutes, Chapter 258: State Parks and Preserves

Part II (Aquatic Preserves):

Florida Statutes, Chapter 259: Land Acquisitions for Conservation or Recreation

Florida Statutes, Chapter 379: Fish and Wildlife Conservation

Florida Statutes, Chapter 403: Environmental Control

Florida Statutes, Chapter 597: Florida Aquaculture Policy Act

A.6 / Florida Administrative Code (F.A.C.)

All rules can be found according to the chapter number at <https://www.flrules.org/Default.asp>

Florida Administrative Code, Chapter 18-20: Florida Aquatic Preserves

Florida Administrative Code, Chapter 18-21: Sovereignty Submerged Lands Management

Florida Administrative Code, Chapter 18-23: State Buffer Preserves

Florida Administrative Code, Chapter 62-302: Surface Water Quality Standards (*Rule designating Outstanding Florida Waters is at 62-302.700*)

A.7 / Management Agreements and Related Documents

A.7.1 / Memorandums of Understanding and Memorandums of Agreement

Management Agreement for Certain Lands in Collier County

WHEREAS, the State of Florida, hereinafter referred to as the “State,” and the United States Fish and Wildlife Service, hereinafter referred to as the “Service,” own and manage adjacent tracts of land in Collier County, namely, the Service manages the Ten Thousand Islands National Wildlife Refuge, hereinafter referred to as the “Refuge,” and the Florida Department of Environmental Protection, Office of Coastal and Aquatic Areas, manages the Cape Romano-Ten Thousand Islands and Rookery Bay Aquatic Preserves. In addition, the State claims sovereignty over certain submerged lands, some of which are within the boundary of the Refuge; and

WHEREAS, the Board of Trustees of the Internal Improvement Trust Fund, hereinafter referred to as the “Board,” holds title to certain sovereignty submerged lands, hereinafter referred to as “State lands,” in Collier County, Florida, and

WHEREAS, the Board may authorize the management of said State lands by virtue of Chapter 253.03, Florida Statutes; and

WHEREAS, the Service desires to manage submerged State lands which may be located within the boundaries of the Refuge for public purposes as outlined in the Comprehensive Conservation Plan/Environmental Assessment for the Refuge, hereinafter referred to as the “Plan,” and specified in Fig 5, “Map of Co-Managed Lands and Navigable Waters” attached hereto; and

WHEREAS, the Board has determined that it would be appropriate for the Service to manage the certain State lands for public purposes as outlined in the Plan;

NOW, THEREFORE, the Board hereby grants to the Service the right to co-manage for public purposes all lands titled in the Board and all submerged lands for which the State claims sovereignty which are located within the boundaries of the overlying jurisdictional areas, hereinafter referred to as the “designated areas,” as described in the Plan, which is attached hereto and made a part hereof, for a period of 50 years from the effective date of this Agreement, on the following terms and conditions:

1. The Service will manage the designated areas as provided for in the Plan in a manner which will not conflict with the conservation, protection and enhancement of said lands and will not interfere with the maintenance of public navigation projects or other public works projects authorized by the United States Congress.
2. The Service will manage the designated areas as part of the Refuge. The wildlife management, public use, and law enforcement on said lands will be administered according to the policies of the Service as well as the regulations set forth in the National Wildlife Refuge System Administration Act of 1966, provided they are acceptable to the Florida Department of Environmental Protection, Florida Fish and Wildlife Conservation Commission, and compatible with the management goals of the State’s aquatic reserve program.

3. The Plan will be reviewed jointly by the Board and the Service at no greater than 5 year intervals and updated as necessary. The Service will not alter the designated areas or engage in any activity except as provided for in the Plan without the prior written approval of the Board.
4. Upon execution of this Agreement, the Service will have the right to enter and occupy the subject lands for the purpose of fulfilling the activities designated under "implementation" in said Plan subject to existing State laws, rights and interests.
5. The Board retains the right to enter the subject lands and to engage in management activities other than those provided for herein following notification, consultation, and approval by the Service. The Service retains the right to affirm or deny any further management activities by third parties, and determine if such activities are compatible for lands incorporated into the National Wildlife Refuge System. Upon such affirmation by the Service, the Board may grant approval to third parties for compatible management activities under the terms of this Agreement.
6. Upon the request of the Board, the Service will provide information regarding Service operations within the designated areas that in any manner relate to this Agreement.
7. Inasmuch as the Florida Department of Environmental Protection (FDEP), has the constitutional authority to manage state fish and wildlife resources, and the Service desires to engage in cooperative efforts for resource management for the Refuge, a Memorandum of Understanding will be developed between the agencies to address in more detail the cooperative elements identified in items 8, 9, and 10.
8. The FDEP and the Service agree to cooperate in support of research and monitoring within the designated areas of cooperative management. Said agencies will coordinate planned research activities with each other on an annual basis, and share results of research projects. Cooperative research will also include sharing of staff and equipment resources when appropriate.
9. The FDEP and the Service agree to cooperate in support of resource management within the designated areas of cooperative management. Said agencies will coordinate planned restoration, public access, and resource protection projects with each other on an annual basis. Both parties agree to monitor and review public use and watershed land use impacts on the Refuge ecosystem.
10. The FDEP and the Service agree to cooperate in support of education and outreach efforts associated with current and future research and management activities within the designated areas of cooperative management. Said agencies will coordinate planned education field and community outreach activities with each other on an annual basis.
11. Section 267.061(1)(b), Florida Statutes, specifies that title to all treasure trove, artifacts, and such objects or antiquity having intrinsic, scientific or historical and archaeological value, which have been abandoned on state-owned waters or state-owned sovereignty submerged lands, is vested in the Division of Historical Resources of the Department of State, for the purpose of administration and protection for the State. The execution of this Agreement in no way affects any of the parties' obligations pursuant to Chapter 267, Florida

Statutes. The disturbance of archaeological and historical sites on state-owned lands is prohibited unless prior authorization has been obtained from the Division of Historical Resources in order to mitigate potential damage or disturbance of, or to preserve, archaeological and historical sites and properties.

12. This Agreement does not convey any title interest from the State or the Service in the areas described in Fig. 5, "Map of Co-Managed Lands and Navigable Waters" of the Refuge.
13. This Agreement may be unilaterally terminated by either party with or without cause, by providing written notice of the intent to the other party at least 60 days prior to the proposed date of termination.
14. The Agreement may be renewed for succeeding additional 10-year terms by mutual agreement of the parties. This option to renew if exercised, together with all additions, deletions, and modifications to this Agreement, shall be affixed hereto.
15. This Agreement and any right and privileges relative to State lands contained herein are for the sole use of the Service and shall not be assigned or transferred in whole or in part to any other party without the consent of the Board.
16. The Service agrees to assist in the investigation of injury or damage claims either for or against the State or the Board pertaining to the Service's area of responsibility or arising out of the Service's management programs hereunder and to contact the Board regarding whatever legal action the Service deems appropriate to remedy same.
17. The liability of the Service for the acts and omissions of its employees pursuant to this instrument shall be governed by the Federal Tort Claims Act.
18. The Service agrees that it will not discriminate against any individual based on race, color, religion, sex, national origin, age, handicap, or marital status with respect to any activity occurring within the area subject to this Agreement or upon lands adjacent to and used as an adjunct area.
19. Unless specified herein to the contrary, this Agreement will be governed and interpreted by applicable Federal and State laws.
20. All notices given under this Agreement must be in writing and mailed to the address of the party to whom notice is to be given, as designated by such party in writing. The Board, the FDEP and the Service hereby designate their respective address as follows:

Board: *Division of State Lands*
Bureau of Land Management Services 3900 Commonwealth
Boulevard
Mail Station 125
Tallahassee, Florida 32399

Service: *Regional Director*
U.S. Fish and Wildlife Service
1875 Century Boulevard

**Department
of Environmental
Protection**

Atlanta, Georgia 30345

Executive Director

Department of Environmental Protection
3900 Commonwealth Boulevard
Tallahassee Florida 32399-3000

Office of Coastal Aquatic Management Areas
3900 Commonwealth Boulevard
Tallahassee Florida 32399-3000

IN TESTIMONY WHEREOF, witnesseth the signature of the Regional Director, Fish and Wildlife Service, on behalf of the United States of America, and the signature of the legally designated agent the Board of Trustees of the Internal Improvement Trust Fund of the State of Florida, this 25th day of October, 2003.

UNITED STATES OF AMERICA – Department of the Interior

By: [Signature] [Signature] [Signature]
Regional Director Witness Witness
Fish and Wildlife Service
Southeast Region

BOARD OF TRUSTEES OF THE INTERNAL IMPROVEMENT TRUST FUND OF THE STATE OF FLORIDA

By: [Signature] [Signature] [Signature]
Director Witness Witness
Division of State Lands
Department of Environmental Protection

By: [Signature] [Signature] [Signature]
Director Witness Witness
Office of Coastal and
Aquatic Managed Areas
Department of Environmental Protection

APPROVED AS TO FORM AND LEGALITY
By: [Signature]
DEP Attorney
Date: 11/14/03

A.7.2 / Memorandum of Understanding Between NOAA and Florida DEP Management of NERRs

MOA-2021-034 / 12138

Memorandum of Understanding
Between the
National Oceanic and Atmospheric Administration and
The Florida Department of Environmental Protection
Detailing the State-Federal Roles in the Management of the Apalachicola, Rookery Bay, and
Guana Tolomato Matanzas National Estuarine Research Reserves

I. PARTIES AND PURPOSE

This Memorandum of Understanding (MOU or agreement) establishes the framework for the cooperative management of Apalachicola, Rookery Bay, and Guana Tolomato Matanzas National Estuarine Research Reserves (the Reserves) in the State of Florida, between Florida Department of Environmental Protection (DEP) and the National Oceanic and Atmospheric Administration (NOAA), Office for Coastal Management. This agreement supersedes the previous agreement between NOAA and DEP regarding Apalachicola, Rookery Bay, and Guana Tolomato Matanzas Reserves made on December 21, 1998.

II. AUTHORITY

The authority for this agreement is the Coastal Zone Management Act of 1972, as amended (CZMA, 16 U.S.C. §§ 1451-65, 1461), and its implementing regulations at 15 C.F.R. Parts 921, 923.

III. BACKGROUND

- A. The State of Florida has determined the waters and related coastal habitats of Apalachicola, Rookery Bay, and Guana Tolomato Matanzas provide unique opportunities for the study of natural and human processes to contribute to the science of estuarine ecosystem processes, enhance environmental education opportunities and public understanding of estuarine areas, and provide a stable environment for research through the long-term protection of reserve resources.
- B. The State of Florida has determined that the resources of the Apalachicola, Rookery Bay, and Guana Tolomato Matanzas Reserves and the values they represent to the citizens of Florida and the United States will benefit from the management of these resources as part of the National Estuarine Research Reserve (NERR) System.
- C. The DEP, as the State agency to whom Florida has delegated the authority and responsibility for maintaining, operating and managing the Apalachicola, Rookery Bay, and Guana Tolomato Matanzas Reserves in accordance with state law and Section 315 of the CZMA, 16 U.S.C. 1461, acknowledges the value of state-federal cooperation for the long-term management and protection of the Reserves in a manner consistent with the purpose of each Reserve's designation.

Last updated October 28, 2020

- D. NOAA finds that the State of Florida has satisfied the legal and procedural requirements for designation and, pursuant to its authority under Section 315 of the CZMA, 16 U.S.C. § 1461, and in accordance with implementing regulations at 15 C.F.R. Part 921, has designated the Apalachicola, Rookery Bay, and Guana Tolomato Matanzas Reserves.
- E. The Apalachicola, Rookery Bay, and Guana Tolomato Matanzas management plans approved by NOAA describe the goals, objectives, strategies/actions, administrative structure, and institutional arrangements for these Reserves, including this agreement and others. In consideration of the mutual agreements herein, NOAA and DEP agree to the following roles indicated in Section IV of this agreement.

IV. STATE-FEDERAL ROLES IN RESERVE MANAGEMENT

- A. DEP's role in Management of the Apalachicola, Rookery Bay, and Guana Tolomato Matanzas Reserves

The DEP shall:

1. be responsible for compliance with all federal laws and regulations, and ensure that the Apalachicola, Rookery Bay, and Guana Tolomato Matanzas Reserve management plans are consistent with the provisions of the CZMA and implementing regulations;
2. ensure protection of the natural and cultural resources of the Reserves, and ensure enforcement of the provisions of state law and regulations aimed at protecting the reserves;
3. ensure adequate, long-term protection and management of lands and waters included within the Reserve boundaries;
4. cooperate with NOAA to apply for and manage funds to support the reserves in accordance with federal and state laws, the Reserve management plans, annual funding guidance from NOAA, and any other NOAA directives pertaining to reserve operations, research and monitoring, education and stewardship, and, as necessary, land acquisition and reserve facility construction;
5. conduct and coordinate research and monitoring programs that encourage scientists from a variety of institutions to work together to understand the ecology of the Reserve ecosystems to improve coastal management;
6. conduct and maintain programs that disseminate research results via materials, activities, workshops, and conferences to resource users, state and local agencies, school systems, the general public, and other interested parties;
7. provide staff and endeavor to secure state funding for the manager, education coordinator, and research coordinator;
8. secure facilities and equipment required to implement the provisions within the Reserve management plans;
9. ensure adequate support for facilities operation and maintenance;

Last updated October 28, 2020

10. maintain effective liaison with local, regional, state, and federal policy makers, regulators, and the general public;
11. serve as principal contact for issues involving proposed boundary changes and/or amendments to the Reserve management plans; and
12. cooperate with NOAA regarding review of performance pursuant to Section 312 of the CZMA, 16 U.S.C. § 1458, 15 C.F.R. § 921.40, and ongoing management plan approvals.

B. Federal Role in Management of the Apalachicola, Rookery Bay, and Guana Tolomato Matanzas Reserves

NOAA's Office for Coastal Management shall:

1. administer the provisions of the Sections 312 and 315 of the CZMA, 16 U.S.C. § 1458 and 16 U.S.C. § 1461, respectively, to ensure that the reserve operates in accordance with goals of the NERR system and the Apalachicola, Rookery Bay, and Guana Tolomato Matanzas Reserve management plans;
2. review and process applications for financial assistance from the DEP, consistent with 15 C.F.R. Part 921, for management and operation of the Reserves, and, as appropriate, land acquisition and facility construction;
3. advise DEP of existing and emerging national and regional issues that have bearing on the Reserves and NERR system;
4. maintain an information exchange network among reserves, including available research and monitoring data and educational materials developed within the NERR system; and
5. to the extent possible, facilitate the allocation of NOAA resources and capabilities in support of the Reserves' goals and programs.

C. General Provisions

1. Nothing in this agreement shall obligate either party in the expenditure of funds, or for future payments of money. Each party bears its own costs to implement this agreement. NOAA may provide Federal funding in accordance with the CZMA and any requirements of the U.S. Department of Commerce through financial assistance awards that are separate from this agreement.
2. A free exchange of research and assessment data between the parties is encouraged and is necessary to ensure success of cooperative studies.

D. Other Provisions

1. Nothing in this agreement diminishes the independent authority or coordination responsibility of either party in administering its respective statutory obligations. Nothing in this agreement is intended to conflict with current written directives or policies of either party. If the terms of this agreement are inconsistent with existing written directives or policies of either party entering this agreement, then those portions of this agreement that are determined to be inconsistent with

Last updated October 28, 2020

such written directives or policies shall be invalid; but the remaining terms not affected by the inconsistency shall remain in full force and effect. In the event of the discovery of such inconsistency, and at the first opportunity for revision of this agreement, the parties shall seek to amend or terminate this agreement in accordance with the provisions of section VI of this agreement.

2. Any disagreement on the interpretation of a provision, amendment, or other matter related to this agreement shall be resolved informally at the lowest operating level of each party's respective organization. If such disagreement cannot be resolved, then the area(s) of disagreement shall be stated in writing and presented to the other party for further consideration. If agreement is not reached within thirty (30) days of presentation, then the parties shall forward the written presentation of the disagreement to their respective higher official for appropriate resolution.

V. PROGRAM EVALUATION

In accordance with section 312 of the CZMA, 16 U.S.C. § 1458, and 15 C.F.R. § 921.40, NOAA's Office for Coastal Management will schedule periodic evaluations of DEP's performance in meeting the terms of this agreement and the Apalachicola, Rookery Bay, and Guana Tolomato Matanzas Reserve management plans. Where findings of deficiency occur, NOAA may initiate action in accordance with the interim sanctions or withdrawal of designation procedures established by the CZMA and applicable regulations at 15 C.F.R. Part 921, Subpart E.

VI. EFFECTIVE DATE, REVIEW, AMENDMENT, AND TERMINATION

- A. This agreement is effective on the date of the last signature on this agreement and shall be in effect until terminated by either party.
- B. This agreement will be reviewed periodically by both parties and may only be amended by the mutual written consent of both parties.
- C. This agreement may be terminated by mutual consent of both parties or by unilateral termination by either party. Termination of this agreement may provide grounds for NOAA (at its discretion) to withdraw designation of the Apalachicola, Rookery Bay, and Guana Tolomato Matanzas Reserves from the NERR system, pursuant to applicable provisions of the CZMA and its implementing regulations as described under 15 C.F.R. Parts 921 (Subpart E) and 923 (Subpart L). Section 315 of the CZMA, 16 U.S.C. § 1461, provides that NOAA may withdraw designation of a NERR if: 1) NOAA finds that any of the criteria for establishing the reserve no longer exist; or 2) a substantial portion of the research conducted within the reserve fails to meet NERR system guidelines. In making any decision to withdraw designation, NOAA will take into consideration factors set forth in 15 C.F.R. § 921.40.
- D. If any clause, sentence, or other portion of this agreement shall become illegal, null, or void for any reason, the remaining portions of this MOU shall remain in full force and effect.

Last updated October 28, 2020

E. No waiver of right by either party of any provision of this agreement shall be binding unless expressly confirmed in writing by the party giving the waiver.

IN WITNESS THEREOF, the parties have caused this agreement to be executed.

PAYNE.JEFFREY.L
.DR.1365833881

Digitally signed by
PAYNE.JEFFREY.L.DR.1365833881
Date: 2020.12.31 19:49:11 -05'00'



Jeffrey L. Payne, Ph.D.
Director
Office for Coastal Management
National Ocean Service
National Oceanic and Atmospheric
Administration
U.S. Department of Commerce

Alex Reed
Director, Office of Resilience and Coastal
Protection
Florida Department of Environmental
Protection

Date

Date 1/11/2021

Last updated October 28, 2020

A.8 / Trustees Lease Agreement and Related Documents

The Trustees lease agreement for lease agreement number 3819, including the legal description, can be obtained by contacting the Florida Department of Environmental Protection's Office of Resilience and Coastal Protection.

A.9 / Federal Memo of Categorical Exclusion

This memo is provided on the next page.



U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
Office for Coastal Management
Silver Spring Metro Center, Building 4
1305 East-West Highway
Silver Spring, Maryland 20910

MEMORANDUM FOR: The Record

FROM: Patmarie S. Nedelka *Patmarie S. Nedelka*
NEPA & Environmental Compliance Coordinator

SUBJECT: Categorical Exclusion (CE) for the approval of the revised Rookery Bay NERR Management Plan

DATE: 3 August 2022

The National Oceanic and Atmospheric Administration's (NOAA) Policy and Procedures for Compliance with the National Environmental Policy Act and Related Authorities (NOAA Administrative Order 216-6A and Companion Manual for NAO 216-6A) establishes NOAA's policy and procedures for compliance with the National Environmental Policy Act, the CEQ regulations, Executive Order (EO) 12114 (Environmental Effects Abroad of Major Federal Actions), EO 11988 and 13690 (Floodplain Management), and EO 11990 (Protection of Wetlands). It was used by NOAA to examine for the approval of the revised Rookery Bay NERR Management Plan for its potential to impact the quality of the human environment as discussed below.

Program Background:

The National Estuarine Research Reserve System (NERRS or Reserve System) is a network of 29 areas representing different biogeographic regions and estuarine types within the United States that are protected for long-term research, monitoring, education, and coastal stewardship. Established by the Coastal Zone Management Act of 1972, as amended, the Reserve System is a partnership program between NOAA and the coastal states.

As part of this partnership, federal regulations require reserves to have a NOAA-approved management plan that is updated every five years (15 C.F.R. Part 921.33(c)). NERRS management plans serve as the foundation and guide for reserve activities; collectively they describe the capacities of the Reserve System. These documents can be used as source documents for other internal and external partner programs such as the National Estuary Program and the Coastal Zone Management Program, as well as national efforts such as the National Climate Assessment. NOAA works collaboratively with each reserve to support the development and approval of its management plan, and to ensure compliance with federal regulations and alignment with national priorities and programs.

Per federal regulations, 15 C.F.R. Part 921.13, management plans must describe the reserve's most pressing coastal management issue. The NERRS program is administered at the federal

level by the Ecosystems Program, Stewardship Division within NOAA's Office for Coastal Management (OCM). The Ecosystems Program is responsible for administering the NERRS program through financial assistance, technical services and information, and participation in priority national, regional, state, and local forums.

Description of the Action(s):

NOAA is proposing to approve the Rookery Bay NERR updated management plan for the period 2022-2026 (attached). The Reserve was designated in 1978 and this plan supports the strategic goals of NOAA and the Florida Department of Environmental Protection. The strategic plan included in this document, which addresses these priorities, was developed through collaborative engagement with partners, including professional colleagues and public and private stakeholders. The strategic plan responds to needs through the integrated activities of the Research, Stewardship, Education, and Coastal Training programs. The purpose of this plan is to provide a framework for program undertakings over the next five years, and to guide Reserve staff and stakeholders in management decisions.

This plan is intended to guide management activities for the Rookery Bay National Estuarine Research Reserve, as well as the two FL aquatic preserves (Cape Romano-Ten Thousand Islands Aquatic Preserve and Rookery Bay Aquatic Preserve) found within the reserve boundaries.

The mission of Rookery Bay Reserve is to serve southwest Florida as a trusted resource for science-based information fostering connected human and ecological communities. The vision of the Reserve is that communities in southwest Florida value nature and prosper in concert with healthy estuaries. Supporting this vision, the Reserve management plan goals include:

- Habitats and species within the Reserve exhibit long-term integrity, function, and biodiversity
- Connections among people and resources in the Reserve are understood and enhanced
- Strong science-to-management connections ensure that ecosystems and communities across the Gulf of Mexico and similar Caribbean habitats are resilient and adaptable to environmental changes and episodic events.
- The value people place on the coastal environment drives informed stewardship actions.

The management plan is framed by a strategic plan under the four goals listed above. Core reserve sectors of research, education, stewardship and coastal training collaborate to achieve these goals to address relevant reserve issues including watershed management, protecting ecological functions, listed species and habitat management, ecosystem values, establishing science-to-management linkages, increasing community awareness and involvement, and promoting informed coastal decisions. The various programs and plans within the revised management plan build upon past reserve successes and accomplishments and are designed to address the specific priority coastal management issues. For education, priorities to be addressed include increasing the use of technology in both exhibits and educational programs; offering a menu of educational programs for teachers and other user groups; building the

Reserve's interpretation program in partnership with volunteer staff; and integrating the Florida Master Naturalist Program courses into education. While the training program, based on their most recent audience needs assessment, is prioritizing training, technical assistance or building partnership around issues that include the use of monitoring data, invasive and vulnerable species, cultural resources, restoration techniques, ecosystem services and socioeconomic indicators, and coastal resilience. The Volunteer and communications programs have their own goals and objectives embedded within the management plan and linked to research, education, training and stewardship.

Resource protection is the stewardship focused part of the management plan with a strong science to management connection. Some of the stewardship priorities include monitoring the effects of prescribed fire and invasive species control efforts on reserve habitats; continued monitoring of priority FWC and USFWS species; implementing adaptive management protocols based on relevant research and monitoring; and updating cultural resource assessments as needed.

The Reserve serves as a living laboratory in southwest Florida. This role allows the Reserve to facilitate science that informs decision-making and provides a platform for environmental education and outreach. To help achieve the goals and objectives laid out in the plan, the Reserve works with many strategic partners. Partnerships with Florida International University and Audubon Florida support critical staff that help accomplish its mission goals. Additionally, no boundaries changes are incorporated into the revised management plan and the reserve remains at its current boundaries and size of 110,000 acres.

CE category number, title, and CE text that applies to the proposed action(s):

The proposed action is in compliance with NERRS program regulations whereby all Reserves must update their management plans. The reserve's updated management plan will be used to guide the future of the reserve and lacks the specificity necessary to conduct a thorough NEPA. The management plan will be used by NOAA as part of the financial assistance award process; however, all funded activities will be subjected to a thorough NEPA review and all necessary environmental compliance will be completed prior to the state's expenditure of federal funds.

The Rookery Bay NERR updated management plan does not include a boundary expansion nor does it add or significantly change allowable uses, uses requiring a permit, or propose new restrictions on existing uses. The approval of the management plan is not part of a larger action; it can therefore be reviewed independently. Approval of the reserve's updated management plan falls within the categorical exclusion A5 - *Updates to existing National Estuarine Research Reserve (NERR) management plans*, provided that the update does not change NERR boundaries or add or significantly change allowable uses, uses requiring a permit, or restrictions on uses.

Effects of the Action(s):

OCM has considered the administrative approval of the Rookery Bay NERR management plan in the context of the extraordinary circumstances listed in the NOAA Companion Manual for NAO 216-6A. No extraordinary circumstances are present, as summarized below (and in attachment).

- Requirements are in place to ensure no adverse effects on human health or safety, and to ensure no effects from hazardous or toxic substances
- The area does not contain unique environmental characteristics
- There are no effects to protected species or historic resources
- There are no effects to minority communities
- No introduction, growth or expansion of invasive species is anticipated
- All federal and state laws will be complied with, and all effects are known
- The requested services are not unique or uncertain and there is no potential for cumulative impacts.

The administrative action of approving a management plan will have no effect on the human environment; any specific activities that may be funded in the future by NOAA will undergo a thorough NEPA analysis and all environmental compliance requirements will be completed prior to the expenditure of federal funds. There is no change to the Reserve's boundary nor does the plan add or significantly change allowable uses, uses requiring a permit, or restrictions on uses. Any future proposed land acquisitions or changes to allowable uses will be subject to NEPA and environmental review, as appropriate.

Environmental Compliance Needs:

The federal consistency provision of the CZMA requires that any federal action occurring in or outside of a state's coastal zone, which has a reasonably foreseeable effect on land uses, water uses, or natural resources of the coastal zone, must be consistent with enforceable policies contained in the state's federally-approved coastal management program. NOAA submitted the consistency determination, as required by 15 C.F.R. Part 930, Subpart C, and in compliance with the state's own review procedures. NOAA received an informal official response from the Florida Coastal Management Program noting that the reserve management plan 'will likely not have adverse impacts on coastal natural resource areas (CNRAs) in the coastal zone and is consistent with the goals and policies of the FLCMP.' Also noted was that future siting and construction should avoid and minimize impacts to coastal natural resource areas. Given that the state was unable to issue a timely decision letter due to state process requirements, NOAA's CZMA compliance obligation for the review of the management plan was found to have been met in accordance with 15 CFR § 930.41 whereby state concurrence may be conclusively presumed in the event that a state decision on a consistency determination is not received within 60 days of receipt.

On February 24, 2022, a public notice advertising the Rookery Bay NERR's March 22, 2022, virtual public meeting and March 25, 2022 in-person public meeting was published in the

Naples Daily News. The public notice invited the public to attend the virtual meeting or in-person meeting and notified the public that comments on the Draft Revised Management Plan would be due by April 8, 2022. The state also published notice of these meetings in Florida Administrative Register 48(39):816. The legal notice of availability for the 30-day public comment period was published in the Federal Register on Monday March 14, 2022 (<https://www.federalregister.gov/d/2022-05277>). Four public comment was received during the online public meeting and numerous comments were received during the in-person public meeting or via email. All public comments were documented in the management plan's Appendix C and addressed throughout the management plan as appropriate. None were deemed controversial.

This administrative action will have no effect on listed species or essential fish habitat and has no potential to cause effect to any historic resources. No other compliance requirements are triggered by the action of approving the management plan revision. NOAA will conduct thorough environmental analysis and complete all environmental compliance requirements prior to the expenditure of subsequent federal funding requests

Categorical Exclusion Determination:

Based upon the above analysis, NOAA has determined that the action proposed falls within the CE A5 - *Updates to existing National Estuarine Research Reserve (NERR) management plans, provided that the update does not change NERR boundaries or add or significantly change allowable uses, uses requiring a permit, or restrictions on uses* - a category of actions that does not individually or cumulatively have a significant effect on the quality of the human environment; is not connected to a larger action (40 CFR 1508.25(a)); and does not involve extraordinary circumstances precluding use of the CE. As such, NOAA has determined that the approval of the reserve's management plan is categorically excluded from further NEPA review.

Attachments:

- Rookery Bay NERR MP
- Extraordinary Circumstances Evaluation Document
- Federal Consistency Determination

A.10 / Federal Consistency Determination

This appendix provides the determination from the National Oceanic and Atmospheric Administration that the revisions to this management plan will have no effects to the coastal uses or resources of Florida, and the response from Florida.



U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
Office for Coastal Management
Silver Spring Metro Center, Building 4
1305 East-West Highway
Silver Spring, Maryland 20910

December 10, 2021

Michael A. Shirley, Ph.D.
Deputy Director
Coastal Management Program Administrator
Office of Resilience and Coastal Protection
Florida Department of Environmental Protection

*Re: Coastal Zone Management Act Negative Determination
Rookery Bay National Estuarine Research Reserve 2021 – 2025 Management Plan*

Dear Dr. Shirley:

Pursuant to section 307(c)(1) of the Coastal Zone Management Act (CZMA), 16 U.S.C. § 1456(c)(1), and 15 C.F.R. § 930.35, NOAA's Office for Coastal Management, Stewardship Division, is submitting this negative determination for the federal approval of proposed revisions to the management plan for the Rookery Bay National Estuarine Research Reserve available at:
(<https://anamare.sharepoint.com/:f:/g/Eop4scXA1kVAn1bHugl0qVABPJrXRU8FWIOezzk3IBUXtg?e=8khWCH.>)
We have determined that the approval of revisions to the plan will have no effects to the coastal uses or resources of Florida.

The CZMA requires that federal actions affecting coastal uses or resources of the coastal zone of a state be consistent to the maximum extent practicable with the enforceable policies of state coastal management programs. When a federal agency determines that an activity of the agency has no coastal effects, the CZMA requirements do not apply except in those circumstances specified at 15 CFR 930.35 where a negative determination must be submitted to the state for review. The Federal Consistency regulations at 15 CFR § 930.35(a)(2) specify that a negative determination must be submitted for activities that are the same or similar to those for which effects were previously found and a consistency determination submitted to the state. In this instance, it has been determined that although a finding of coastal effects was made and a consistency determination submitted for previous management plans, the approval of the revised Rookery Bay NERR Management Plan would have no coastal effects as there are no substantive changes between the actions and priorities included in this plan and the previous management plan. The Office for Coastal Management has reviewed the State coastal policies of the Florida Coastal Management Plan (CMP) found at <<https://floridadep.gov/rcp/fcmp/content/24-florida-statutes-florida-coastal-management-program>>. Conservation, research, education, and management activities associated with the Reserve are permissible uses under the Florida CMP. Reserve management and staff collaborate closely with the Florida CMP so that activities and actions taken in support of the Rookery Bay NERR management plan are consistent with the Florida CMP. The Reserve's activities and actions comply with the Florida CMP's enforceable policies and will be conducted in a manner consistent with the Florida CMP.

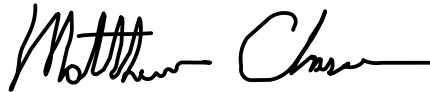
Pursuant to 15 C.F.R. § 930.35, the Florida Coastal Management Program has 60 days from the receipt of this negative determination to concur with or object to the finding of no coastal effects, with an option to extend the review an additional 15 days pursuant to 15 C.F.R. § 930.41 (b) with notice to this Office. NOAA will presume State concurrence if a decision by the state is not received by the 60th day from receipt of this determination (or 75 days if the review period is extended by the state).

Please send the State's response to:

Matt Chasse
Coastal Management Specialist
National Oceanic and Atmospheric Administration
NOS, Office for Coastal Management
1305 East West Highway, SSMC4/ 10th Floor
Silver Spring, MD 20910
and email copy to matt.chasse@noaa.gov

Please let me know if you have any questions or concerns. I can be reached at (410) 570-1020 or at [matt.chasse@noaa.gov].

Sincerely,

A handwritten signature in black ink, appearing to read "Matt Chasse", with a stylized, cursive script.

Matt Chasse
Coastal Management Specialist
National Estuarine Research Reserve System

Attachment

Cc: Keith Laakkonen, Manager, Rookery Bay National Estuarine Research Reserve



FLORIDA DEPARTMENT OF Environmental Protection

Bob Martinez Center
2600 Blair Stone Road
Tallahassee, FL 32399-2400

Ron DeSantis
Governor

Jeanette Nuñez
Lt. Governor

Shawn Hamilton
Secretary

August 9, 2022

Mr. Matt Chasse
Coastal Management Specialist
National Oceanic and Atmospheric
Administration NOS, Office for Coastal
Management
1305 East West Highway,
SSMC4/ 10th Floor Silver
Spring, MD 20910

*Re: Coastal Zone Management Act Negative Determination
Rookery Bay National Estuarine Research Reserve 2021 – 2025 Management Plan*

Dear Mr. Chasse,

The Florida Department of Environmental Protection (Department) has reviewed NOAA's Office for Coastal Management, December 10, 2021 letter regarding the proposed revisions to the management plan for the Rookery Bay National Estuarine Research Reserve (NERR).

The Department, designated as the state's lead coastal management agency pursuant to section 306(c) of the CZMA, 16 U.S.C. § 1456 (c), and § 380.22, *Florida Statutes*, hereby notifies NOAA that, pending Board of Trustees of the Internal Improvement Trust Fund approval of the Rookery Bay National Estuarine Research Reserve 2021 – 2025 Management Plan, the Department concurs (or does not object) with/to the negative determination as outlined in the referenced letter.

If you have any questions, please contact me.

Dr. Michael Shirley
Deputy Director, Office of Resilience and Coastal Protection

APPENDIX B. RESOURCES

Appendix B. Resource Data

B.1/ Acronym List

Acronym	Description	Acronym	Description
ACSC	Area of Critical State Concern	IFAS	UF's Institute of Food and Agricultural Sciences
BMP	Best Management Practice	IPCC	Intergovernmental Panel on Climate Change
B-WET	Bay Watershed Education and Training	KEEP	K-12 Estuarine Education Program
CARL	Conservation and Recreation Lands	LiDAR	light detection and ranging
CDMO	Centralized Data Management Office	NAS	National Audubon Society
CERP	Comprehensive Everglades Restoration Plan	NEPA	National Environmental Policy Act
CFR.	Code of Federal Regulations	NERR	National Estuarine Research Reserve
CISMA	Cooperative Invasive Species Management Area	NOAA	National Oceanic & Atmospheric Administration
CRCP	Coral Reef Conservation Program	NWR	National Wildlife Refuge
CSF	Conservancy of Southwest Florida	OCEAN	Ocean Conservation Education Action Network
CSO	Citizen Support Organization	OPS	Other Personal Services
CTP	Coastal Training Program	QA/QC	Quality Assurance/Quality Control
CWA	Critical Wildlife Area	ppt	parts per thousand
Florida DEP	Florida Department of Environmental Protection	RCP	Office of Resilience and Coastal Protection
Florida DRP	Florida Division of Recreation and Parks	SEACAR	Statewide Ecosystem Assessment of Coastal and Aquatic Resources
EIS	Environmental Impact Statement	SETs	Surface Elevation Tables (SETs)
ELC	Environmental Learning Center	SFWMD	South Florida Water Management District
ESA	Endangered Species Act	SLR	sea-level rise
F.A.C.	Florida Administrative Code	SOC	Save Our Coast
FGCU	Florida Gulf Coast University	SSAM-1	Sentinel Site Application Module 1
FIU	Florida International University	STEAM	Summer Institute for Marine Science
FLEPPC	Florida Exotic Pest Plant Council	SWMP	System-Wide Monitoring Program
FISC	Florida Invasive Species Council	TNC	The Nature Conservancy
FLUCCS	Florida Land Use Cover Classifications	TOTE	Teachers on the Estuary
FNAI	Florida Natural Areas Inventory	TPL	Trust for Public Land
FORB	Friends of Rookery Bay, Inc.	UF	University of Florida
F.S.	Florida Statute	USDA	U.S. Department of Agriculture
FWC	Florida Fish and Wildlife Conservation Commission	USFWS	U.S. Fish and Wildlife Service
GIS	geographic information system	USGS	U.S. Geological Survey
GOES	Geostationary Operational Environmental Satellites	WMD	Water Management District
HOA	home-owners' association	YBP	years before present

B.2 / Glossary

References to these definitions can be found at the end of this list and in Appendix B.3.

- Aboriginal** The original biota of a geographical region (Lincoln, Boxshall & Clark 2003).
- Anaerobic** Growing or occurring in the absence of molecular oxygen (Lincoln et al. 2003).
- Aquaculture** The cultivation of aquatic organisms (Lincoln et al. 2003).
- Codify** To arrange laws and rules systematically (Neufeldt & Sparks 1990).
- Diversity** A measure of the number of species and their relative abundance in a community (Lincoln et al. 2003).
- Drainage Basin (Catchment)** The area from which a surface watercourse or a groundwater system derives its water; watershed (Allaby 2005).
- Easement** A right that one may have in another's land (Neufeldt & Sparks 1990).
- Ecosystem** A community of organisms and their physical environment interacting as an ecological unit (Lincoln et al. 2003).
- Emergent** An aquatic plant having most of the vegetative parts above water; a tree which reaches above the level of the surrounding canopy (Lincoln et al. 2003).
- Endangered Species** An animal or plant species in danger of extinction throughout all or a significant portion of its range (U.S. Fish and Wildlife Service [USFWS] 2005).
- Endemic** Native to, and restricted to, a particular geographical region (Lincoln et al. 2003).
- Estuary** Expanse of brackish water, water in which fresh water off the land mixes with the sea's salt water (Whitney et al. 2004).
- Extinction** The disappearance of a species from a given habitat. (Lincoln et al. 2003)
- Exotic** Species that have been introduced into Florida from other parts of the world where they are native (Whitney et al. 2004).
- Fauna** The animal life of a given region, habitat or geological stratum (Lincoln et al. 2003).
- Flora** The plant life of a given region, habitat or geological stratum (Lincoln et al. 2003).
- Geographic Information System (GIS)** - computer system supporting the collection, storage, manipulation and query of spatially referred data, typically including an interface for displaying geographical maps (Lincoln et al. 2003).
- Hydric** Pertaining to water; wet (Lincoln et al. 2003).
- Infauna** The animal life within a sediment; epifauna (Lincoln et al. 2003).
- Intertidal Zone** The shore zone between the highest and lowest tides; littoral (Lincoln et al. 2003).
- Invasive** Species that has been introduced into a geographic region (in this case, Florida) from elsewhere and has been determined to cause environmental or economic harm in its introduced range. (Elton 1958)

Listed Species	A species, subspecies, or distinct population segment that has been added to the federal list of endangered and threatened wildlife and plants (USFWS 2005).
Mandate	An order or command; the will of constituents expressed to their representative, legislature, etc. (Neufeldt & Sparks 1990).
Mesic	Pertaining to conditions of moderate moisture or water supply; used of organisms occupying moist habitats (Lincoln et al. 2003).
Mosaic	An organism comprising tissues of two or more genetic types; usually used with reference to plants (Lincoln et al. 2003).
Native	Population of a given species that has existed in Florida prior to European arrival and has adapted to local conditions, including the presence of other native species (Whitney et al. 2004).
Population	All individuals of one or more species within a prescribed area. A group of organisms of one species, occupying a defined area and usually isolated to some degree from other similar groups (Lincoln et al. 2003).
Psammophyte	A plant growing or moving in unconsolidated sand (Lincoln et al. 2003).
Ruderal	Pertaining to or living amongst rubbish or debris or inhabiting disturbed sites (Lincoln et al. 2003). (FNAI describes ruderal as areas impacted by development measures such as roadways, drainage ditches, navigational channels or are considered hydrological alterations.)
Runoff	The portion of precipitation that is not held in the soil but drains freely away (Lincoln et al. 2003).
Salinity	A measure of the total concentration of dissolved salts in seawater (Lincoln et al. 2003).
Sessile	Non-motile; permanently attached at the base (Lincoln et al. 2003).
Species	A group of organisms, minerals or other entities formally recognized as distinct from other groups; the basic unit of biological classification (Lincoln et al. 2003).
Species of Concern	An informal term referring to a species that might be in need of conservation action. This may range from a need for periodic monitoring of populations and threats to the species and its habitat, to the necessity for listing as threatened or endangered. Such species receive no legal protection and use of the term does not necessarily imply that a species will eventually be proposed for listing. "Imperiled species" is another general term for listed as well as unlisted species that are declining (USFWS 2005).
Stakeholder	Any person or organization who has an interest in the actions discussed or is affected by the resulting outcomes of a project or action (USFWS 2005).
Subtidal	Environment which lies below the mean low water level (Allaby 2005).
Supratidal	The zone on the shore above mean high tide level (Lincoln et al. 2003).
Threatened Species	An animal or plant species likely to become endangered within the foreseeable future throughout all or a significant portion of its range (USFWS 2005).

Turbid	Cloudy; opaque with suspended matter (Lincoln et al. 2003).
Upland	Land elevated above other land (Neufeldt & Sparks 1990).
Vegetation	Plant life or cover in an area; also used as a general term for plant life (Lincoln et al. 2003).
Water Column	The vertical column of water in a sea or lake extending from the surface to the bottom (Lincoln et al. 2003).
Watershed	An elevated boundary area separating tributaries draining into different river systems; drainage basin (Lincoln et al. 2003).
Wetland	An area of low-lying land, submerged or inundated periodically by fresh or saline water (Lincoln et al. 2003).
Wildlife	Any undomesticated organisms; wild animals (Allaby 2005).
Xeric 2003).	Having very little moisture; tolerating or adapted to dry conditions (Lincoln et al.

B.3 / References

- Adams, C.R. and N.M. Steigerwalt (2010). Research Needs and Logistic Impediments in Restoration, Enhancement, and Management Projects: A Survey of Land Managers. Publication ENH1161, Environmental Horticulture Department, Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida, Gainesville, FL. Accessed 10/23/19 online at <https://ufdc.ufl.edu/IR00003275/00001>.
- Allaby, M. (Ed.) (2005). *Oxford Dictionary of Ecology* (3rd ed.). Oxford University Press, Oxford, UK.
- Barry, M.J., A. Hartley, and B. McCartney (2013). Vegetation mapping at Rookery Bay National Estuarine Research Reserve. Report submitted to Friends of Rookery Bay, Inc., Naples, FL, by The Institute for Regional Conservation, Delray Beach, FL.
- Below, T.H. and M.P. Kahl (1979). Avian Utilization of Wetlands in the Vicinity of Marco Island, Florida, Appendix A. ill in: The Draft Environmental Impact Statement for Deltona Corporation's Residential Development in Wetlands Near Marco Island, Florida.
- Blewett, D.A. and P.W. Stevens (2014). Temperature variability in a subtropical estuary and implications for common snook *Centropomus undecimalis*, a cold-sensitive fish. *Gulf of Mexico Science* 2014:44–54.
- Board of Trustees of the Internal Improvement Trust Fund, F.S. § 253.03 (1967).
- Briggs, J.E. (1974) *Maine Zoogeography*. McGraw-Hill, St. Louis, MO.
- Boucek, R.E. and J.S. Rehage (2014). Climate extremes drive changes in functional community structure. *Global Change Biology* 20:1821–1831.
- Brown, R.C. (1994). *Florida's First People. 12,000 Years of Human History*. Pineapple Press, Inc., Sarasota, FL.
- Byrne, M.J. Sr. and M.R. Dickman. (2019). Monitoring Storm Tide and Flooding from Hurricane Irma along the U.S. Virgin Islands, Puerto Rico, and the Southeastern United States, September 2017. U.S. Geological Survey Report 2019-1013, U.S. Geological Survey, Reston, VA. Available online at <https://pubs.usgs.gov/of/2019/1013/ofr20191013.pdf>.
- Carpenter, J. and P.W. Larsen (1979). An Approach to Estimating the Relative Importance of Allochthonous and Autochthonous Materials to Estuarine Production in the Marco Island Area, Appendix B. ill in: The Draft Environmental Impact Statement for Deltona Corporation's Residential Development in Wetlands Near Marco Island, Florida.
- Clean Water Act. 33 U.S.C. § 1251-1387 (1972).
- Coastal Zone Management Act of 1972, 16 U.S.C. § 1451-1464 et seq. (West 1982 & Supp. 1988).
- Collier County (2009). Tourism Statistics [online resource]. Accessed online at <https://www.colliercountyfl.gov/your-government/divisions-s-z/tourism/tourism-statistics>.
- Collier County Tourist Development Council (2019). 2018 Tourist Impact Facts [online resource]. Accessed online at https://www.paradisecoast.com/sites/default/files/annual_tourism_impact_facts_2018_ada.pdf.
- Conservation Foundation, The (1968). Rookery Bay Area Project. The Conservation Foundation, Washington, DC.

- Courtney, C.M. (1979). A Standing Crop Determination for Fishes of a Saline Golf Course Drainage Pond – Marco Island, Florida, Appendix C. ill in: The Draft Environmental Impact Statement for Deltona Corporation's Residential Development in Wetlands Near Marco Island, Florida.
- Daddio, E. and J. van der Kreeke (1979). Carbon Export from a South Florida Wetland Area, Appendix E. ill in: The Draft Environmental Impact Statement for Deltona Corporation's Residential Development in Wetlands Near Marco Island, Florida.
- Davis, R.A. (1997). Geology of the Florida coast. Pp. 155–168 in: The Geology of Florida (A.F. Randazzo and D.S. Jones, eds.), University Press of Florida, Gainesville, FL.
- Dragovitch, A. (1963). Hydrology and plankton of coastal waters at Naples, Florida. Quarterly Journal of the Florida Academy of Sciences 26:22–47.
- Dragovitch, A., J.H. Finucane, and B.Z. May (1969). Counts of red tide organisms, *Gymnodium breve*, and associated oceanographic data from Florida west coast. 1957-1959. USFWS, Special Scientific Report-Fisheries No. 369, Washington, D.C.
- Dunion, J.P., C.W. Landsea, S.H. Houston, and M.D. Powell (2003). A reanalysis of the surface winds for Hurricane Donna of 1960. Monthly Weather Review 131:1992–2011.
- Elton. C.S. (1958). The Ecology of Invasions by Animals and Plants. Methuen and Co., Ltd., Strand, London.
- Finan, D.S. (1979). A Standing Crop Determination for the Fishes of Lake Marco Shores, Marco Island, Florida, Appendix F in: The Draft Environmental Impact Statement for Deltona Corporation's Residential Development in Wetlands Near Marco Island, Florida.
- Finan, D.S. and C.M. Finan (1979). A Preliminary Study of the Macroinvertebrate Populations in the Marsh Area of Unit 30, Appendix G in: The Draft Environmental Impact Statement for Deltona Corporation's Residential Development in Wetlands Near Marco Island, Florida.
- Finucane J. H. and A. Dragovitch (1959). Counts of Red Tide Organisms and Associated Oceanographic Data from Florida West Coast, 1954-1959. USFWS, Special Scientific Report-Fisheries #289, Washington, D.C.
- Florida Aquatic Preserve Act of 1975, F.S. § 258.35-258.46 (1975).
- Florida Department of Natural Resources. (1985). Guana River State Land Conceptual Plan. FDNR, Division of Recreation and Parks, Tallahassee, FL.
- Florida Department of Natural Resources (1988). Rookery Bay and Cape Romano - Ten Thousand Islands Aquatic Preserves, Management Plan. Bureau of Aquatic Preserves, Division of State Lands, Tallahassee, FL. Available online at <https://www.govinfo.gov/content/pkg/CZIC-qh91-75-f6-r66-1988/pdf/CZIC-qh91-75-f6-r66-1988.pdf>.
- Florida, Department of Transportation (1999). Florida Land Use Cover and Forms Classification System: Handbook. FDOT Surveying and Mapping Office, Thematic Mapping Section, Tallahassee, FL.
- Florida Natural Areas Inventory (1990). Matrix of Habitats and Distribution by County of Rare/Endangered Species In Florida. FNAI, Tallahassee, FL
- Florida Natural Areas Inventory and Florida Department of Natural Resources (2010). Guide to the Natural Communities of Florida. FNAI and FDNR, Tallahassee, FL.

- Ford, W.M., K.R. Russell, and C.E. Moorman (eds.). (2002) The Role of Fire in Nongame Wildlife Management and Community Restoration: Traditional Uses and New Directions; Proceedings of a Special Workshop. Proceedings of 15 Sep 200 workshop, Nashville TN, published by USDA Forest Service, Northeastern Research Station, Newtown Square, PA. Available online at https://www.nrs.fs.fed.us/pubs/gtr/gtr_ne288/gtr_ne288.pdf.
- Gentry, R.C. (1974). Hurricanes in South Florida. Gleason, P.J. (ed.) Environments of South Florida: Past and Present. Miami Geological Society, Miami, FL.
- Gilliland, M.S. (1975). The Material Culture of Key Marco, Florida. The University Presses of Florida, Gainesville, FL.
- Gore, R.H. (1984). Natural Resources of Collier County Florida. Part 3. Coastal Estuarine Resources Department. Natural Resource Management Technical Report 84-3.
- Government-in-the-Sunshine Law, F.S. § 286.011 (1976).
- Heald, E.J. (1978). Biological Impact of Development on Specific Permit Areas in the Vicinity of Marco Island," Florida, Appendix J in: The Draft Environmental Impact Statement for Deltona Corporation's Residential Development in Wetlands Near Marco Island, Florida.
- Heald, E.J. (1979). Natural Resources Assessment of Specific Permit Areas in the Vicinity of Marco Island, Florida, Appendix I in: The Draft Environmental Impact Statement for Deltona Corporation's Residential Development in
- Heald, E.J. (1981). Floral Description of the Marco Shores Development Site, pp. 212–218 in: R.D. Cross and Williams (eds.), Proceedings of the National Symposium on Freshwater Inflow to Estuaries. FWS/ OBS-81/04, USFWS, Washington, D.C.
- Hedgepeth, J.W. (1953). An Introduction to the Zoogeography of the Northwestern Gulf of Mexico. Public Institute of Marine Science 3 (1):111–124.
- Huber, W.C. and P.L. Brezonik (1979). Preliminary Assessment of Projected Water Quality in Man-made Lakes and Waterways of Unit 24 and Unit 30 Developments, Near Marco Island, Florida, Appendix K in: The Draft Environmental Impact Statement for Deltona Corporation's Residential Development in Wetlands Near Marco Island, Florida.
- Huber, W.C. and P.L. Brezonik (1981). Water Budget and Projected Water Quality in Proposed Man-made Lakes Near Estuaries in the Marco Island Area, Florida, pp. 241–251 in: Cross, R.D & D.L. Williams (eds.) Proceedings of the National Symposium on Freshwater Inflow to estuaries. FWS/OBS-81/04, USFWS, Washington, D.C.
- Jordan, C.L. (1973). The Physical Environment, Part II (A). Climate. In: Jones, J.I., R.E. Ring, M.O. Rinkel and R.E. Smith (eds.) A Summary of Knowledge of the Eastern Gulf of Mexico.
- Kawula, R. (2009). Florida Land Cover Classification System. Final report from State Wildlife Grant, SWG T-13, FWC, Tallahassee, FL.
- Kozuch, L. (1993). Sharks and Shark Products in Prehistoric South Florida. Monograph 2, Institute of Archaeology and Paleoenvironmental Studies, University of Florida, Gainesville, FL.
- Larsen, P.W. (1979). An Estimate of Water Budget Changes Due to Construction of Deltona's Proposed Unit 30 Project, Appendix L in: The Draft Environmental Impact Statement for Deltona Corporation's Residential Development in Wetlands Near Marco Island, Florida.

- Lee, T.B. and B. Yokel (1973). Hydrography and Beach Dynamics. Rookery Bay Land Use Studies, Study NO.4. The Conservation Foundation, Washington, D.C.
- Leighty, R.G. (1954). Soil Survey of Collier County, Florida. Series 1942, No. 8, U.S. Department of Agriculture, Soil Conservation Service and Florida Agricultural Experiment Station.
- Liudahl, K., D.J. Belz, L. Carey, R.W. Drew, S. Fisher, and R. Pate (1998). Soil Survey of Collier County Area, Florida. Series 1998, U.S. Department of Agriculture, Natural Resources Conservation Service in cooperation with University of Florida, Institute of Food and Agricultural Sciences, Agricultural Experiment Stations, and Soil and Water Science Department, and Florida Department of Agriculture and Consumer Services.
- Lugo, A. (1980). Mangrove ecosystems: successional or steady state? *Biotropica* 12: 65-72.
- Lugo, A.E., G. Evink, M.M. Brinson, A. Broce, and S.C. Snedaker (1973). Diurnal Rates of Photosynthesis, Respiration and Transpiration in Mangrove Forests of South Florida, pp. 01-45. The role of mangrove ecosystems in the maintenance of environmental quality and a high productivity of desirable fisheries. Final Report to the USFWS, Contract No. 14-16-008-606. University of Florida, Gainesville, FL.
- Lugo, A.E., M. Sell, and S.C. Snedaker (1973). Mangrove Ecosystem Analyses, pp. E1-60. The role of mangrove ecosystems in the maintenance of environmental quality and a high productivity of desirable fisheries. Final Report to the USFWS, Contract No. 14-16-008-606. University of Florida, Gainesville, FL.
- Lugo, A.E. and S.C. Snedaker (1975). Properties of a Mangrove Forest in Southern Florida, pp. 170-212 In: *Biology and Management of Mangroves*. Proc. 1st Int. Sym. on Mangroves. University of Florida, Gainesville, FL.
- MacNeil, F.S. (1950). Pleistocene Shore Lines in Florida and Georgia. Geological Survey Professional Paper 221-F, U.S. Department of the Interior, Geological Survey, U.S. Government Printing Office, Washington, D.C. Available online at <https://pubs.usgs.gov/pp/0221f/report.pdf>.
- McCoy, H.J. (1962). Ground Water Resources of Collier County, Florida. Florida Geological Survey, Information Circ. No. 51.
- McKenney, C.L. Jr., P.S. Harris, M.A. Shirley, and R.H. Pierce (1996). Altered Lipid Composition in the Hepatopancreas of Fiddler Crabs in Relation to Mosquito Control Pesticide Residues. *Amer. Zool.* 36(5)109A.
- Muller, J. W., Hardin, E. D., Jackson, D. R., Gatewood, S. E., and Caire, N. (1989). Summary Report on the Vascular Plants, Animals and Plant Communities Endemic to Florida. Technical Report No. 7, Florida Game and Fresh Water Fish Commission, Nongame Wildlife Program, Tallahassee, FL.
- Nalley, N.D., E. Langston, and T.E. Hopkins (1997). Resource Damage Assessment of the Ten Thousand Island National Wildlife Refuge Following Hurricane Andrew. Final Data Report prepared for USFWS, Rookery Bay National Estuarine Research Reserve, and Florida Department of Environmental Protection, Naples FL.
- Naples, Marco Island, and Everglades Convention and Visitors Bureau (2010). Accessed online at <https://www.visitflorida.com/en-us/listing.a0t40000007ulOXAAAY.html>.
- National Estuarine Research Reserve System Regulations, 15 C.F.R. § 921 (2003).

- Natural Resources Conservation Service (2019). Web Soil Survey [online soils spatial database]. U.S. Department of Agriculture, Natural Resources Conservation Service accessed online at <https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx>.
- National Oceanic and Atmospheric Administration (1977). Final Environmental Impact Statement, Proposed Estuarine Sanctuary Grant Award for Rookery Bay, Collier County, Florida, to State of Florida. NOAA, Office of Coastal Zone Management, Department of Commerce, Washington, D.C.
- National Oceanic and Atmospheric Administration (1982). Local Climatological Data, Annual Summary and Comparative Data. NOAA, Jacksonville, FL.
- National Oceanic and Atmospheric Administration (2016). Employment: Living Resources [online resource]. Accessed online at <https://coast.noaa.gov/enowexplorer/#/employment/living/resources/2016/12021>.
- National Oceanic and Atmospheric Administration. (2020). Reserve System Management Plan Guidelines and Resources [in press; expected by the end of 2020].
- Natural Resources Conservation Service (2019). Web Soil Survey [online soils spatial database]. U.S. Department of Agriculture, Natural Resources Conservation Service website accessed online at <https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx>.
- Neufeldt, V. and A.N. Sparks (1990). Merriam-Webster's New World Dictionary (3rd Ed.). Merriam-Webster, Inc., Cleveland, OH.
- PBS&J. (2010). Technical Memorandum, Watershed Model Update and Plan Development. PBS&J, Fort Myers, FL. Accessible online at <https://www.colliercountyfl.gov/Home/ShowDocument?id=31257>.
- Poole, D.J. and A.E. Lugo (1973). Litter Production in Mangroves, In: A.E. Lugo and S.C. Snedaker (eds.), pp. G1-35, The role of mangrove ecosystems in the maintenance of environmental quality and a high productivity of desirable fisheries. Final Report to the USFWS, Contract No. 14-16-008-606. University of Florida, Gainesville, FL.
- Poole, D.J., A.E. Lugo, and S.C. Snedaker (1975). Litter Production in Mangrove Forests of Southern Florida and Puerto Rico, pp. 213-237. In: Biology and management of mangroves. Proc. 1st Int. Sym. on Mangroves. Univ. Florida, Gainesville, FL.
- Poole, D.J., S.C. Snedaker, and A.E. Lugo (1977). Structure of mangrove forests in Florida, Puerto Rico, Mexico and Costa Rica. *Biotropica* 9:195-2112.
- Poulakis, G.R., P.W. Stevens, A.A. Timmers, T.R. Wiley, and C.A. Simpfendorfer (2011). Abiotic affinities and spatiotemporal distribution of the endangered smalltooth sawfish, *Pristis pectinata*, in a south-western Florida nursery. *Marine and Freshwater Research* 62:1165–1177.
- Rayer, S. and Y. Wang. (2019). Population projections by age, sex, race, and Hispanic origin for Florida and its counties, 2020–2045, with estimates for 2018. Bureau of Economics and Business Research, Florida Population Studies, Bulletin 184, University of Florida, Gainesville, FL. Accessible online at https://www.bebr.ufl.edu/sites/default/files/Research%20Reports/projections_2019_asrh.pdf.
- Rayer, S. and Y. Wang. (2020). Projections of Florida populations by county, 2020–2045, with estimates for 2019. Bureau of Economics and Business Research, Florida Population

- Studies, Volume 53, Bulletin 186, University of Florida, Gainesville, FL. Accessible online at https://www.bebr.ufl.edu/sites/default/files/Research%20Reports/projections_2020.pdf.
- Research Data Services, Inc. (2018). Naples, Marco Island, Everglades Convention and Visitors Bureau 2018 Calendar Year Visitor Profile [online resource]. Report by Research Data Services, Inc., Tampa, FL, for Collier County Board of County Commissioners and Naples, Marco Island, Everglades Convention and Visitors Bureau, Naples, FL. Accessed online at https://www.paradisecoast.com/sites/default/files/annual_stats_-_all_categories_2018_ada.pdf.
- Rutchev, K., T.N. Schall, R.F. Doren, A. Atkinson, M.S. Ross, D.T. Jones, M. Madden, L. Vilchek, K.A. Bradley, J.R. Snyder, J.N. Burch, T. Pernas, B. Witcher, Milo Pyne, Rickie White, T. J. Smith III, J. Sadle, C.S. Smith, M.E. Patterson, and G.D. Gann (2006). Vegetation Classification for South Florida Natural Areas. Open-File Report 2006-1240. US Geological Survey, St. Petersburg, FL.
- Schwadron, M. (2010). Landscapes of Maritime complexity: Prehistoric Shell Work Sites of the Ten Thousand Islands, Florida. PhD thesis submitted to the Department of Archaeology and Ancient History, University of Leicester, Leicester, UK.
- Schwadron, M. (2017). Shell works, prehistoric terraformed communities of the Ten Thousand Islands, Florida. *Hunter Gatherer Research* 3(1):31–63.
- Shirley, M.A. and C.L. McKenney (1994). Evaluation of Xanthid Population Dynamics and Energy Metabolism as Indices of Environmental Degradation. Final Report #NA20r0214-01, Submitted to NOAA, OCRM, Sanctuaries and Reserves Division.
- Shirley, M.A., C.L. McKenney Jr., and R. H. Pierce (1996). Assessing the Impact of ULV Applications of Baytex on Non-Target Estuarine Species. In: *Proceedings, The 3rd Annual Workshop on Salt Marsh Management and Research*. Vero Beach, FL.
- Shirley, M., J. Haner, H. Stoffel, and H. Flanagan (1997). Rookery Bay National Estuarine Research Reserve and Ten Thousand Islands Aquatic Preserve: Estuarine Habitat Assessment. Final Report #NA670Z0463. Florida Department of Community Affairs, Florida Coastal Zone Program.
- Smith, T.J. III. 1993. An Environmental Characterization of the Rookery Bay National Estuarine Research Reserve. Phase 1, Final Report Grant # NA17ORO326-01. Rookery Bay National Estuarine Research Reserve, Florida Department of Environmental Protection, Naples, FL.
- Smith, T.J. III, and K.R.T. Whelan (1993). Vegetation Dynamics in the Land-Margin Ecosystems: The Mangroves of South Florida.
- Smith, T.J. III, A.M. Foster, P.R. Briere, and J.W. Jones (2004). Historic Aerial Photography of the Greater Everglades Archive and Geodatabase Development US Department of the Interior US Geological Survey Fact Sheet 2004-3139.
- Snedaker, S.C. and D.J. Poole (1973). Mangrove Forest Types and Biomass, pp. C113, *The Role of Mangrove Ecosystems in the Maintenance of Environmental Quality and a High Productivity of Desirable Fisheries*. Final Report to the USFWS, Contract No. 14-16-008-606. University of Florida, Gainesville, FL.
- Sovereignty Submerged Lands Management, 18-21, FAC (2007).
- Surface Water Quality Standards, 62-302, FAC (2006).

- Tabb, D.C., E.J. Heald, and G.L. Beardsley (1977). Natural Resource Assessment of Marco Mainland Properties Tract, Appendix N lo. In: The Draft Environmental Impact Statement for Deltona Corporation's Residential Development in Wetlands Near Marco Island, Florida.
- Tabb, D.C. and R.B. Manning (.1961). A Checklist of the Flora and Fauna of Northern Florida Bay and Adjacent Brackish Waters of the Florida mainland. Ball. Marine Science, Gulf Caribbean.
- Tebeau, C.W. (1971). A History of Florida. University of Miami Press, Coral Gables, FL.
- The Randall Act, Chapter 67-393 Laws of Florida (1967).
- Thoemke, K.W. and K.P. Gyorkos (1988a). An Analysis of Nutrient, Chlorophyll, Heavy Metal, and Pesticide Levels in Rookery Bay National Estuarine Research Reserve. Final Report to NOAA, MEMD. Grant # NA83AA-D-CI060.
- Thoemke, K.W. and K.P. Gyorkos (1988b). Distribution and Abundance of Benthic Invertebrates in Rookery Bay National Estuarine Research Reserve. Final Report to NOAA, MEMD. Grant # NA83AA-D-CI060.
- Thomas, T.M. (1974), A detailed analysis of climatological and hydrological records of south Florida with reference to man's influence upon ecosystem evolution, in: Gleason, P.J., ed., Environment of south Florida--Present and past: Miami, FL, Miami Geological Society Memoir 2, p. 82–122.
- Twilley, R.R. (1982). Litter Dynamics and Organic Carbon Exchange in Black Mangrove (*Avicennia germinans*) Basin Forests in a Southwest Florida Estuary. Ph.D. Dissertation. University of Florida, Gainesville, FL.
- Twilley, R.R. (1985). The exchange of organic carbon in basin mangrove forests in a southwest Florida estuary. Estuarine, Coastal & Shelf Science 20:543–557.
- Twilley, R.R., A.E. Lugo, and C. Patterson-Lucca (1986). Litter production and turnover in basin mangrove forests in southwest Florida. Ecology 67:670-683.
- Twilley, R.R., and G.D. Steyer (1988). Litter Dynamics and Nutrient Cycling Efficiency Among Overwash, Fringe and Basin Mangrove Forests in Rookery Bay, Final Report. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Washington, D.C.
- U.S. Census Bureau. (2000). Population Data for Census Block Groups. Washington, DC.
- USFWS, Endangered Species Program (2005). Endangered Species Glossary [online resource]. Accessed online at <https://www.fws.gov/midwest/endangered/glossary/index.html>.
- Wanless, H.R. (1974). Sediments in natural and artificial waterways, Marco Island area, Florida. University of Miami, Rosenstiel School of Marine & Atmospheric Sciences, Scientific Report UM-RSMAS #74032. Miami, FL.
- Water Quality Standards, 17-3, FAC (2007).
- Water Resources Data (1983). Water Year 1983 – Volume 2A. United States Geologic Survey.
- Weinstein, M.P., C.M. Courtney, and J.C. Kinch (1977). The Marco Island estuary: A summary of physicochemical and biological parameters. Florida Scientist 40:97–124.

Yokel, B.J. (1975). Estuarine Biology. Rookery Bay Land Use Studies, Study NO.5. The Conservation Foundation, Washington, D.C.

B.4 / Species Lists

B.4.1 / Threatened and Endangered Species in Rookery Bay National Estuarine Research Reserve

Common Name	Scientific Name	Federal Status	State Status	FNAI Global	FNAI State	FNAI Habitats
Mammals						
Florida Bonneted Bat	<i>Eumops floridanus</i>	E	E	G1	S1	HFU, HPS, PF, CU, FFW, MEVW
Humpback Whale*	<i>Megaptera novaeangliae</i>	E	E			ME
Florida Panther	<i>Puma concolor coryi</i>	E	E	G5T1	S1	HFU, HPS, PF, CU, FFW, MEVW
Big Cypress Fox Squirrel	<i>Sciurus niger avicennia</i>		T	G5T2	S2	HFU, HPS, PF, CU, FFW, MEVW
West Indian Manatee	<i>Tricheus manatus</i>	T	T	G2	S2	ME
Birds						
Florida Sandhill Crane	<i>Antigone canadensis pratensis</i>		T	G5T2T3	S2S3	FFW
Florida Burrowing Owl	<i>Athene cunicularia floridana</i>		T	G4T3	S3	CU
Red Knot	<i>Calidris canutus rufa</i>	T	T	G4T2	S2N	CU, ME
Crested Caracara	<i>Caracara cheriway</i>	T	T	G5	S2	HPS, PF, FFW, MEVW
Piping Plover	<i>Charadrius melodus</i>	T	T	G3	S2	CU, ME
Snowy Plover	<i>Charadrius nivosus</i>		T	G3	S1	CU, ME
Little Blue Heron	<i>Egretta caerulea</i>		T	G5	S4	FFW, MEVW, ME
Reddish Egret	<i>Egretta rufescens</i>		T	G4	S2	MEVW, ME
Tricolored Heron	<i>Egretta tricolor</i>		T	G5	S4	FFW, MEVW, ME
American Oystercatcher	<i>Haematopus palliatus</i>		T	G5	S2	MEVW, ME
Wood Stork	<i>Mycteria americana</i>	T	T	G4	S2	FFW, MEVW
White-crowned Pigeon	<i>Patagioenas leucocephala</i>		T	G3	S3	HFU, CU, MEVW
Roseate Spoonbill	<i>Platalea ajaja</i>		T	G5	S2	FFW, MEVW, ME
Everglades Snail Kite	<i>Rostrhamus sociabilis plumbeus</i>	E	E	G4G5	S2	FFW
Black Skimmer	<i>Rynchops niger</i>		T	G5	S3	CU, ME
Roseate Tern*	<i>Sterna dougallii</i>	T	T	G4	S1	CU, ME
Least Tern	<i>Sternula antillarum</i>		T	G4	S3	CU, ME

Common Name	Scientific Name	Federal Status	State Status	FNAI Global	FNAI State	FNAI Habitats
Reptiles						
Loggerhead Sea Turtle	<i>Caretta caretta</i>	T	T	G3	S3	CU, ME
Green Sea Turtle	<i>Cheolonia mydas</i>	T	T	G3	S2S3	CU, ME
American Crocodile	<i>Crocodylus acutus</i>	T	T	G2	S2	CU, MEVW, ME
Leatherback Sea Turtle*	<i>Dermochelys coriacea</i>	E	E	G2	S2	CU, ME
Eastern Indigo Snake	<i>Drymarchon couperi</i>	T	T	G3Q	S3	HFU, HPS, PF, CU, FNFV, FFW, MEVW
Hawksbill Sea Turtle x Loggerhead Sea Turtle*	<i>Eretmochelys imbricata</i> x <i>Caretta caretta</i>	E/T	E/T	G3	S1/S3	ME
Gopher Tortoise	<i>Gopherus polyphemus</i>	C	T	G3	S3	HFU, HPS, PF, CU
Kemp's Ridley Sea Turtle	<i>Lepidochelys kempii</i>	E	E	G1	S1	ME
Fish						
Smalltooth Sawfish	<i>Pristis pectinata</i>	E	E			ME

Common Name	Scientific Name	Federal Status	State Status	FNAI Global	FNAI State	IRC S. FL	FNAI Habitats
Plants							
Barbedwire cactus	<i>Acanthocereus tetragonus</i>		T			SF3	HFU, CU
Golden leather fern	<i>Acrostichum aureum</i>		T	G5	S3	SF3	FNFW, FFW, MEVW
Curtiss' milkweed	<i>Asclepias curtissii</i>		E			SF2	HFU, PF, HPS
Many-flowered grasspink	<i>Calopogon multiflorus</i>		T	G2G3	S2S3	SF2	PF, HPS
West Indian cock's-comb	<i>Celosia nitida</i>		E			SF3	HFU, CU
Iguana hackberry	<i>Celtis iguanaea</i>		E	G5	S1	SF1	CU
Satinleaf	<i>Chrysophyllum oliviforme</i>		T			SF3	HFU, CU
Florida flatsedge	<i>Cyperus filiformis</i>		E	G4G5	S1	SF2	CU
Ghost orchid	<i>Dendrophylax lindenii</i>		E	G2G4	S2		HFU, CU, FFW
Butterfly orchid	<i>Encyclia tampensis</i>		CoE				HFU, HPS, PF, CU, FFW, MEVW
Dingy-flowered epidendrum	<i>Epidendrum anceps</i>		E			SF2	HFU, CU, FFW
Night-scented star orchid	<i>Epidendrum nocturnum</i>		E	G4G5	S2		HFU, CU, FFW
Rigid epidendrum	<i>Epidendrum rigidum</i>		E			SF2	HFU, CU, FFW
Sand dune spurge	<i>Euphorbia cumulicola</i>		E	G2	S2	SF2	HPS, CU
Wild cotton	<i>Gossypium hirsutum</i>		T				HFU, CU
Nodding pinweed	<i>Lechea cernua</i>		T	G3	S3		HPS
Pine lily	<i>Lilium catesbaei</i>		T				PF
Nodding clubmoss	<i>Lycopodiella cernua</i>		CoE			SF2	PF, FNFW, FFW
Florida mayten	<i>Maytenus phyllanthoides</i>		T				CU, MEVW
Blodgett's swallowwort	<i>Metastelma blodgettii</i>		T				HFU, PF, HPS, CU
Simpson's stopper	<i>Myrcianthes fragrans</i>		T				CU
Southern lip fern	<i>Myriopteris microphylla</i>		E	G5	S3	SF1	CU
Hand fern	<i>Ophioglossum palmatum</i>		E	G4	S2	SF2	HFU, CU, FFW
Shell mound prickly pear	<i>Opuntia stricta</i>		T				CU
Giant orchid	<i>Orthochilus ecristatus</i>		T	G2G3	S2		HFU, HPS, PF

Common Name	Scientific Name	Federal Status	State Status	FNAI Global	FNAI State	IRC S. FL	FNAI Habitats
Plants (continued)							
Cinnamon fern	<i>Osmundastrum cinnamomeum</i>		CoE				FNFW, FFW
Coral panic grass	<i>Paspalidium chapmanii</i>		E				HFU, CU
Keys blackbead	<i>Pithecellobium keyense</i>		T				CU
Greater yellowspike orchid	<i>Polystachya concreta</i>		E				HFU, CU, FFW
Clamshell orchid	<i>Prosthechea cochleata</i>		E	G4G5	S2	SF2	HFU, CU, FFW
Florida royal palm^	<i>Roystonea regia</i>		E	G2G3	S2		HFU, FFW
Inkberry	<i>Scaevola plumieri</i>		T				CU
Saw palmetto	<i>Serenoa repens</i>		CoE				HFU, HPS, PF
Mullein nightshade	<i>Solanum donianum</i>		T				HFU, CU
Showy dawnflower	<i>Stylisma abdita</i>		E	G3	S3	SF1	HPS
West Indian mahogany^	<i>Swietenia mahagoni</i>		T	G3G4	S3		HFU, CU
Florida thatch palm	<i>Thrinax radiata</i>		E	G4G5	S2		CU
Reflexed wild-pine	<i>Tillandsia balbisiana</i>		T				HFU, HPS, PF, CU, FFW, MEVW
Common wild-pine	<i>Tillandsia fasciculata</i>		E				HFU, HPS, PF, CU, FFW, MEVW
Twisted airplant	<i>Tillandsia flexuosa</i>		T	G5	S3		HFU, HPS, PF, CU, FFW, MEVW
Fuzzy-wuzzy airplant	<i>Tillandsia pruinosa</i>		E	G4	S1	SF1	HFU, CU FFW
Giant airplant	<i>Tillandsia utriculata</i>		E				HFU, HPS, PF, CU, FFW, MEVW
Soft-leaved wild-pine	<i>Tillandsia variabilis</i>		T				HFU, CU, FFW
Poponax	<i>Vachellia tortuosa</i>		E	G4G5	S1	SF1	CU
Coontie	<i>Zamia integrifolia</i>		CoE				HFU, CU
Simpson's zephyr-lily	<i>Zephyranthes simpsonii</i>		T	G2G3	S2S3	SF2	PF

* Accidental

^ Naturalized

IRC The Institute for Regional Conservation

Key to Status

C Candidate species for future federal listing as Endangered or Threatened
CoE Commercially exploited
E Endangered
T Threatened

Key to FNAI Habitat Types

HFU Hardwood Forested Uplands
HPS High Pine and Scrub
PF Pine Flatwoods
CU Coastal Uplands
FNFW Freshwater Non-Forested Wetlands
FFW Freshwater Forested Wetlands
MEVW Marine and Estuarine Vegetated Wetlands
ME Marine and Estuarine (Non-Wetland)

FNAI Code	FNAI Natural Community Group	Total Number T&E Species
HFU	Hardwood Forested Uplands	33
HPS	High Pine and Scrub	19
PF	Pine Flatwoods and Dry Prairie	19
CU	Coastal Uplands	51
FNFW	Freshwater Non-Forested Wetlands	12
FFW	Freshwater Forested Wetlands	27
MEVW	Marine and Estuarine Vegetated Wetlands	18
ME	Marine and Estuarine (Non-Wetland)	20
Rookery Bay Reserve Total		78

T&E = Threatened and Endangered

B.4.2 / List of Invasive Non-native Animal Species of Rookery Bay Reserve

Common Name	Scientific Name
Mammals	
Nine-Banded Armadillo	<i>Dasypus novemcinctus</i>
Norway Rat	<i>Rattus norvegicus</i>
Black Rat	<i>Rattus rattus</i>
Feral Hog	<i>Sus scrofa</i>
House Mouse	<i>Mus musculus</i>
Birds	
Common Myna	<i>Acridotheres tristis</i>
Egyptian Goose	<i>Alopochen aegyptiaca</i>
Muscovy Duck	<i>Cairina moschata</i>
Rock Pigeon	<i>Columba livia</i>
House Finch	<i>Haemorhous mexicanus</i>
House Sparrow	<i>Passer domesticus</i>
Rose-Ringed Parakeet	<i>Psittacula krameri</i>
Eurasian Collared-Dove	<i>Streptopelia decaocto</i>
European Starling	<i>Sturnus vulgaris</i>
Reptiles	
Bark Anole	<i>Anolis distichus</i>
Knight Anole	<i>Anolis equestris equestris</i>
Brown Anole	<i>Anolis sagrei sagrei</i>
Brown Basilisk	<i>Basiliscus vittatus</i>
Boa Constrictor	<i>Boa constrictor</i>
Black Spinytail Iguana	<i>Ctenosaura similis</i>
African Spurred Tortoise	<i>Geochelone sulcata</i>
Tropical House Gecko	<i>Hemidactylus mabouia</i>
Mediterranean Gecko	<i>Hemidactylus turcicus</i>
Green Iguana	<i>Iguana iguana</i>
Northern Curlytail Lizard	<i>Leiocephalus carinatus</i>
Burmese Python	<i>Python bivittatus</i>
Brahminy Blind Snake	<i>Ramphotyphlops braminus</i>
Amphibians	
Greenhouse Frog	<i>Eleutherodactylus planirostris</i>
Cuban Treefrog	<i>Osteopilus septentrionalis</i>
Cane Toad	<i>Rhinella marina</i>
Fish	
Oscar	<i>Astronotus ocellatus</i>
Black Acara	<i>Cichlasoma bimaculatum</i>
Mayan Cichlid	<i>Cichlasoma urophthalmus</i>
Walking Catfish	<i>Clarias batrachus</i>
African Jewelfish	<i>Hemichromis bimaculatus</i>
Brown Hoplo	<i>Hoplosternum littorale</i>
Blue Tilapia	<i>Oreochromis aureus</i>
Spotted Tilapia	<i>Pelmatolapia mariae</i>
Vermiculated Sailfin Catfish	<i>Pterygoplichthys disjunctivus</i>
Orinoco Sailfin Catfish	<i>Pterygoplichthys multiradiatus</i>

Common Name	Scientific Name
Invertebrates	
Golden Star Tunicate	<i>Botryllus schlosseri</i>
Mexican Bromeliad Weevil	<i>Metamasius callizona</i>
Green Mussel	<i>Perna viridis</i>
New Guinea Flatworm	<i>Platydemus manokwari</i>
Island Applesnail	<i>Pomacea maculata</i>
Red Imported Fire Ant	<i>Solenopsis invicta</i>
Cuban Brown Snail	<i>Zachrysia provisoria</i>
Fungi	
Laurel Wilt Disease	<i>Raffaelea lauricola</i>

B.4.3 / List of Invasive Plant Species of Rookery Bay Reserve

Common Name	Scientific Name	FLEPPC Category	Noxious Weed	Prohibited Aquatic
Rosary Pea	<i>Abrus precatorius</i>	I	X	
Earleaf Acacia	<i>Acacia auriculiformis</i>	I	X	
Sisal Hemp	<i>Agave sisalana</i>	II		
Mimosa	<i>Albizia julibrissin</i>	I		
Woman's Tongue	<i>Albizia lebbbeck</i>	I		
Coral Vine	<i>Antigonon leptopus</i>	II		
Shoebuttan Ardisia	<i>Ardisia elliptica</i>	I	X	
Asparagus Fern	<i>Asparagus aethiopicus</i>	I		
Orchid Tree	<i>Bauhinia variegata</i>	I		
Bishopwood	<i>Bischofia javanica</i>	I		
Paper Mulberry	<i>Broussonetia papyrifera</i>	II		
Australian Pine	<i>Casuarina equisetifolia</i>	I	X	X
Fountaingrass	<i>Cenchrus setaceus</i>	II		
Coconut Palm	<i>Cocos nucifera</i>	II		
Latherleaf	<i>Colubrina asiatica</i>	I	X	
Carrotwood	<i>Cupaniopsis anacardioides</i>	I	X	
Crowsfoot Grass	<i>Dactyloctenium aegyptium</i>	II		
Air Potato	<i>Dioscorea bulbifera</i>	I	X	
Common Water-Hyacinth	<i>Eichhornia crassipes</i>	I		X
Pothos	<i>Epipremnum pinnatum</i>	II		
Surinam Cherry	<i>Eugenia uniflora</i>	I		
West Indian Marsh Grass	<i>Hymenachne amplexicaulis</i>	I		
Jaragua Grass	<i>Hyparrhenia rufa</i>	II		
Cogon Grass	<i>Imperata cylindrica</i>	I	X	
Life Plant	<i>Kalanchoe pinnata</i>	II		
Lantana	<i>Lantana camara</i>	I		
Lead Tree	<i>Leucaena leucocephala</i>	II	X	
Old World Climbing Fern	<i>Lygodium microphyllum</i>	I	X	
Japanese Climbing Fern	<i>Lygodium japonicum</i>	I	X	
Catsclaw Vine	<i>Macfadyena unguis-cati</i>	I		
Sapodilla	<i>Manilkara zapota</i>	I		
Melaleuca	<i>Melaleuca quinquenervia</i>	I	X	X
Chinaberry	<i>Melia azedarach</i>	II		
Rose Natal Grass	<i>Melinis repens</i>	I		
Catclaw Mimosa	<i>Mimosa pigra</i>	I		
Balsam Apple	<i>Momordica charantia</i>	II		
Asian Sword Fern	<i>Nephrolepis brownii</i>	I		
Tuberous Sword Fern	<i>Nephrolepis cordifolia</i>	I		
Burma Reed	<i>Neyraudia reynaudiana</i>	I	X	

Common Name	Scientific Name	FLEPPC Category	Noxious Weed	Prohibited Aquatic
Ground Orchid	<i>Oeceoclades maculata</i>	N/A		
Guinea Grass	<i>Panicum maximum</i>	II		
Torpedo Grass	<i>Panicum repens</i>	I		
Napier Grass	<i>Pennisetum purpureum</i>	I		
Water Lettuce	<i>Pistia stratioides</i>	I		
Guava	<i>Psidium guajava</i>	I		
Downy Rose-Myrtle	<i>Rhodomyrtus tomentosa</i>	I	X	
Largeflower Mexican Clover	<i>Richardia grandiflora</i>	II		
Castor Bean	<i>Ricinus communis</i>	II		
Bowstring Hemp	<i>Sansevieria hyacinthoides</i>	II		
Beach Naupaka	<i>Scaevola taccada</i>	I	X	
Schefflera	<i>Schefflera actinophylla</i>	I		
Brazilian Pepper	<i>Schinus terebinthifolia</i>	I	X	X
Climbing Cassia	<i>Senna pendula</i> var. <i>glabra</i>	I		
Rattlebox	<i>Sesbania punicea</i>	II		
Twinleaf Nightshade	<i>Solanum diphyllum</i>	II		
Tropical Soda Apple	<i>Solanum viarum</i>	I	X	
Shrubby False Buttonweed	<i>Spermacoce verticillata</i>	II		
Wedelia	<i>Sphagneticola trilobata</i>	II		
Smutgrass	<i>Sporobolus jacquemontii</i>	I		
Blue Snakeweed	<i>Stachytarpheta cayennensis</i>	II		
Arrowhead Vine	<i>Syngonium podophyllum</i>	I		
Java Plum	<i>Syzygium cumini</i>	I		
Sea Hibiscus	<i>Taliparti tiliaceum</i>	II		
Tropical Almond	<i>Terminalia catappa</i>	II		
Seaside Mahoe	<i>Thespesia populnea</i>	I		
Oyster Plant	<i>Tradescantia spathacea</i>	II		
Puncture Weed	<i>Trilobus cistoides</i>	II		
Caesar Weed	<i>Urena lobata</i>	I		
Para Grass	<i>Urochloa mutica</i>	I		

FLEPPC = Florida Exotic Pest Plant Council (recently re-named the Florida Invasive Species Council [FISC])

B.4.4 / List of Nuisance and Early Detection and Rapid Response (EDRR) Species of Rookery Bay Reserve

Nuisance - A native species that causes resource management and human safety concerns.

EDRR - Early Detection and Rapid Response species that have not been recorded within the Reserve but can be reasonably expected to expand into the Reserve.

Common Name	Scientific Name	Status
Mammals		
Coyote	<i>Canis latrans</i>	Nuisance
Raccoon	<i>Procyon lotor</i>	Nuisance
Feral Dog	<i>Canis lupus familiaris</i>	EDRR
Feral Cat	<i>Felis cattus</i>	EDRR
Capybara	<i>Hydrochoerus hydrochaeris</i>	EDRR
Nutria	<i>Myocastor coypus</i>	EDRR
Birds		
American Crow	<i>Corvus brachyrhynchos</i>	Nuisance
Fish Crow	<i>Corvus ossifragus</i>	Nuisance
Scarlet Ibis	<i>Eudocimus ruber</i>	EDRR
Hill Myna	<i>Gracula religiosa</i>	EDRR
Ring-Necked Dove	<i>Streptopelia risoria</i>	EDRR
Purple Swamphen	<i>Porphyrio poliocephalus</i>	EDRR
Yellow-Headed Parrot	<i>Amazona oratrix</i>	EDRR
Nanday Parakeet	<i>Aratinga nenday</i>	EDRR
White-Winged Parakeet	<i>Brotogeris versicolurus</i>	EDRR
Blue-Crowned Parakeet	<i>Aratinga acuticaudata</i>	EDRR
Reptiles		
African Redhead Agama	<i>Agama picticauda</i>	EDRR
Giant Ameiva	<i>Ameiva ameiva</i>	EDRR
Amazon Racerunner	<i>Ameiva praesignis</i>	EDRR
Giant Whiptail	<i>Aspidoscelis motaguae</i>	EDRR
Spectacled Caiman	<i>Caiman crocodilus</i>	EDRR
Veiled Chameleon	<i>Chamaeleo calyptratus</i>	EDRR
Rainbow Whiptail	<i>Cnemidophorus lemniscatus</i>	EDRR
Green Anaconda	<i>Eunectes murinus</i>	EDRR
Yellow Anaconda	<i>Eunectes notaeus</i>	EDRR
Tokay Gecko	<i>Gekko gekko</i>	EDRR
Red-Footed Tortoise	<i>Geochelone carbonaria</i>	EDRR
Common House Gecko	<i>Hemidactylus frenatus</i>	EDRR
Indo-Pacific House Gecko	<i>Hemidactylus garnotii</i>	EDRR
Asian Flat-Tailed House Gecko	<i>Hemidactylus platyurus</i>	EDRR

Common Name	Scientific Name	Status
Reptiles (cont.)		
Red-Banded Butterfly Lizard	<i>Leiolepis rubritaeniata</i>	EDRR
Giant Day Gecko	<i>Phelsuma madagascariensis grandis</i>	EDRR
Twist-Necked Turtle	<i>Platemys platycephala</i>	EDRR
Bearded Dragon	<i>Pogona vitticeps</i>	EDRR
Ball Python	<i>Python regius</i>	EDRR
Reticulated Python	<i>Malayopython reticulatus</i>	EDRR
Ringed Wall Gecko	<i>Tarentola annularis</i>	EDRR
Red-Eared Slider	<i>Trachemys scripta elegans</i>	EDRR
Black-And White Tegu	<i>Tupinambis merianae</i>	EDRR
Fish		
Pike Killfish	<i>Belonesox belizanus</i>	EDRR
Peacock Bass	<i>Cichla ocellaris</i>	EDRR
Gizzard Shad	<i>Dorosoma cepedianum</i>	EDRR
Threadfin Shad	<i>Dorosoma petenense</i>	EDRR
Suckermouth Catfish	<i>Hypostomus plecostomus</i>	EDRR
Silver Dollar	<i>Metynnis</i> sp.	EDRR
Asian Swamp Eel	<i>Monopterus albus</i>	EDRR
Nile Tilapia	<i>Oreochromis niloticus</i>	EDRR
Jaguar Guapote	<i>Parachromis managuensis</i>	EDRR
Red Lionfish	<i>Pterois volitans</i>	EDRR
Plants		
Nightflowering Jessamine	<i>Cestrum nocturnum</i>	EDRR
Grand Eucalyptus	<i>Eucalyptis grandis</i>	EDRR
Torrell's Eucalyptis	<i>Eucalyptis torelliana</i>	EDRR
Swamp Morningglory	<i>Ipomoea aquatica</i>	EDRR
Giant Salvinia	<i>Salvinia molesta</i>	EDRR

EDRR = early detection and rapid response

B.5 / Drone Policy

(See attached Florida DEP Drone Policy updated July 21, 2020.)

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION		
PROGRAM POLICY		
	TITLE: DRONES	POLICY: SEC 900
		EFFECTIVE DATE: July 21, 2020
		Established:
REFERENCES: Searches and Seizure Using a Drone , Section 934.50, Florida Statutes; Activities and Recreation , Rule 62D-2.014(15), Florida Administrative Code; Small Unmanned Aircraft Systems , 14 Code of Federal Regulation, Part 107; FAA Drone Registration		

The purpose of this policy is to provide authorization and guidance to the DEP related to the safe and responsible operation of drones to enhanced data collection activities. Drones can provide unique and cost-effective data collection methods greatly benefiting the mission of the department.

Data acquisition using drones can be an efficient and cost-effective alternative to traditional data collection activities. Drones can collect data from extreme vantage points such as aerial, underwater, and from hazardous environments. They have become a mainstream technology with many vendors providing a range of related services and competitive pricing.

DEP business units are authorized to acquire data using drones within the parameters of this policy, the rules and laws referenced, and any applicable local laws or ordinances.

DEP business units are encouraged to utilize drone data collection service providers to acquire any needed data. A list of service providers and example agreement language can be found on the [Drone Data Acquisition Resource Page](#).

DEP business units may not purchase or have staff operate drones without the written permission of DEP's Office of the Secretary and will be allowed by exception only.

PROCEDURES/MANUALS/FORMS:

Program Procedures for Drones

[Drone Operation Consent Form](#)

[Drone Operations Exception Form](#)

B.6 / Prescribed Fire Management Plan

Fire Management Plan for Rookery Bay National Estuarine Research Reserve Collier County, Florida 2020.

1. Introduction: Why We Burn

Land managers now widely recognize that fire plays a critical role in maintaining many ecosystems. Here in Florida, more lightning strikes occur per square mile than in any other state in North America. Fire is one of the primary natural forces under which Florida's land ecosystems have developed. Before human development occurred, lightning-ignited fires were able to sweep across the landscape unimpeded. Over thousands of years, many natural habitats have evolved under a regime of habitat disturbance and regrowth brought on by periodic fire and depend on it.

Fire-dependent communities now require planned burns to mimic lightning-caused fire by carefully introducing fire according to detailed plans called "prescriptions." Prescribed fire is used to burn these natural areas to restore and maintain representative portions of original Florida natural communities.

The ecological purpose of Rookery Bay Reserve's prescribed fire management is to maintain or restore the original composition, productivity, and vertical structure in fire-dependent natural communities.

2. Benefits of Fire Management

Florida Division of Recreation and Parks recognizes three major benefits of its prescribed fire program: 1) preserving Florida's natural and cultural heritage, 2) biodiversity conservation, and 3) reducing hazardous-fuel conditions.

Preserving Our Natural and Cultural Heritage

As the human population of the state has grown and fire has been increasingly excluded from natural lands, the number of acres of fire-dependent habitats has drastically declined. As a result, many unique plants and animals needing these habitats are disappearing.

The open piney woods, ever-blooming prairies, and aromatic scrubs of Florida and the unique species they support are an irreplaceable part of the natural and cultural heritage of Florida's citizens. They not only provide a source of enjoyment and inspiration but continue to play a vital role in shaping the character and spirit of the people of Florida. If our native fire-dependent habitats and species were lost, we would not only lose a critical link to our past but our quality of life would be seriously diminished as well.

Biodiversity Conservation

Florida has many upland and wetland natural communities that require periodic fire to maintain their health and biological diversity. Without fire, applied at appropriate frequencies and intensities, the entire structure and species composition of such areas gradually change. This is often caused by invasion or greatly increased dominance by woody plant species. Prolonged fire exclusion will eventually cause the community composition to change, resulting in the loss of Florida's fire-dependent natural communities and the plant and animal species that depend on them.

Many of Florida's rare and endangered plant and animal species are dependent on periodic fire for their continued existence. Without periodic fires, species such as the Florida scrub-jay, Sherman's fox squirrel, gopher tortoises, red-cockaded woodpecker, white-top pitcher-plant, and four-petal pawpaw would disappear forever.

Hazard Reduction

Fire-dependent natural communities contain pyrogenic vegetation, with many plant species having characteristics that promote the spread of fire. Over time, these "fuels" gradually accumulate and make the area more susceptible to wildfire and more severe fire impacts due to the amount of available fuel. So, for much of Florida's wildlands, it is not a question of whether an area will burn or not, but WHEN.

If fire is removed from a fire-dependent community, fuel levels can become dangerously high. Under such conditions, a single lightning strike or an ember from a backyard grill can cause a raging wildfire. With prescribed burning, we reduce fuel levels in natural communities under controlled conditions, thereby protecting life, property, and natural and cultural resources.

There are numerous reasons why prescribed fire is used as a management tool in natural areas. Listed below are some of the primary reasons/benefits from the use of prescribed fire:

1. Reduction of fuel load/decrease threat of wildfires — The process of removing flammable vegetation and dead material such as pine needles, logs and leaves, that build up on the forest floor over time.
2. Site Preparation for seeding or planting — Prescribed burning is useful for seeding, planting or natural regeneration. On open sites, fire alone can expose adequate mineral soil and control competing vegetation until seedlings become established. Prescribed fire also recycles nutrients.
3. Forage/wildlife — Prescribed burning substantially benefits wildlife by stimulating food and seed production and by creating openings for feeding and travel. A mosaic of burned and unburned areas tend to maximize "edge effect" which promotes a large and varied wildlife population.
4. Control of undesired vegetation — Fire is used to thin out undesirable vegetation so that desirable vegetation can thrive without having to compete for water, nutrients and growing space which otherwise may significantly lower the growth rates.
5. Range management — Improves range forage for livestock.
6. Forest disease/pathogen control — Brownspot disease is a fungal infection that may seriously weaken and eventually kill longleaf pine seedlings. Once the seedlings of a plant become infected burning is the most practical method of disease control. Control is recommended when more than 20 percent of the seedlings are affected.
7. Improved access to public (hunting, hiking, etc.) — Removing accumulated vegetation and dead material helps to reduce the amount of fuel that helps to offset the risk of a wildfire during harvesting. Hikers and tourists find it easier to travel and increases a hunters visibility. Also, burning opens up the forest for easy access to timber sale areas and improves the efficiency to measure the timber sale volume area, to timber mark and harvest.
8. Improved appearance — Prescribed burning is the practical way to maintain many visually attractive vegetative communities, such as pine flatwoods, scrub, marshes and others. It also perpetuates many plant species such as the Florida bonzamia, Harper's beauty, White-birds-in-a-nest and the Florida skullcap.

9. Ecosystem diversity / restoration — Fire breaks down complex organic molecules in plants to smaller molecules. By breaking the molecules down, fire makes them more water soluble which in turn allows the nutrients to be used again by other growing plants. Fire also changes both the composition and density of the forest. Ash and nutrients occupy less space than trees and shrubs.
10. Endangered/threatened species — Habitat preferences of several endangered species, including the Florida Panther, Gopher Tortoise, Eastern Indigo Snake and Red-cockaded Woodpecker, are enhanced by prescribed burning.
11. Invasive plant control — Some invasive plant species can be controlled by using prescribed fire at particular stages in the development of the plant. For example, fire in mature melaleuca stands causes extensive damage to the existing native plant because melaleuca burns extremely hot. However, following removal of the seed trees, melaleuca seedlings can be controlled by fire if burned when 1–1.5 meters in height or less.

The primary objectives of prescribed burning on Reserve lands are:

- Restore and maintain pyrogenic communities
- Restore and maintain natural communities for listed plant and animal species
- Promote natural diversity in pyrogenic communities
- Reestablish lightning season burn regime
- Reduce the potential for detrimental effects of catastrophic wildfires, e.g., impacted air quality, loss of soils through erosion, liability associated with smoke management, loss of habitat diversity; and
- Maintain ecotones or transitional zones between community types.

As the human population of the state increases, fire has been increasingly excluded from natural areas, and the number of acres of fire-dependent habitats has drastically declined (Ford et al. 2002). As a result, many unique plants and animals needing these habitats are disappearing (Ford et al. 2002). Florida has many upland and wetland natural communities that require periodic fire to maintain their health and biodiversity. Without fire applied at appropriate frequencies and intensities, the entire structure and species composition change gradually. Prolonged fire exclusion will eventually cause the loss of fire-dependent plant and animal species. Fire-dependent natural communities contain pyrogenic vegetation, with many plant species having characteristics that promote the spread of fire. If fire is removed from fire-dependent communities, fuel load levels can become dangerously high. Under such conditions, a single lightning strike or an ember from a backyard grill can cause a raging wildfire. With prescribed fire, we can reduce fuel loads under a set of parameters in controlled conditions, protecting life, property, and natural and cultural resources.

In the Reserve, prescribed fire is used to:

- Reduce hazardous fuel buildup
- Improve habitat for wildlife
- Enhance ecosystem biodiversity
- Preserve endangered plants and animals
- Maintain fire-dependent ecosystems
- Improve access for invasive-plant treatments
- Protect life, property, and cultural and other resources from wildfire

3. Fire Type Communities and Fire Return Intervals

Vegetation Habitat Types at Rookery Bay (FNAI)

A high proportion of Florida land-based natural communities are dependent on periodic fire for their continued existence. The Reserve manages examples of many of the state's fire-dependent communities, as classified by the Florida Natural Areas Inventory. Table 1 is a list of the Reserve's fire-dependent acreages.

Rookery Bay Reserve is using target fire-return intervals to reach optimal ecological conditions for each fire-type community. The fire-return intervals needed to maintain optimal ecosystem health are highly variable. Substantial long-term research indicates that the preferred fire-return interval is on the shorter end of more widely published ranges (e.g., Guide to the Natural Communities of Florida [FNAI 2010], Ecosystems of Florida [Myers and Ewel 1990]).

Decisions on when to apply fire to burn zones should be based on habitat conditions within each zone, not on rigid adherence to predetermined community or zone fire-return intervals. The actual timing of burning should be chosen to achieve the objectives of the individual planned fire and the overall natural community goals for the specific burn unit. The winter/dormant season (December–March) should be used to reduce heavy fuel buildup when air temperatures are lower and weather patterns are more dependable over longer periods of time. The growing/lightning season (June–August) should be utilized to simulate natural ecological succession, but weather patterns are not as dependable. Depending on objectives and goals for units, the transition seasonal months (i.e., April, May, September, October, November) may also have less desirable weather patterns.

Rainy (Growing) Season vs. Dry Season Fire

Two distinct seasons occur in Florida, the rainy spring/summer (growing) season and the dry winter season. Before the inclusion of humans into the landscape, at approximately 12,000 years B.P., almost all fires occurred from lightning strikes during the rainy season.

The physiological effects between burning in the growing season versus the dry season do not appear to be as clear as one might expect. In terms of effects on soil, two divergent points of view exist (Robbins and Myers 1992):

1. Leeching of nutrients is greatest during burns conducted in the dry season (fall and early winter) as dormant vegetation cannot easily uptake nutrients.
2. Nutrients are concentrated in the aerial portions of plants during the growing season, and a fire at this time will cause loss of these vital nutrients through volatilization. In contrast, nutrients are stored below ground in the dry season and are protected during surface burns.

In terms of effects on plants, again, the difference is not clear. Since the height of the fire increases as temperature increases, more crown damage will occur during the warmer growing season, although the lethal temperature may be lower in the growing season. Mortality was found to be dependent not on whether the burn occurred in the growing or dry season but on what part of the season it was conducted. Mortality is usually greatest following late growing-season fires than early growing season. Low-intensity burning during any season appears to be okay. It is hypothesized that the effects of burns would differ between C3 and C4 grasses, with C4 grasses better able to handle growing-season fires, but no definitive conclusion has been reached.

It has long been held that for pine flatwoods, annual summer burning kills off the understory (USDA 1988), but a study conducted in the Everglades National Park for the effect on slash pine (*Pinus elliottii*) found no difference (Robbins and Myers 1992).

Dry-season burns are thought to lead to the increase in Brazilian pepper “tree islands” with tropical hardwood habitats (Zouhar et al. 2008).

Post-burn results should be assessed to determine if burns accomplish resource management objectives, if future prescriptions should be modified, or if additional treatments are needed (including mechanical treatments) to meet desired resource management objectives.

Note that applying fire at a particular interval does not mean that the goal is necessarily to burn the entire community or to burn the entire burn zone every time fire is applied. In fact, the goal for many communities should be to burn frequently, to apply a suitable firing pattern, and to select weather conditions that result in a mosaic of burned and unburned areas. Within reason, staff have the latitude to fine-tune fire return intervals to match the ecological conditions within the Reserve.

Many fire-management plans excluded fire from barrier island systems. Like storm winds, storm tides, salt spray, and shoreline erosion, fire is a natural process on barrier islands. Where fire-dependent natural communities occur on barrier islands within the Reserve, active prescribed burn programs must be developed. In some cases, active burning of barrier island communities (including beach dune, coastal strand, and scrub) are required to maintain and enhance threatened and endangered species habitat.

Table 1. Natural community types; recommended fire return intervals; and acreages for in Rookery Bay Reserve.

Natural Community Type	Recommended Fire Return Interval (years)	Acreage
1100 Hardwood Forested Uplands	3-5 years and adjacent communities/site conditions	30
1200 High Pine and Scrub	3-5 years and adjacent communities/site conditions	44
1300 Pine Flatwoods and Dry Prairie	2-5 years and adjacent communities/site conditions	557
1400 Mixed Hardwood-Coniferous	3-5 years and adjacent communities/site conditions	123
1600 Coastal Uplands	2-8 years and adjacent communities/site conditions	539
1650 Maritime Hammock	rare	391
1800 Cultural - Terrestrial	3-5 years or Land Management Objectives	154
2100 Freshwater Non-Forested Wetlands	2-4 years and adjacent communities/site conditions	378
2200 Freshwater Forested Wetlands	3-5 years and adjacent communities/site conditions	757
5200 Intertidal	2-4 years and adjacent communities/site conditions	455
7000 Exotic Plants	Land Management Objectives	30

For more-detailed natural community descriptions, go to <http://www.fnai.org/>: see Reference Natural Communities.

4. Legal Requirements

All burning done by Reserve staff must follow Florida's forest fire laws and open burning regulations as set forth in Florida Statutes (F.S.) and Florida Administrative Codes (FAC). The Florida Forest Service (FFS) is the agency charged with enforcing these requirements.

A. Statutes

For liability purposes, Reserve staff are required to follow the guidelines established by the following legal requirements:

- Chapter 590 Forestry Protection, F.S.
- Chapter 51-2 Open Burning, FAC

These regulations allow for a certain degree of liability protection for Reserve staff based on the following guidelines:

Certified prescribed burning may be conducted only when a Certified Prescribed Burn Manager (CPBM) is on site; requires that a written prescription be prepared prior to receiving authorization from FFS; requires landowner consent; requires FFS authorization; requires adequate firebreaks, personnel, and equipment; and be considered in the public interest and does not constitute a public or private nuisance when conducted under applicable state air pollution statutes and rules; and is considered a property right of the property owner.

B. Certified Prescribed Burn Manager Requirements

Certification as a Prescribed Burn Manager is an FFS process outlined in 5I-2.006(2)(c), FAC. All burn bosses are required to be CPBMs. All acreage burns on Reserve-managed lands must be conducted as a certified burn. Reserve staff wanting to pursue CPBM status must satisfactorily complete the Florida Interagency Basic Prescribed Fire Course; then have direct participation in at least three prescribed burns after class completion; then write a prescription that FFS reviews and approves; and then successfully execute the burn as a burn boss trainee with FFS oversight. FFS issues the CPBM number. Reserve staff are required to maintain their CPBM status as long as they are operating in the role of Burn Boss for the Reserve.

Renewal criteria for CPBM is outlined in FAC 5I-2.006(2)(d). It requires participation in a minimum of 8 hours of approved training (see FFS web page) every 5 years or participation in an annual Fire Council meeting. CPBMs must submit their certification number for two completed prescribed burns in the preceding 5 years or participate in five prescribed burns that are documented and verified by a current CPBM or by retaking the Florida Interagency Basic Prescribed Fire Course. To keep up good working relations with local collaborators, Reserve staff are encouraged to attend Fire Council meetings yearly.

It is the employee's personal responsibility to ensure that FFS has a current address for communications and to maintain their CPBM status.

C. Fire Activities Seaward of the Coastal Construction Control Line (CCCL)

Any fire activities (burning, fireline construction, mechanical treatments) that are conducted seaward of the CCCL require a CCCL permit, which is obtained from the Department of Environmental Protection. Allow a minimum of 2 weeks for a field inspector to visit the site before issuing a permit. See the Bureau of Beaches and Coastal Systems website at <http://www.dep.state.fl.us/beaches/programs/ccclprog.htm>.

D. Burning on Non-State Managed Lands

Prescribed burning and wildfire suppression often involve interagency partners. The Reserve encourages working with partners to accomplish fire management objectives. Numerous partners provide significant aid to the Reserve's annual fire accomplishments. In the spirit of interagency cooperation, Reserve staff may provide assistance to partners. It is extremely important from the liability standpoint that fire activities, both prescribed burning and wildfire suppression, be included in an individual's job description.

When assisting cooperators on prescribed burns or wildfires on non-Florida DEP lands (i.e., while "on the Florida DEP clock" or otherwise acting as a representative of Florida DEP), Reserve staff are required to follow all aspects of this Fire Management Standard. Staff may, of course, be required by a cooperator to follow elements of the cooperator's standards if they require additional conditions for PPE, training, etc. than the Reserve's standards.

5. Annual Fire Plan

A. Annual Planning Process

Each fiscal year, the Reserve's fire-type acreage must go through an annual resource management work plan process. The Reserve is broken into resource management zones, and some of these management zones include fire-type acres. The annual fire planning process only concerns itself with management zones that include fire-type acres (referred to as burn zones for this discussion). Developing the breakdown of management/burn zones often takes place as part

of the unit planning process but can occur on an as-needed basis. Zone boundaries tend to remain static but could be modified if a need develops. Boundaries may be composed of both man-made and natural fire breaks and should be features that can be located on the ground.

Annually, each management/burn zone should be evaluated as to whether it should be placed on the annual plan for burning in that fiscal year. Determining whether a zone should be burned or not in the next annual cycle is a matter of considering fire return intervals for each community type, present fuel load, resource management objectives, and strategic location. A zone can be placed on the annual resource management work plan for a variety of reasons, not just because it is "due" or "overdue" from a time perspective. It is very important to consider how each zone fits into the overall scheme of accomplishing several burns. Each year, the Reserve should have a selection of zones that meet different weather parameters to increase the chance of being able to burn under a variety of conditions. To the greatest extent possible, zones should be planned in a sequence so that each burn makes the next burn easier by reducing the amount of holding required to burn each zone (i.e., plan to burn into recently burned zones).

While it is not ideal to burn 100% of a natural community type in one area of the Reserve, most burning gets spaced in time so that all zones are rarely burned at the same time. The frequency of burning is very important. Long-term research indicates that frequent burning can at least partially compensate for the effects of season of burn. Ideally, an area should be burned as frequently as possible under a variety of conditions, including the time of year. In time, the annual plan should consider season of burn with an emphasis placed on growing season burning as the ideal objective but with the flexibility to burn as opportunities present themselves.

The annual fire plan should include zones to be burned, zones that need mechanical treatments, invasive treatments, equipment needs, and personnel training needs. Including all of these items gives the Reserve's burn managers a more complete picture of the overall fire management needs for each annual cycle. This plan also aids in resource needs along with adjacent land development properties.

B. Burn Prescriptions

Once an annual burn plan is developed, a prescription must be written for each zone or group of zones, depending on how they will be burned. Prescriptions may be written by a variety of staff, but ultimately a Reserve's CPBM needs to review the final prescription. The Reserve's prescription form (Figure C) is the preferred format for preparing prescriptions.

Burn prescriptions should be completed well in advance to not hold up burning when optimal conditions arrive. The prescriptions will be reviewed the day before burns to make any adjustments for contingency and medical plans. The prescription will describe the desired conditions and methods to conduct a particular burn and what to do should the burn escape from its pre-determined boundaries.

C. On-Site Keetch-Byram Drought Index

The Keetch-Byram Drought Index (KBDI) is a simple measure of drought often used as a prescribed fire planning tool and as an indicator of potential fire behavior and smoke production. It was developed to evaluate the effects of extended drying of the soil humus layer on fire activity. Using and interpreting the index helps fire managers identify burn days and anticipate potential fire problems.

The FFS maintains county-wide and 4-km-long resolution KBDI maps on their website.

D. Public Relations and Interpretation

As urbanization and development pressures increase in areas adjacent to Florida DEP/Rookery Bay Reserve-managed lands, it is becoming more important for land managers to develop strategies to heighten public awareness and promote prescribed fire activities. In addition to the educational aspects, it is important that Florida DEP/ Rookery Bay Reserve land managers develop 'good neighbor' relations. This can be accomplished by communicating with neighbors and cooperators to inform them of planned burn activities. Rookery Bay Reserve's Fire Management Team's current notifications procedures are:

- Notification of planned burn activities to appropriate organizations such as local law enforcement, fire departments, local homeowner associations, and adjacent landowners. The notification list should be tailored to the requirements of the local area and may be different for different burn zones and areas of the Reserve. These notifications are done via email and phone calls.
- Use informational signage inside and outside of the Reserve. Signage outside of a Reserve on a roadway must meet FDOT requirements. Reserve staff may place signage along public roadways.

The Rookery Bay Fire Management Team also hosts presentations about the fire program to local developments and homeowner associations that are adjacent to Rookery Bay Reserve.

Reserve staff should make good use of all opportunities to interpret the Reserve's fire program to the public. This includes but is not limited to presentations, signage, tours, brochures, etc. The Environmental Learning Center also has a display that describes the importance of fire within the Reserve.

6. Personnel Training and Experience

Training and experience are critical components to becoming a proficient burner. As such, classes and actual fire experience should be made available to staff who are part of the Reserve fire program. All staff and volunteers must comply with the Reserve training and experience requirements for each position they fill. It is the responsibility of the Reserves Fire Management Officer and the individual burner to ensure that standards are met. A list of common fire courses is included in Appendix B.

A. Positions and Responsibilities

Incident Commander/Burn Boss

The single person in charge of the burn; ultimately responsible for planning, preparation, execution, and mop-up of the burn; ultimately responsible for crew safety; ultimately responsible for paperwork, including acquiring burn authorization and completing all required burn prescription, day of burn, and evaluation paperwork. The burn boss can delegate portions of their responsibilities. Any staff member meeting the position qualifications (not limited to park managers) can fill the position.

Burn Boss Trainee (BBT)

Performs all the duties and assumes the responsibilities of a burn boss while working under the direct supervision of a qualified burn boss. All decisions and actions must be approved by the burn boss. An individual's FFS certification burn is done while the individual is acting as a BBT.

Crew Boss

Supervises a crew (hand crew, engine crew(s), holding crew, firing crew, etc.); serves as an assistant to the Incident Commander/Burn Boss and carries out his/her directions; responsible for crew safety and task assignments and performance; maintains full communication with the Incident Commander/Burn Boss and crew members.

Crew Boss Trainee

Performs all the duties and assumes all the responsibilities of a crew boss while working under the direct supervision of a qualified crew boss. All decisions and actions must be approved by the crew boss.

Crew

A non-supervisory position that may include responsibility for any combination of ignition, holding, and weather monitoring tasks. May be assigned to watch a Crew Trainee.

Crew Trainee

A position that shadows a specified crew member to learn the responsibilities and techniques of the position. Not allowed to work alone on a fire. Does not count towards minimum staff listed on the burn prescription.

B. Training and Experience Requirements

The minimum certification, training, and experience requirements for each burn crew position are indicated in Figure 2 and Table 2. All staff (FTE, OPS) and volunteers must meet these requirements. The requirements for a position include all the requirements of the positions supervised (i.e., crew boss must also meet the requirements of a crew member; burn boss must meet the requirements of a crew boss). As practicable, staff should accumulate both training and experience required to advance to the next level. Staff should keep accurate personal records to document accomplishments. Staff who are interested in Strike Team details will need as well to provide documentation to their local FPS district office for entry into the statewide fire database.

The Reserve partners with Federal agencies and will need to follow NWGC standards to participate in fire operations with these partners. To participate in fire operations with federal partners, staff will be required to pass the arduous pack test and may be required to complete the following trainings: S-230; S-234; S-231; Rx 301; Rx 310 WUI; Rx 400; Rx 341.

Table 2. Minimum certification, training, and experience requirements for each burn crew position

Position	Training Requirements	Experience Requirements	Prerequisites
Crew Trainee	S-130; S-190; L-180; I-100		Moderate Pack Test
Crew		Minimum of 3 burns paired with a crew member at all times. Supervisor approval required to qualify as full crew.	Crew trainee
Fire Effects	Florida Fuels & Weather: S-131; S-133; I-200; S-215 Also: S-290; Rx 310	Minimum of 10 burns. Demonstrate knowledge of positions and equipment.	Crew
Crew Boss Trainee	Florida Fuels & Weather: S-131; S-133; S-212; S-290; S-215; I-200; S-200; SA-214; suggested CBA	Minimum of 10 burns. Demonstrate knowledge of positions and equipment.	Crew
Crew Boss		Minimum of 20 burns. Demonstrate ability to lead under pressure. Working under direct supervision of a qualified Crew Boss with all decisions approved by Crew Boss. Supervisor approval.	Crew Boss Trainee
Burn Boss Trainee	Interagency Basic Rx Fire Course; Certified Prescribed Burn Manager	Minimum 10 burns as crew boss.	Crew Boss
Burn Boss		Follow Florida Forest Service requirements	

* To maintain qualifications in all positions, all fire staff must successfully complete an annual fire shelter refresher and at the least a moderate pack test. Burn Boss must retain Certified Prescribed Burn Manager status with Florida Forest Service.

C. Exemptions and Substitutions to Training Requirements

Since training classes continually evolve over time, some training classes are replaced with others during an individual's fire career with Florida DEP. In recognition of changes through time, the Division has approved a number of substitutions. Any additional substitutions must be approved by the Division Fire Coordinator.

D. Training Burns as Part of a Fire Class

Training burns occur when a person attends a class that includes some type of live fire exercise. Students do not receive any supervisory experience from a class burn. The most an individual can be credited with for class participation burn is as crew. This assumes they are already qualified as crew. If a burn is done as part of an S130 class, the student gets no credit for that burn, even as a trainee.

E. Annual Training Requirements - Pack Tests and Fire Shelter Refreshers

All fire staff are required to refresh their skills in the areas of fire shelter deployment and pack testing once annually. Staff must view the fire shelter deployment video and practice fire shelter deployment using either the appropriate practice or actual fire shelter.

Deployment will be timed and must be successfully accomplished in 25 seconds or less (and include PPE of a hardhat and leather gloves). All operational fire staff must annually successfully complete the moderate pack test (see Appendix E - Pack Test Forms and Procedures). Annual testing (pack and shelter) typically occurs from October 31 to January 31 of the following year. The January yearly expiration date is recorded in the database, and the results are only good until January 31st of the year after the testing period. For example: if a person tests on November 15, 2013; they are in compliance until January 31, 2015. If a person tests on January 15, 2014; they are in compliance until January 31, 2015. If a person test on April 12, 2014; they are current until January 31, 2015.

All staff wanting to participate on FPS strike teams will also be required to take the RT130 refresher annually. The expiration date of the following January is recorded in the Division of Recreation and Parks (DRP) District database. Strike Team information can be found in Section 11c.

F. Logistical Staff versus Operational Staff

All personnel assigned to work inside the "control line" on a prescribed burn or on extended attack during a wildfire are considered Operational Staff and shall meet all the Reserve's Burning Standards for training, PPE, and fitness. Operational positions on a prescribed burn consist of Burn Boss, Burn Boss Trainee, Crew Boss, Crew Boss Trainee, Crew, and Crew Trainee. Operational positions on an extended attack wildfire consist of Incident Commander, Division Supervisor, Strike Team Leader, Crew Boss, and Crew.

Logistical Support Staff are personnel who are acting in a supporting role to the more actively engaged Operational Staff. Logistical Support Staff cannot be actively engaging the fire or actively on standby for fire suppression. They can act in such roles as ground support (mechanic, fuel transport); liaison officer; information officer; traffic control; field monitor (weather, photos, etc.); patrol (does not include active mop-up); mentor; advisor; etc. Discretion needs to be used in regard to PPE and training for Logistical Support Staff. If an individual is making a quick trip to the fireline and then leaving, no special training or PPE is required (e.g., person shuttling food, fuel, etc.).

However, if the individual will be spending time on the fireline where they could be exposed to an escape, they need standard PPE and fire shelter training (e.g., person taking photos all day along the fireline).

The "control line" as defined by the National Wildfire Coordinating Group Fireline Handbook is an inclusive term for all constructed or natural barriers and treated fire edges used to control a fire.

G. Volunteer and Partner Requirements

All volunteers must follow the Reserve's training and experience requirements. The Reserve will track volunteers in a database and maintain a training certificate file for each person. The Reserve Fire Management Officer is responsible for having the volunteer fill out all volunteer agreement paperwork.

Individuals who are assisting the Reserve as an interagency partner and who are acting as employees of their own agency must adhere to their agency's requirements for each crew position. All Reserve safety requirements (PPE) must be adhered to by cooperators. It is the burn boss' ultimate responsibility to ensure that a partner is sufficiently qualified for the position s/he is acting in while assisting on a burn and has sufficient PPE.

H. Compliance with Standards

It is each individual's personal responsibility to understand the standards and to know their level of qualifications. Staff who work in a position they are unqualified for not only jeopardize themselves and fellow crew members, but they also jeopardize the integrity of the Reserve's fire program.

I. How to Find Training and Experience Opportunities

There are several different opportunities to receive training. Many of these can be found on-line. All fire classes must be NWCG endorsed to receive credit. Incident Command emergency management courses can be found on FEMA site.

Training opportunities include the following:

- Florida Forest Service: <http://floridaforestservice.com>
- National Interagency Prescribed Fire Training Center (PFTC):
<http://www.fws.gov/fire/pftc>
Wildland Fire learning Portal: <https://wildlandfirelearningportal.net/>
FEMA: <https://training.fema.gov/emi.aspx>

J. Position Descriptions Related to Fire Program

Inclusion of burning in position descriptions (not a condition of employment)

It is important to include both prescribed burning and suppression of wildfires in each job description where there is the expectation that the position will perform these duties.

Inclusion of fire-related duties in a position description does not mean that the person has to perform those duties, but it is important for burning to be included in position descriptions so the Reserve can say that burning is a normal part of a person's duties. This can become an issue from the liability standpoint. Protection can be afforded as long as an individual is acting within the scope of their employment.

Inclusion of pack test requirement in position description (a condition of employment)

Each supervisor has the option to add an annual pack test requirement to position descriptions. For selected positions that play an important role in prescribed fire, adding the pack test requirement to the position description gives the supervisor a tool to maintain a functioning fire individual in that position. Failure to pass the pack test is a failure-to-perform issue.

The pack test requirement may only be added to a position description when the position is vacant. The pack test requirement should only be added to a position description when it is necessary to meet the operational needs of the Reserve's fire program.

7. Equipment and Personal Protective Equipment (PPE) Required

A. Minimum Required Equipment

The following equipment is required on all prescribed burns conducted on Florida DEP-managed lands. Exceptions may be authorized for specific sites or occasions as appropriate.

1. A minimum of two pieces of rolling water-delivery equipment; must carry spare/replacement equipment sufficient that basic repairs can be made in the field. Spare equipment would include items such as spare hose of various lengths and diameters, spare nozzles of various types, spare fittings, hose gaskets, nozzles, and drip torches. Engines (fire trucks) that are typed according to National Wildfire Coordinating Group (NWCG) standards must carry equipment required for that specific type.
2. Rolling equipment must be able to draft/refill the tank. If the equipment is not draft-capable, a portable pump and draft hose must be carried for that task.
3. Fire extinguisher in each vehicle.
4. Vehicle/pump tool kits with important spare parts including, but not limited to, spare spark plugs, fuel filters, Teflon™ tape, pipe wrenches, etc.
5. High-band two-way radio for each crew member on the fireline; high-band mobile radio mounted inside of engines.
6. Fire belt weather kit or appropriate electronic weather monitoring equipment that is correctly calibrated.
7. Hand tools that match the task and number needed for job (Council fire rake, fire flap, round-pointed shovel, ax, McLeod, Pulaski, etc.).
8. Drip torches with spare parts (gaskets, wicks, spouts, plugs, etc.) needed to make repairs on the fire.
9. Sufficient spare fuel in appropriately labeled safety cans with funnel or spout to maintain operations for the entire day. Enough spare fuel must be carried for drip torches, pump motor and, if necessary, the engine itself.
10. Chainsaw with tools and appropriate PPE for saw operations (wrench, spare chain, bar oil, chaps, and spare fuel).
11. First aid kit for burn dressings, including eyewash.
12. Telephone or radio equipment necessary to provide 24-hour communications from the burn site. Must include a list of emergency contact numbers (EMS, DOT, Air Rescue, Hospital).
13. Drinking water for the crew.
14. Red or amber light mounted on top of engine to be used to alert the public of hazardous conditions.

B. Equipment Maintenance and Standardization

1. All fire equipment must be kept "fire ready" such that no preparation action is needed to take the vehicle and its equipment to a fire. Fire equipment should be returned to ready status as soon as possible after both prescribed fires and wildfires. Needed repairs should be made as soon as possible. Replacement items will be purchased as soon as possible.
2. Equipment must be maintained in top mechanical condition. Equipment not in good mechanical condition should not be used in fire operations.

3. When planning for equipment for a prescribed fire, plan for the equipment needed to handle the fire if it escapes.
4. When replacing or repainting engines, the cab of the engine shall be white in color with Florida DEP emblems placed on the outside center of each front door.
5. The initialism Florida DEP plus the last four digits of the license plate number will appear on each engine's roof to allow for vehicle identification from the air. Numbers will be a minimum size of 12" tall but may be adjusted as needed due to roof constraints. The markings will be red reflective stickers or paint.
6. The RBR abbreviation and the last 2 digits of the engine's license plate will be placed on the front center portion of the engine doors or on the front quarter panels. These decals will be 3" red reflective letters/numbers.

C. PPE Requirements

The following items of personal protective equipment must be worn by Reserve staff and are required on all prescribed fires, wildfires, and during mop-up. There are no exceptions to this standard. Use of additional items will be determined by the Burn Boss according to the site and weather characteristics of each particular burn. All Nomex clothing items must be NFPA 1977 approved.

1. High-density polyethylene hardhat (Bullard or similar brand preferred). Hardhat must be yellow in color to promote visibility in smoky conditions. Existing non-yellow hardhats shall be phased out as they become unsafe for wear. Adornments such as stickers placed on hardhats shall function for agency recognition and/or group unity (park-specific). The only other type of sticker allowed on hardhats shall be reflective strips.
2. Eye protection (face shield, goggles, safety-rated glasses or safety-rated sunglasses).
3. Outerwear (shirt and pants or jumpsuit) shall be of Nomex (Aramid, Nomex IIIA, or Advanced Fabric Nomex). Clothing worn under Nomex should be made from cotton or other natural fibers.
4. Leather boots with hard, slip-resistant soles (leather, Vibram, or rubber preferred); boots to be non-steel-toed, lace-up, and at least 8" tall.
5. Leather gloves.
6. Fire shelter carried at all times either on a web belt or fire pack with shelter holder so shelter is readily accessible (deployment training required).
7. Nomex (Aramid) fabric neck, ear, and face protector attached to hardhat with Velcro.
8. Directional compass.
9. Ear protection for staff working around pump engines, chainsaws, or heavy equipment.
10. Hand-held radio carried in a chest pack; radios should not be carried on a web belt.
11. Bandana or other cotton or Nomex (or equivalent) item to assist with filtering large particulates while working in heavy smoke. Neoprene filter masks or masks with exposed filters are not permitted due to the tendency to melt and/or ignite.
12. Headlamp or flashlight that can be affixed to allow hands-free operation at night. This item needs to be available to staff but may be stored in the fire truck.
13. Whistle (plastic or metal) attached to radio chest pack or location that makes it readily accessible for noise generation.
14. A means for starting a fire such as matches or a lighter.

Recommended Optional Items:

1. Water bottle with web belt or camel pack - 1 quart minimum.
2. Multi-purpose tool such as Leatherman or Gerber, or a small knife.

D. Fire Radio Standards

Background

Communication issues are routinely cited as a stumbling block in many post-fire reviews where the situation did not go as planned and a lack of communications hampered actions. Accordingly, the Reserve recognized the need to use high-band radios in its fire program to improve internal and external (interagency) fireline communications. PPE standards require that each person on a fire have a high-band hand-held radio in a radio chest pack and that engines be equipped with a mobile high-band radio.

The radio of choice for fire use is a Bendix-King field-programmable handheld or mobile radio. These radios were chosen because they can be programmed in the field if needed, allowing the user to add new frequencies as needed on the fireline. They also have multiple groups and channels that allow radio frequencies to be organized in a meaningful way. These radios are also widely used by the interagency fire community, making the Reserve's radios compatible with many other fire agencies.

Frequencies/Licensing for Base Stations and Mobile Units

Rookery Bay Reserve Fire Management program currently does not have a designated radio frequency. The Reserve does, however, have an 800-mhz designated radio to communicate with local county emergency management agencies. The Reserve is working on establishing a narrowband frequency in the future as funds come available. The Reserve relies on the Florida Division of Recreation and Parks (DRP) statewide fire and emergency frequencies. The following is the Florida DRP language.

"A narrowband FCC license is required for each frequency used. The license process is coordinated through the state technology office. All newly erected park radio towers must be 100 feet or less. When possible, the base station antenna is added to a pre-existing structure (e.g., another radio tower, fire tower, office).

Once a license is issued, a park has a 1-year period to install its hardware and have the system functional. A maximum 6-month extension can be applied for from the state technology office. The license will list the transmission frequencies assigned to the park and the location and operational area for these frequencies.

Florida DRP also has license to several statewide fire and emergency frequencies that are not linked to a fixed base station. These frequencies are available for use throughout the state for Division fires and emergencies. These frequencies are in Group 1.

Florida DRP also has a shared-use license for the White Mutual Aid frequency. Because of this shared use license to White Mutuel Aid, Florida DRP is not required to ask permission to use the White Mutual Aid frequency. Permission (from the county emergency operations manager) is still required for use of the Blue and Red Mutual Aid frequencies. The standard protocol for all shared emergency frequencies is for users to yield their use to the higher emergency.

Florida DRP's Fire Coordinator is responsible for updating the statewide fire radio programming files. This information is stored on the Tallahassee server at the following location: F:\Resource Management\Fire\Radio Info. All radio programming software is also stored at this location.

Programming Plan

Because all fire radios (both handhelds and mobiles) have the potential to travel statewide for such operations as fire training, fire strike teams, disaster relief, etc., the Division has a statewide radio programming plan that each park and district must follow. Deviations from this plan are not allowed. It is imperative that all frequencies and associated code guards are correctly programmed into all radios.

- *Group 1 - FFS Programming; 3 Mutual Aid frequencies (Red, White, Blue); Florida DRP statewide fire frequencies; and cooperators frequencies.*
- *Group 2 - Weather stations for the entire state, automated National Weather Service frequencies.*
- *Group 3 - Blank.*
- *Groups 4, 5 - Assigned to District 1 for park frequencies.*
- *Groups 6, 7 - Assigned to District 2 for park frequencies.*
- *Groups 8, 9 - Assigned to District 3 for park frequencies.*
- *Groups 10, 11 - Assigned to District 4 for park frequencies.*
- *Groups 12, 13 - Assigned to District 5 for park frequencies.*
- *Group 14 – Temporary use – available to use on temporary basis as needed for fire assignments in other areas.*
- *Group 15 - Customized group for each park to program as desired.*

The basic programming for groups 4 through 13 will have mobile frequencies for each park. Depending on the park's size, a park may have more than one mobile channel. The mobile programming lets the portable (hand-held) or mobile (vehicle-mounted) radio talk through the repeater to other radios.

Standard park programming uses the antennae/base transmit frequency as the radio's receive frequency and the park's mobile frequency as the radio's transmit frequency. Each park will also have access to a talk-around channel that allows communications from radio to radio without going through the park's repeater system. The talk-around will be enabled by switching the Lo/Hi power toggle switch to the Lo position on a handheld or by using the monitoring (MON) or talk around (TA) button on a mobile radio (on pre-programmed radios). Accordingly, the talk-around frequency pair will not appear as a channel in the radio. Talk-around allows you to have a private conversation from radio to radio without it being broadcast (and possibly scanned) through the repeater. Talk-around frequencies are limited by distance from radio to radio.

A district or a park can use the programming files to update its radio programming as frequently as desired, but all radios must be updated at least once per year on the same schedule as pack testing (by January 31 each year). To update the radios, a user needs the specific radio programming software; the most current programming file; a programming cable, programming plug, or cloning cable; and a computer with the software and programming file loaded (unless programming by hand). Every district office should have the cables and software and a person knowledgeable in programming.

There are several ways to program radios. If the radio has never been programmed with the Division's standardized programming, it should receive its initial programming via a computer hookup. The link to a computer is needed to initially transfer any global settings. Once the global settings have been transferred, the radio will retain them.

Once a radio has been given its global settings, it can be programmed from a laptop computer using the computer-to-radio programming cable. Using a computer allows you to copy all groups at once. Radios can also be cloned from one to another once one radio has been updated. Cloning requires a cloning cable, and each group must be copied individually. A handheld radio can be used to clone a mobile radio; again, one group at a time. Handhelds can also be manually programmed using a programming plug."

8. Firebreaks Requirements, Approvals, and BMPs

A. Initial Requirements and Approvals

1. A prescribed burn must not be conducted without adequate firebreaks surrounding the burn zone. Firebreaks must be as wide as needed and of appropriate type to provide reasonable assurance that prescribed fire should not escape under prescribed and forecasted conditions.
2. In most cases where Reserve boundaries cross flammable vegetation, perimeter firebreaks must be in place and are essential for protection of life, property, and natural resources in the Wildland-Urban Interface.
3. The adequacy of perimeter firebreaks must be regularly assessed, and corrective action must be taken if needed. This is especially critical in the Wildland-Urban Interface. In many cases, perimeter firebreaks should be considerably more robust than interior firebreaks.

B. BMPs for Artificial Firebreaks

To the degree practicable, firebreaks should follow natural contours to minimize erosion.

Firebreaks should avoid natural community boundaries to protect ecotones and to allow fire to spread into and across ecotonal communities.

Firebreaks should be mowed and/or disked at least once a year and timed with the burn schedule to maximize effectiveness. In some situations, mowing may be preferable to disking since no soil disturbance occurs, erosion is minimized, and restoration is easier. Mowing should be considered especially on steep slopes to avoid severe erosion problems.

C. BMPs for Natural Firebreaks

Use of natural firebreaks can be beneficial because they require no disturbance of soil or native groundcover and can reduce management time and costs. They might be used repeatedly and be considered a permanent burn zone boundary or may be used only occasionally.

Various natural features can be used as firebreaks. Water bodies such as lakes, seasonal ponds, rivers, streams, oceans, or bays and wetland communities such as swamps and marshes may be used with effectiveness depending on water level, soil moisture, and other conditions. Upland communities such as hammock and scrub may also serve as firebreaks, although effectiveness depends on fuel moisture, humidity, and other conditions.

Natural firebreaks should be considered where nonflammable or relatively nonflammable biological community types occur adjacent to burn zones when current fuel and weather conditions permit. If a wetland feature is too narrow or flammable to stop the advance of prescribed fires, it should not be relied on as a firebreak.

9. Conducting Prescribed Burns

A. Prescribed Fire Decision Making Process

Deciding whether to burn on a particular day is a complex decision made by the Burn Boss with input from others as needed. Many parameters enter into that decision and to be successful, much pre-planning needs to take place. The Burn Checklist included in the RX Burn forms will help the burn planner step through the complicated process of preparing a zone to burn.

B. Day of Burn Procedures

The process begins by comparing the forecast weather parameters to the prescribed parameters. The burn boss should obtain a combination of at least two of the three National Weather Service (NWS) fire weather forecasts: NWS regional fire weather forecast as well as an NWS spot weather forecast and/or an NWS hourly weather graph to compare the forecasts to desired conditions. The burn boss should not only consider the weather on the day of burn but also look to future day's weather for smoke management and control purposes. There are a number of models that will allow you to run projected wind directions and speed to figure smoke plotting on a given unit. Example: Simple Smoke Screen Tool <http://fireweather.fdacs.gov/Simple-Smoke/>

Once the burn boss decides that the weather is within the range of desired conditions, they must obtain a burn authorization from FFS <http://fireinfo.fdacs.gov/FMIS.WebOBA/Login>. Typically, most burns are conducted during daylight hours, but night burns can be done if the burn boss has obtained a night-time authorization from FFS.

Once authorization has been received from FFS. Emails and notification calls will be placed to listed adjacent landowners, local fire departments and law enforcement. Once all staff and equipment are assembled, the burn boss must conduct a briefing and distribute maps and other information to the individuals on the burn. Fire staff, volunteers and equipment must comply with all safety standards, found in Section 7.

Throughout the day of burn, the burn boss compiles the information required in the day of burn sections of the standard prescribed fire prescription.

Upon completion of the burn, the burn boss directs mop-up and sets up a schedule for monitoring. Monitoring may continue for an extended time period (nights, days and weeks) depending upon local conditions and concerns. The burn boss is responsible for completing all required paperwork.

C. Burning During Drought Conditions

The Reserve recognizes that prescribed fire needs to be applied over a variety of conditions to accomplish resource management objectives and to manage fire-type communities in the best approximation of natural conditions. Transitional season burning (burning in late spring prior to summer rains) often produces highly desired ecological benefits. However, due to the increased number of wildfires and the ability to control fires, this is also a time when it may be difficult to obtain authorizations and to determine when to impose a burn ban.

To keep the decision to burn at the local Burn Manager's level to the greatest extent possible, it is absolutely critical for the Burn Manager to walk through their burn zones. In general, if a prescription requires drought conditions, the prescription must be written to address the full range of KBDI values that the Burn Manager is willing to burn under. As conditions become drier, more controls must be in place.

D. After Action Review Procedures

The After Action Review (AAR) procedure is designed to provide the framework to perform any level of AAR, from very informal (after a routine event) to very formal (after a rare event or event with serious consequences). This procedure has been developed for the fire program, but it can be equally applied to any event where more learning and analysis are desired. An AAR is a professional discussion of an event focused on performance to learn what happened, why it happened, and how to sustain strengths and improve on weaknesses. An AAR conducted after every prescribed fire and routine review of events identifies ways to improve the Reserve's fire program. Activated by the Park Manager, the Burn Boss, or the individual burn crew and conducted by on-site staff, an AAR provides:

- Candid insights into specific crew, leader, and team strengths and weaknesses from various perspectives
- Feedback and insight critical to improving fire application
- Details often lacking in routine fire-related paperwork
- Information to staff to learn for themselves what happened, why it happened, and how to improve and move forward

10. Monitoring

The Reserve has implemented an evaluation tool to determine the vegetative responses to the fire regimes in each burn unit and collectively across the Reserve. Photos are visual examples of change over time as a result of wildfire or prescribed fire. There are also two Post-Burn Evaluations that need to be filled out. One of these is conducted immediately post burn and the other is conducted after a growing season, typically 1 year post burn. These forms can be found in the Fire Prescription Plan (Appendix B.8.1).

1. Photo Points

At approximately two sites per burn unit, photos will be taken facing north (0°), east (90°), west (180°), and south (270°). These sites are marked by metal poles driven into the ground. Photos will be taken pre-burn, 1 to 2 days post burn, 1 year post burn, and annually until the next burn in the unit.

2. Small Unmanned Aircraft Systems (sUAS)

Pre and post-burn imagery. The small unmanned aircraft system (drone) flight (at 200 to 225 feet) is made to capture imagery of each burn zone. This information is used to map the extent and intensity of the fire based on weather parameters on that day.

11. Wildfire Response

A. General Procedures for First Reporting and Follow-Up Procedures

1. Wildfire

If on-site staff cannot immediately contain an escaped fire or if the occurrence of a wildfire is documented, staff must notify their local FFS office as soon as possible with the relevant information and request assistance as needed. When on Rookery Bay Reserve-managed lands, responding agencies will follow Minimum Impact Suppression Tactics (MIST) guidelines. To minimize the lasting impacts to resources within the Reserve, the use of light hand tactics, low-psi impact rubber-tracked machinery, and hose lays off existing fire lines and roads were used for fire suppression within the Reserve. When suppressing fires within the authorized boundaries of the Reserve, other cooperators will adhere to this standard except in the case of immediate threats to life safety or property. This will mean that plows or dozer blades will only be used in the event of the above-mentioned threats. Foam or wetting agents may be used, as needed, but may not be used over water. Endangered species are a concern and will be considered in any suppression action as regards to negative impacts on sensitive habitats.

A contingency plan for escaped prescribed fires is a required part of the burn prescription, and all crew must be briefed on the plan at the pre-burn crew meeting.

2. Restoration and Rehabilitation

In the event of dozer/plow activities, the Reserve will be asking for assistance for and during restoration and rehabilitation. After fire spread has stopped, lines are secured, and fire is deemed out cold, restoration activities will include filling in deep and wide firelines and cup trenches and obliterating any berms. The berm material should be spread back into the fireline or recontoured to the fireline. Any trees or large-size brush cut during fireline construction should be scattered to appear natural. Discourage the use of newly created firelines and trails by blocking with brush, limbs, poles, and logs in a natural-appearing arrangement.

B. FFS Agreement for Suppression Actions

Florida DEP has an agreement with FFS whereby Florida DEP makes its fire suppression resources available to FFS to respond to fire emergencies when agreed upon by both agencies. Florida DEP may use the value of these performed activities to offset suppression and training costs, as well as for services provided by FFS. The primary form of services Florida DEP provides to FFS is engine strike teams during the wildfire season. Requests for services under this agreement must be made through the Florida DRP Division Director's office. Requests cannot be made at the local level. BNCR assembles the costs of Florida DEP resources and submits them to FFS.

This agreement for services in lieu of payment applies to more extended operations and does not apply to local, short-term requests for assistance. Florida DEP does not track every small instance of local assistance, just as FFS does not charge for all local suppression activities. Questions should be directed to Florida DEP's Division Fire Coordinator.

C. Wildfire Engine Strike Teams

As mentioned in the previous section, Florida DRP may provide engine strike teams to FFS during wildfire situations. To receive an engine strike team, FFS makes an official request through Florida DRP Division Director. The Division Fire Coordinator typically organizes and fills these resource order requests once the Division has authorized the availability of its resources.

At the beginning of wildfire season, pre-planning is done to establish staff and engines that are available for assignment. Each strike team is typically composed of 1 strike team leader and 1 strike team leader trainee with 4 x 4 pick-ups, 4 Type 5/6 engines, each with 2 crew members. This is a total of 10 staff and 6 vehicles. The Division typically covers 34 strike-team-related costs.

Many expenses are covered by FFS depending on the size of the incident (may include meals, lodging, engine repairs, etc.).

Strike team details are for a maximum of 14 days, and staff are expected to serve for the full time period. The Division Fire Coordinator will coordinate with the strike team leader and FFS to ensure that the needs of the strike team are met. Mobilization is typically on a short turnaround time. The Division Fire Coordinator will provide the strike team leader with as much advance notice as possible. The strike team leader is responsible for communicating with the team members.

The Division Director authorizes overtime for included employees. Overtime for excluded employees is typically not paid until the Governor declares a State of Emergency. Selected exempt service Florida DEP employees receive no overtime. Except for included employees, overtime payments are never automatic.

D. Wildfire Meal Purchases

Food and/or prepared meals may be provided to staff engaged in wildfire suppression or other emergency actions when it is deemed that such staff cannot be released from the incident during the following established meal periods, in accordance with Ch. 112.061, F.S.:

Breakfast	6 a.m. to 8 a.m.
Lunch	noon to 2 p.m.
Dinner	6 p.m. to 8 p.m.

Meals may be purchased for all Florida DEP crew members, regardless of their travel status, if authorized by the Park Manager (PM), Incident Commander (IC) or Strike Team Leader (STL). The criteria and forms for meal purchases are included in Appendix I.

Literature Cited

- Florida DEP. (2016). Department of Environmental Protection. Division of Recreation and Parks. Resource Management Standard Fire Management.
- Florida Natural Areas Inventory (1990). Matrix of Habitats and Distribution by County of Rare/Endangered Species In Florida. FNAI, Tallahassee, FL
- Florida Natural Areas Inventory and Florida Department of Natural Resources (2010). Guide to the Natural Communities of Florida. FNAI and FDNR, Tallahassee, FL.
- Ford, W.M., K.R. Russell, and C.E. Moorman (eds.). (2002) The Role of Fire in Nongame Wildlife Management and Community Restoration: Traditional Uses and New Directions; Proceedings of a Special Workshop. Proceedings of 15 Sep 200 workshop, Nashville TN, published by USDA Forest Service, Northeastern Research Station, Newtown Square, PA. Available online at https://www.nrs.fs.fed.us/pubs/gtr/gtr_ne288/gtr_ne288.pdf.

B.7 / Recorded Managed Archaeological Sites

The following archaeological sites occur within Rookery Bay Reserve and are managed by the Reserve. These sites occur between Gordon's Pass, in Naples, south through Cape Romano and the Ten Thousand Islands, to the boundary with Everglades National Park.

Site ID	Site Name	Resource Description
CR00019	DOWNS PLACE	Building remains; Campsite (prehistoric); Cistern; Specialized site for procurement of raw materials; Farmstead; Habitation (prehistoric)
CR00020	FAKAHATCHEE RIVER	Prehistoric shell midden; Prehistoric midden(s)
CR00021	ELLIS PLACE	Building remains; Campsite (prehistoric); Specialized site for procurement of raw materials; Habitation (prehistoric); Homestead; Land-terrestrial
CR00022	FAKAHATCHEE KEY	Building remains; Historic burial(s); Campsite (prehistoric); Specialized site for procurement of raw materials; Farmstead; Habitation (prehistoric)
CR00023	PANTHER KEY/GOMEZ KEY	
CR00027	DISMAL KEY	Specialized site for procurement of raw materials; Habitation (prehistoric); Homestead; Land-terrestrial; Prehistoric burial mound(s); Prehistoric shell midden
CR00028	SHELL KEY	Campsite (prehistoric); Specialized site for procurement of raw materials; Habitation (prehistoric); Land-terrestrial; Prehistoric shell midden; Prehistoric shell mound(s)
CR00029	BUTTONWOOD KEY	Campsite (prehistoric); Specialized site for procurement of raw materials; Habitation (prehistoric); Land-terrestrial; Prehistoric shell midden; Prehistoric shell mound(s)
CR00035	ADDISON'S KEY	Campsite (prehistoric); Specialized site for procurement of raw materials; Habitation (prehistoric); Land-terrestrial; Prehistoric shell midden
CR00036	ADDISONS GROVE	Specialized site for procurement of raw materials; Land-terrestrial; Prehistoric burial mound(s); Prehistoric shell midden; Prehistoric midden(s); Prehistoric shell mound(s)
CR00037	HORRS ISLAND 1	Prehistoric shell midden
CR00038	HORRS ISLAND 2	Prehistoric shell midden
CR00039	HORRS ISLAND 3	Prehistoric shell midden
CR00040	HORRS ISLAND 4	Prehistoric shell midden
CR00041	HORRS ISLAND 5	Prehistoric burial mound(s)
CR00042	HORRS ISLAND 6	Prehistoric burial mound(s)
CR00045	GOODLAND POINT MIDDEN	Campsite (prehistoric); Specialized site for procurement of raw materials; Farmstead; Habitation (prehistoric); Land-terrestrial; Prehistoric shell midden
CR00046	GOODLAND POINT BURIAL	Prehistoric burial mound(s); Prehistoric shell midden
CR00047	BEAR POINT SHELL MOUND	Land-terrestrial; Prehistoric shell midden; Wetland-palustrine-sometimes flooded

Site ID	Site Name	Resource Description
CR00051	JOHNSON PLACE	Agriculture/Farm structure; Building remains; Farmstead; Old field (historic); Homestead; Land-terrestrial
CR00052	J E WILLIAMS PLACE	Specialized site for procurement of raw materials; Homestead; Land-terrestrial; Prehistoric shell midden; No field investigation--record based on informant; Historic road segment
CR00053	MCILVANE'S KEY	Habitation (prehistoric); Land-terrestrial; Prehistoric shell midden; Tidal-estuarine Wetland-palustrine-sometimes flooded
CR00054	SAND HILL BAY MOUND	Land-terrestrial; Prehistoric burial mound(s); Prehistoric shell midden; Prehistoric mound(s)
CR00055	CRAWFORD'S KEY	Prehistoric shell midden
CR00101	FAKAHATCHEE 3	Campsite (prehistoric); Habitation (prehistoric); Homestead; Land-terrestrial; Prehistoric shell midden; Prehistoric midden(s)
CR00102	FAKAHATCHEE 2	Prehistoric shell midden
CR00103	FAKAHATCHEE WEST	Campsite (prehistoric); Specialized site for procurement of raw materials; Habitation (prehistoric); Land-terrestrial; Prehistoric shell midden; Prehistoric shell mound(s)
CR00104	MOUTH OF WOOD RIVER	Prehistoric shell midden
CR00105	FOUR BROTHERS	Prehistoric shell midden
CR00109	MAR 6	Campsite (prehistoric); Prehistoric shell midden
CR00110	MAR 7A	Prehistoric shell midden
CR00111	MAR 7B	Prehistoric shell midden
CR00112	MAR 8	Prehistoric shell midden
CR00113	MAR 9	Prehistoric shell midden
CR00114	KIRK NURSERY	Destroyed
CR00115	56 CHEVY	Prehistoric shell midden
CR00116	RACoon GRAVEYARD	Prehistoric shell midden
CR00117	MAR 13	Prehistoric shell midden
CR00119	PETTIT	Prehistoric shell midden
CR00149	MIS 1	Prehistoric shell midden
CR00150	MIS 2	Prehistoric shell midden
CR00151	MIS 3	Prehistoric shell midden
CR00152	BEEHIVE LANDING	Prehistoric shell midden
CR00153	MIS 6	Prehistoric shell midden
CR00191	REMUDA RANCH SOUTH 1	Land-terrestrial; Redeposited site (to this location)
CR00192	REMUDA RANCH SOUTH 2	
CR00193	NN	Prehistoric shell midden

Site ID	Site Name	Resource Description
CR00194	MARCO RIVER	Campsite (prehistoric); Specialized site for procurement of raw materials; Habitation (prehistoric); Land-terrestrial; Prehistoric shell midden; Prehistoric midden(s)
CR00196	TRIPOD KEY	Campsite (prehistoric); Specialized site for procurement of raw materials; Habitation (prehistoric); Land-terrestrial; Prehistoric shell midden; Prehistoric shell mound(s)
CR00201	SOUTHWEST DOCK	Specialized site for procurement of raw materials; Land-terrestrial; Prehistoric shell midden; Wetland-palustrine-sometimes flooded
CR00205	CARLSON ROADBLOCK SITE	Prehistoric shell midden; Artifact scatter-dense (> 2 per sq meter)
CR00206	MOUND B - HERR'S ISLAND ARCHAIC	Habitation (prehistoric); Prehistoric burial mound(s); Prehistoric shell midden; Prehistoric mound(s); Redeposited site (to this location); Prehistoric earthworks
CR00207	MOUND C - HERR'S ISLAND ARCHAIC VILLAGE	Habitation (prehistoric); Land-terrestrial; Prehistoric shell midden; Prehistoric mound(s); Redeposited site (to this location); Prehistoric shell mound(s)
CR00208	MOUND A - HERR'S ISLAND ARCHAIC	Habitation (prehistoric); Land-terrestrial; Prehistoric burial mound(s); Prehistoric mound(s); Redeposited site (to this location); Prehistoric earthworks
CR00209	HERR'S ISLAND ARCHAIC VILLAGE	Subsurface features are present; Habitation (prehistoric); Land-terrestrial; Prehistoric shell midden; Other; Variable density scatter of artifacts
CR00211	MOUND D - HERR'S ISLAND	Land-terrestrial; Prehistoric shell midden; Prehistoric mound(s); Redeposited site (to this location); Prehistoric earthworks; Prehistoric shell mound(s)
CR00217	HIS 17	Platform mound (prehistoric); Prehistoric shell midden; Prehistoric midden(s); Historic refuse / dump; Prehistoric shell mound(s)
CR00298	GARDEN PATCH	Campsite (prehistoric); Specialized site for procurement of raw materials; Habitation (prehistoric); Prehistoric shell midden; Prehistoric midden(s); Historic refuse / dump
CR00371	WHITE RIVER 1	Campsite (prehistoric); Specialized site for procurement of raw materials; Habitation (prehistoric); Land-terrestrial; Prehistoric shell midden; Prehistoric midden(s)
CR00391	BUD'S PLACE	Prehistoric shell mound(s)
CR00543	WEST BARFIELD	Prehistoric midden(s); Historic refuse / dump
CR00548	HAMILTON PLACE	Campsite (prehistoric); Canal; Specialized site for procurement of raw materials; Habitation (prehistoric); Land-terrestrial; Prehistoric shell midden
CR00549	NORTH ROOKERY CHANNEL	Building remains; Cistern; Habitation (prehistoric); Homestead; Land-terrestrial; Prehistoric shell midden
CR00577	NORTH ROOKERY MOUND	Land-terrestrial; Prehistoric burial mound(s)

Site ID	Site Name	Resource Description
CR00578	JOHN'S PASS HAMMOCK MIDDEN	Campsite (prehistoric); Specialized site for procurement of raw materials; Habitation (prehistoric); Homestead; Land-terrestrial; Prehistoric shell midden
CR00580	DALE'S DIGGING	Campsite (prehistoric); Specialized site for procurement of raw materials; Habitation (prehistoric); Prehistoric shell midden; No field investigation--record based on informant; Tidal-estuarine
CR00581	PALM GROVE	Campsite (prehistoric); Specialized site for procurement of raw materials; Habitation (prehistoric); Prehistoric shell midden; No field investigation--record based on informant; Artifact scatter-low density (< 2 per sq meter)
CR00582	NORTH POINT	Campsite (prehistoric); Specialized site for procurement of raw materials; Habitation (prehistoric); Prehistoric shell midden; No field investigation--record based on informant; Saltwater submerged site
CR00685	SAFFRON PLUM MOUND	Prehistoric mound(s)
CR00695	ANGEL'S SCATTER	Campsite (prehistoric); Specialized site for procurement of raw materials; Land-terrestrial; Prehistoric shell midden; Artifact scatter-low density (< 2 per sq meter)
CR00696	HARRIS HILL	Prehistoric burial(s); Campsite (prehistoric); Specialized site for procurement of raw materials; Land-terrestrial; Prehistoric shell midden; Artifact scatter-low density (< 2 per sq meter)
CR00716	HALL BAY CABIN	Building remains; Farmstead; Habitation (prehistoric); Land-terrestrial; Historic refuse / dump
CR00717	BOLGER PLACE	Building remains; Historic burial(s); Farmstead; Habitation (prehistoric); Homestead; Human remains noted at site
CR00718	ONCEWASA	Campsite (prehistoric); Specialized site for procurement of raw materials; Habitation (prehistoric); Land-terrestrial; Prehistoric shell midden; Prehistoric midden(s)
CR00728	KIRKLAND PLACE	Cistern; Farmstead; Habitation (prehistoric); Homestead; Land-terrestrial; Prehistoric shell midden
CR00738	BRUSH ISLAND	Campsite (prehistoric); Specialized site for procurement of raw materials; Habitation (prehistoric); Land-terrestrial; Prehistoric shell midden; Prehistoric midden(s)
CR00754	KIRKLAND CEMETERY	Cemetery
CR00766	SATIN LEAF HAMMOCK	Specialized site for procurement of raw materials; Land-terrestrial
CR00767	BARTELL PLACE	Building remains; Homestead; Land-terrestrial; Historic refuse / dump; Artifact scatter-dense (> 2 per sq meter); Tidal-estuarine
CR00768A	OLD SHACK SITE	Building remains; Homestead; House; Land-terrestrial; Historic refuse / dump; Artifact scatter-dense (> 2 per sq meter)
CR00768B	Old Shack	Building remains; Homestead

Site ID	Site Name	Resource Description
CR00769	MUNLIN CREEK	Building remains; Farmstead; Homestead; Land-terrestrial; Historic refuse / dump; Artifact scatter-dense (> 2 per sq meter)
CR00776	JOHNSON'S LANDING	Campsite (prehistoric); Specialized site for procurement of raw materials; Farmstead; Habitation (prehistoric); Inundated land site; Land-terrestrial
CR00777	SAM WILLIAMS SITE	Campsite (prehistoric); Specialized site for procurement of raw materials; Habitation (prehistoric); Land-terrestrial; Prehistoric shell midden; Artifact scatter-dense (> 2 per sq meter)
CR00778	ERNIE CARROLL SITE	Campsite (prehistoric); Specialized site for procurement of raw materials; Habitation (prehistoric); Land-terrestrial; Prehistoric shell midden; Artifact scatter-low density (< 2 per sq meter)
CR00781	MID KEY ISLAND	Campsite (prehistoric); Specialized site for procurement of raw materials; Land-terrestrial; Prehistoric shell midden; Prehistoric midden(s)Other
CR00782	HALL BAY #2	Building remains; Farmstead; Homestead; Land-terrestrial; Other; Historic refuse / dump
CR00784	SHELL ISLAND	Specialized site for procurement of raw materials; Habitation (prehistoric); Land-terrestrial; Prehistoric shell midden; Prehistoric midden(s); Artifact scatter-dense (> 2 per sq meter)
CR00848	County Road 22	
CR00849	Shell Island Homesteads	Destroyed; Homestead; Land-terrestrial; Other; Historic refuse / dump; Artifact scatter-low density (< 2 per sq meter)
CR00850	Williams Grove	Building remains; Farmstead; Homestead; Land-terrestrial; Historic refuse / dump; Wharf / Dock / Pier
CR00851	Barefoot Williams Bridge	Bridge Remains; Historic road segment; Tidal-estuarine
CR00861	Shell Key Ring	Campsite (prehistoric); Specialized site for procurement of raw materials; Habitation (prehistoric); Land-terrestrial; Prehistoric shell midden; Other
CR00862	Dismal Key Southeast Ring	Habitation (prehistoric); Land-terrestrial; Prehistoric shell midden; Prehistoric midden(s); Other; Prehistoric shell mound(s)
CR00863	Santina Horseshoe	Campsite (prehistoric); Specialized site for procurement of raw materials; Habitation (prehistoric); Land-terrestrial; Prehistoric shell midden; Other
CR00864	Lori's Place	Campsite (prehistoric); Specialized site for procurement of raw materials; Habitation (prehistoric); Land-terrestrial; Prehistoric shell midden
CR00865	Steve's Place	Campsite (prehistoric); Specialized site for procurement of raw materials; Habitation (prehistoric); Land-terrestrial; Prehistoric shell midden; Prehistoric shell mound(s)

Site ID	Site Name	Resource Description
CR00866	Pumpkin Bay Linear Ridge	Campsite (prehistoric); Specialized site for procurement of raw materials; Habitation (prehistoric); Land-terrestrial; Prehistoric shell midden; Prehistoric shell mound(s)
CR00870	Youman's Mound	Campsite (prehistoric); Specialized site for procurement of raw materials; Farmstead; Habitation (prehistoric); Homestead; Land-terrestrial
CR00899	McReynolds Albert R	Artifact scatter-low density (< 2 per sq meter); Saltwater submerged site; Historic shipwreck
CR00900	Rock Creek Site	Campsite (prehistoric); Specialized site for procurement of raw materials; Habitation (prehistoric); Land-terrestrial; Prehistoric shell midden; Prehistoric midden(s)
CR01072	Blackwater Bay Shell Ring	Campsite (prehistoric); Specialized site for procurement of raw materials; Habitation (prehistoric); Land-terrestrial; Prehistoric shell midden; Prehistoric shell ring
CR01103	Shell Island Outer Mound	Prehistoric burial mound(s); Prehistoric mound(s); Tidal-estuarine
CR01107	Horr's Island Scatter	Campsite (prehistoric); Specialized site for procurement of raw materials; Habitation (prehistoric); Land-terrestrial; Artifact scatter-low density (< 2 per sq meter)
CR01157	Cannon Island Homestead	Building remains; Historic burial(s); Farmstead; Homestead; Land-terrestrial; Historic refuse / dump
CR01161	Turtle Key Mound	Habitation (prehistoric); Saltwater submerged site; Prehistoric shell mound(s)
CR01162	Munlin Island Homestead	Building remains; Homestead; Land-terrestrial; Historic refuse / dump; Artifact scatter-low density (< 2 per sq meter); Tidal-estuarine
CR01163	Thomas Hart Homestead	Farmstead; Homestead; Land-terrestrial; Historic refuse / dump; Artifact scatter-low density (< 2 per sq meter); Saltwater submerged site
CR01171	Barefoot Williams West	Building remains; Homestead; Land-terrestrial; Historic refuse / dump
CR01177	Barefoot Williams East	Building remains; Homestead; Land-terrestrial; Historic refuse / dump; Historic road segment; Tidal-estuarine
CR01178	Tomlinson Place	Campsite (prehistoric); Specialized site for procurement of raw materials; Habitation (prehistoric); Homestead; Land-terrestrial; Prehistoric shell midden
CR01179	Key Island Deer Camp	Campsite (prehistoric); Specialized site for procurement of raw materials; Habitation (prehistoric); Prehistoric shell midden; Artifact scatter-low density (< 2 per sq meter); Tidal-estuarine
CR01361	East Lighter Bay	Habitation (prehistoric); Land-terrestrial; Prehistoric shell ring; Tidal-estuarine
CR01362	Southwest Gate	Habitation (prehistoric); Land-terrestrial; Prehistoric shell ring; Tidal-estuarine

Site ID	Site Name	Resource Description
CR01365	Pig Key Homestead	Homestead; Land-terrestrial; Artifact scatter-low density (< 2 per sq meter)
CR01397	Rookery Bay Reburial	Land-terrestrial
CR01407	Artifact Scatter	Artifact scatter-low density (< 2 per sq meter)

B.8 / Nuisance and Invasive Species Control Plan

Part I. Invasive/Exotic Plants

Introduction to Invasive/Exotic Plants

Much of southwest Florida (as well as other portions of the state and country) have been invaded by invasive/exotic plant species. These plants displace native vegetation and turn once biologically diverse systems into near monocultures with minimal diversity. These vegetational shifts by invasive plants affect both the native plant communities and the faunal composition of the area. Diverse systems support a wider range of animal species, while monotypic systems support a smaller range of animal species.

Rankings and Regulations

In Florida, terrestrial invasive/exotic plants are regulated by the Florida Department of Agriculture, while aquatic exotic plants are regulated by the Department of Environmental Protection.

While lacking regulatory authority, the Florida Exotic Pest Plant Council ([FLEPPC], recently renamed the Florida Invasive Species Council [FISC]) encourages the exchange of information on exotic plants in the state. FLEPPC ranks invasive/exotic plants into two categories based on level of damage done to natural areas:

Category I - Species that are invading and disrupting native plant communities in Florida. *This definition does not rely on the economic severity or geographic range of the problem, but on documented ecological damage caused.*

Category II - Species that have shown a potential to disrupt native plant communities. *These species may become ranked as Category I but have not yet demonstrated disruption of natural Florida communities.*

Invasive Plant Control Efforts

Rookery Bay Reserve staff have been involved in habitat restoration through invasive plant control for more than 25 years. Control has been accomplished through staff and volunteer efforts and through contractual services using both hand clearing and heavy equipment, depending upon the site conditions.

Currently, most invasive plant management is done through a combination of Florida Fish and Wildlife Conservation Commission Invasive Plant Management Section (FWC IPMS) funding, FORB funding, CISMA work groups, student volunteers, and staff workdays. In the past, funding and personnel have also been acquired through

- AmeriCorps volunteers
- U.S. Fish & Wildlife Service grants
- CARL funds
- NOAA National Marine Fisheries Service grants
- Earthwatch grants
- Department of Corrections work crews
- Mitigation and violation funds

- Contributions from private landowners

Rotation intervals between treatments have largely been determined by availability of funding and manpower and by densities of invasive/exotic plants in each management unit. Based on ground observations, a 3- to 4-year rotation between treatments would be ideal. Treatment efforts for the Ten Thousand Islands are usually coordinated with the Ten Thousand Islands National Wildlife Refuge.

TREATMENT METHODS

Chemical Control Methods

Herbicides are the most commonly used control method in the Reserve. Herbicides are applied under the supervision of staff with a current Natural Areas Weed Management Applicators License or by a licensed contractor.

Methods currently used in herbicide application at the Reserve include:

Foliar- Herbicides are pre-mixed with a diluent and sprayed onto the foliage of the plant so the leaves are 'sprayed-to-wet', which means applying only enough solution that it begins running off the leaf surface.

Cut Stump- An herbicide is applied to the stump immediately after the stem or trunk is cut near ground level .

Hack and Squirt- Stems are girdled or hacked near the base before herbicide is applied.

Basal Bark- Herbicides are applied to the stem or trunk of the plant in a wide band near the base. The chemical is absorbed and translocated throughout the plant.

Other application methods such as direct injections, basal soil treatment, and aerial application can be used to control invasive plant species. However, these methods are currently not used at the Reserve.

Non-target Damage

Most herbicides currently used in the Reserve are non-selective, meaning they will damage non-target species. Imazapyr in particular translocates through the soil and causes leaf deformation (known as rosetting) in certain plants. Mangrove species, particularly buttonwood, are especially sensitive to the cut-stump applications of this chemical. When applied in large concentrations, Garlon has caused damage to native pine trees.

Non-target damage can be mitigated by

- Never exceeding the per-acre application rates as listed on the herbicide labels
- Not spraying on windy days
- Lowering the pressure and increasing the aperture size on pumps to increase droplet size, minimizing drift
- Not applying herbicide when surface water is present

General Safety in Herbicide Application

The herbicide labels should be treated as the final authority on proper personal protective equipment (PPE). However, there are a few basic safety guidelines common to all herbicides used in Rookery Bay:

- Gloves should be worn when applying chemicals.
- Sturdy shoes or boots should be worn to prevent slipping and falling.
- Goggles or a face shield should be worn if there is any chance of getting the pesticide into eyes.
- A long-sleeved shirt and pants should be worn when applying chemicals.
- A first aid kit with eye wash should be taken on all invasive plant control field excursions.

Current herbicide mixtures are described below.

Binders containing emergency phone numbers, safety data sheets, and herbicide labels are located in the herbicide section of the firehouse and in the main office. First aid kits are in each Rookery Bay vehicle and in the firehouse.

Physical Control Methods

Mechanical Control

Mechanical control of invasive plants can be used in some areas. In high-density infestations, bulldozers, frontend loaders, root rakes, and other specialized heavy equipment can be used. The use of heavy equipment in low- to medium-density infested areas may not be suitable due to the disruption caused to the native community. Once heavy equipment disturbs the soil structure, the area is more susceptible to invasive plant invasions. Areas identified for mechanical control should be discussed with the Resource Management Coordinator prior to initiation of the work.

Other Tools and Equipment

- Machetes are used for cutting down saplings and girdling larger trees.
- Landscaping loppers can be used in cut-stump treatments on saplings and small trees to expose a surface for herbicide application.
- Chainsaws are used in cut-stump treatments on medium to large trees.

Chainsaw use requires:

- Completion of a chainsaw safety class conducted by the Florida Forest Service. This class includes safety aspects, handling/use, and maintenance.
- Safety glasses, chaps, gloves, long sleeves, long pants, and boots must be worn during chainsaw operation. Safety glasses, chaps, and gloves are stored in the firehouse.
- Ear plugs are recommended for chainsaw operators, especially if operating for an extended period of time. Disposable ear plugs are located in the firehouse.

Manual Control

Control of seedlings through hand-pulling is another form of physical control used at the Reserve. This is an effective form of control when the primary root system is removed. For example, Brazilian pepper has numerous lateral roots. If the primary lateral roots are broken while pulling, the plant may resprout. Melaleuca, on the other hand, has a primary tap root. If this is tap root is

broken, the plant will resprout. Hand-pulling of seedlings is an important form of control in restoration areas where the seed trees have been controlled and the canopy removed.

Biological Control

Biological control involves long-term methods for controlling the growth, reproduction, and spread of invasive plant species. Biological controls alone will not solve all invasive plant problems but can be effective when used in conjunction with other methods. The release of biological control agents (generally insects) requires approval from state and federal agencies. A number of biological control agents are being examined for melaleuca and Brazilian pepper.

Air potato leaf beetles (*Lilioceris cheni*) were released into the Snail Trail area (Unit 12) in 2017 by IFAS, but heavy rains caused low survival rates. The possibility of releasing a second group of beetles should be examined.

Prescribed Fire Control

Fire can be both a benefit and an obstacle to controlling invasive plants. Many species, such as melaleuca and downy rose-myrtle, are well-adapted to fire. Unusually hot fires can cause significant mortality in native plant species and cause enough disturbance for the re-infestation of invasive/exotic plants. (In fact, such re-infestation occurred following the Lee Williams Road wildfire in the Picayune Strand in 2017.) Cogon grass and Old World climbing fern can cause extreme fire behavior by burning hotter and taking the fire into the canopy.

On the other hand, fire can be used in conjunction with chemical treatments to kill invasive/exotic plants. Cogon grass, for example, readily sprouts after a fire and is easy to find and treat. The stress of the fire combined with chemical treatment of surviving plants can be an effective means of control. Fire may be useful in controlling Australian pine due to the plant's shallow root system.

Habitat Mapping / Encroachment Rates

The Reserve is currently in the process of re-mapping habitats. Information on invasive/exotic species density and distribution will be helpful in determining priority areas and species. Furthermore, resource management units should be visited once a year to track any changes in invasive/exotic species coverage and composition.

Herbicides and treatments used to treat invasive plants within Rookery Bay Reserve are summarized below.

Herbicide Name	Trade Name(s)	Treatment Rate & Type	Target Species
Glyphosate	Accord Concentrate Glyphosate 4 Razor Pro	Foliar 1.5-3% (with 0.1-0.5% imazapyr)	Grasses, rosary pea, rattlebox, wedelia, Caesar weed, and other herbaceous species
Imazapyr	Arsenal Polaris Habitat Stalker	Cut Stump 5-10%	Melaleuca
Triclopyr Amine	Element 3A Garlon 3A	Cut Stump 25%	Brazilian pepper, earleaf acacia, and other woody species

Triclopyr Ester	Element 4 Garlon 4	Basal Bark/Cut Stump 4-18%	Brazilian pepper, earleaf acacia, and other woody species
		Foliar 4%	Wedelia and shrubby false buttonweed

Part II. Invasive/Exotic and Nuisance Animals

Introduction to Exotic Animals

South Florida, with its semi-tropical climate, high human population, and vicinity to major ports of entry, contains the most invasive/exotic animal species anywhere in the continental United States. Reptiles and fish are the most species-rich, but all taxa contribute at least several invasive/exotic species to south Florida. The vast interconnected network of canals, swamps, and the Everglades makes control of aquatic and semi-aquatic species problematic. Impacts of invasive animals vary by species but generally include increased competition with and displacement of native species, a reservoir for disease transmission, and habitat alteration.

Invasive/Exotic and Nuisance Animal Control Efforts

Control efforts for invasive animals tend to be on a smaller scale than efforts for invasive plants due to a current lack of effective management techniques for invasive/exotic animal species in natural areas. Many current techniques (insecticides, rodenticides, etc.) were developed for use in greenhouses, ports of entry, and residential areas and would cause undue damage to native species. Furthermore, a significant subset of our invasive/exotic animals are largely found in urbanized areas and cause little damage to our natural areas. Efforts thus far have focused on larger animals causing significant problems for which effective management strategies have been developed.

Nuisance species (coyotes, raccoons, and crows) are generally controlled locally around sea turtle and bird nesting areas on an as-needed basis.

Notes on Species Accounts

Only the most ecologically and numerically important invasive/exotic species have been described below. There are several groups of species (birds, small lizards, etc.) that are not being actively managed due to small population numbers or limited ecological impacts. A complete list of invasive/exotic species in the Reserve is in Appendix B.4.

Feral Hog ***Sus scrofa***

Origin: Eurasia via Spain and the British Isles. Introduced to Florida beginning in the 1500s as a source of food for the Spanish and American settlers. Occasionally moved to new locations by hunters.

Similar Species: None.

Habitats Invaded: Can be found in all habitats in the Reserve, but are most commonly encountered in hammocks, along beaches, and in open mangrove forests. Hogs generally prefer having a source of shade and water nearby for thermoregulation.

- Food Habits:** A generalist omnivore. In the Reserve, they are known to eat seagrape, cocoplum, palmetto berries, and sea turtle eggs.
- Impacts:** Rooting behavior destroys native vegetation and creates a disturbance that can then be exploited by invasive plants. A known carrier of several diseases, including brucellosis and the coliform bacterium *Escherichia coli*. Hogs are particularly problematic on Keewaydin, where they destroy sea turtle nests (including those that are caged).
- Current Control:** Currently trapped and shot in-house and in partnership with USDA. To date, most control efforts have focused on Keewaydin, where predation on sea turtle nests has been high. Florida Panthers (*Puma concolor coryi*) are an important biological control in areas to the east, but the Reserve lacks enough quality habitat to sustain a significant permanent population of panthers.
- Known Occurrences:** Feral Hogs are mostly found west of Collier Boulevard (Route 951) and are completely absent from Cape Romano and the Ten Thousand Islands. Most observations occur on Keewaydin, Cannon, and Little Marco Islands, Shell Island, The Snail Trail, and the Bathey Property.
- Comments:** USDA and Reserve staff have recently secured funding for a more thorough hog control program. Because hogs are isolated in a pocket of habitat (bounded by Naples, the Gulf of Mexico, and areas of relatively high panther densities), eradication may be possible.

Iguanas

Black Spinytail Iguana- *Ctenosaurus similis*

Green Iguana- *Iguana iguana*

- Origin:** Black Spinytail Iguana. Southern Mexico and Central America. Based on genetic sampling, the population in Lee, Charlotte, and Collier counties was probably introduced from the Atlantic coast of Honduras. First introduced to Cayo Costa and Gasparilla Islands around 1980. Based on anecdotal reports, a homeowner introduced about 20 to 30 individuals on southern Keewaydin from Gasparilla in the mid-1990s.
- Green Iguana- Originally from Mexico through Paraguay. First reported on the east coast in the 1960s, probably as escaped pets.
- Similar Species:** Green Iguanas are usually bright green in color, while Black Spinytail Iguanas are usually dark green to black and have whorls of enlarged scales (small spines) encircling their tails.
- Habitats Invaded:** Black Spinytail Iguanas utilize most of the habitats on Keewaydin, including dunes, coastal strands, coastal hammocks, and mangrove woodlands. They seem to prefer to burrow in open, well-drained areas, including lawns and are often found around houses and outbuildings. Green iguanas are usually found around disturbed areas, but this may just be a relic of increased human reporting in these areas.

- Food habits:** Both species are mostly herbivores, feeding on fruits, leaves, and flowers. Sarah Funck observed a diet shift in Black Spinytail Iguanas, with hatchlings feeding mainly on insects (especially hymenopterans), while the subadults and adults feed mostly on plant material. Iguanas have been observed feeding on listed thatch palm (*Thrinax radiata*) fruits, tree snails, and least tern chicks on Keewaydin.
- Impacts:** Iguanas will either dig their own burrows or steal burrows of other species to use as their own. This habit, along with their dietary preferences, puts them as the same niche as Gopher Tortoises as a possible competitor. Furthermore, the remains of a juvenile Gopher Tortoise have been found in the stomach of an adult male Spinytail Iguana on Gasparilla Island. The impacts of predation on Gopher Tortoises and other listed species are unknown. An experiment is underway at the Naples Botanical Garden looking at the germination rate of thatch palm seeds collected from the tree vs. those collected from the stomach of an iguana.
- Current Control:** Black Spinytail Iguanas are currently shot on Keewaydin both in-house and in partnership with FWC. Green Iguanas are too rarely encountered to be controlled.
- Known Occurrences:** Green Iguanas are sporadically found east of Route 951, including the Shell Island Road field station and the Learning Center area. Spiny-tail Iguanas are limited to Keewaydin Island, south of 26.04°.

Burmese Python ***Python bivittatus***

- Origin:** Originally from southeast Asia. Many individuals in Florida are hybrids between the Burmese Python and the closely related Indian Python (*Python molurus*) from south Asia. (Hunter et al. 2018). First reported from the Flamingo area in the late 1970s.
- Similar Species:** The Boa Constrictor is generally much smaller than the Burmese Python (11 feet maximum vs. 20 feet maximum, respectively). In addition, Burmese Pythons have angular reddish-brown patches on a tan background that resemble a Giraffe, while boas have large tan ovals separated by dark brown saddles. Reticulated Pythons have black, white, and yellow markings on a grayish background. Ball Pythons have rounded, tan markings on a dark background. Anacondas are generally stouter than pythons and have round black markings on a green or yellow background.
- Habitats Invaded:** Burmese Pythons are found in all habitats of the Reserve.
- Food Habits:** Burmese Pythons have been implicated in severe meso-mammal declines in Everglades National Park. Recorded prey items for Pythons in Florida include Raccoons, Opossums, Rabbits, Squirrels, Rats, Mice, wading birds, Coots, Alligators, and Deer.

- Impacts:** Pythons have had significant impacts (95% reduction of certain species) on mammal populations in southeast Florida. This level of impact has not yet been recorded in southwest Florida, but it appears to be only a matter of time before similar decimation occurs there as well. (Severe declines in mammal populations in the eastern Everglades were first noted around 2003, about 25 years after pythons were first observed in the area. In Collier County, Pythons were first observed about 20 years ago.) Besides fundamentally altering the food chain, Pythons pose a threat to pets and possibly to people. Effects of predation on the federally endangered Florida Panther (*Puma concolor coryi*) are unknown.
- Current Control:** Rookery Bay is partnering with the Conservancy of Southwest Florida for ongoing Burmese Python research and removal.
- Known Occurrences:** Burmese Pythons have been found throughout the Reserve west of San Marco Road. Pythons have been reported along Tamiami Trail east of San Marco, along Marsh Trail in the Ten Thousand Islands National Wildlife Refuge, and from the berm of the Faka Union Canal, but no pythons have been reported from the Ten Thousand Islands or Cape Romano complex.
- Comments:** Anacondas (*Eunectes murinus* and *Eunectes notaeus*), Ball Pythons (*Python regius*) and Reticulated Pythons (*Malayopython reticulatus*) have been occasionally reported from Collier County, but these most likely represent isolated pet releases. Based on recent genetic studies, at least some Burmese Pythons in Florida are partially hybridized with Indian Pythons (*Python molurus*).

Cane Toad- *Rhinella marina*

- Origin:** Native to Mexico through the Amazon basin. Established in Florida around the 1950s through intentional releases and pet escapes.
- Similar Species:** Cane Toads are much larger than our native toads.
- Habitats Invaded:** Cane Toads are largely limited to residential and commercial areas within the Reserve development boundary.
- Food Habits:** Cane Toads will eat anything that can fit into their mouths, including insects, snails, worms, other frogs, and small lizards.
- Impacts:** Cane Toads compete with native amphibians for food and breeding areas and may cause some modest declines in native invertebrates. They also predate native reptiles, amphibians, and other vertebrates. Cane Toads secrete toxins on their skin, potentially causing some mortality in predators, including pets. Cane Toads do not appear to be causing large declines in predator species in Florida as is the case in Australia.
- Current Control:** The Reserve is partnering with the University of Florida to test the efficacy of traps for Cane Toads.

Known Occurrences: Cane Toads are limited to residential areas within the Reserve's development boundary.

Fish

(See Appendix B.4 for individual species)

Most invasive/exotic fish species in our area were introduced from Central America, West Africa, and Southeast Asia after the 1950s through pet releases and aquaculture escapes. Several species have become important game or food fishes (Peacock Bass, Mayan Cichlid). Impacts to native species from include disease transmission, direct competition through predation, and indirect competition for limited resources such as suitable nesting sites and prey species. Control of invasive/exotic fishes is extremely difficult, as standing water during the rainy season allows fish to disperse nearly everywhere, and canals and ditches provide travel corridors even during the dry season. Furthermore, Mayan Cichlids and Spotted Tilapia have a high tolerance for brackish water and can be found through most of the upper reaches of the mangroves (Units 4, 6, 9, etc). Current management is limited to Reserve support of CISMA's Nonnative Fish Roundup, a yearly fishing tournament dedicated to raising awareness about invasive/exotic fish species.

Invertebrates

(See Appendix B.4 for individual species)

Most invasive/exotic invertebrates in southwest Florida were inadvertently brought here through the shipping and horticulture industries, although the Island Applesnail (*Pomacea maculata*) was probably established through aquarium releases. Unfortunately, relatively little is known about the distribution of invasive/exotic invertebrates in the Reserve, and no feasible long-term management techniques are currently known for these species in Florida's natural areas.

Green Mussels (*Perna viridis*) were observed in Catclaw Lagoon (Dave Addison) and around Marco Island in the early 2000s, but no observations have been made since. Laboratory experiments suggest that green Mussels exhibit high rates of mortality in low salinity (less than 15 ppt) or high-desiccation environments (McFarland et al. 2014).

Island Applesnails (*Pomacea maculata*) negatively affect populations of our native Florida Applesnail, *P. paludosa*, along with the aquatic plants they feed on. Furthermore, invasive/exotic Apple Snails serve as vectors for the Rat Lungworm (*Angiostrongylus cantonensis*) and have been shown to negatively affect agricultural crops. Limpkins (*Aramus guarauna*) and Snail Kites (*Rhostramus sociabilis*) may provide some natural biological control of Apple Snails, but not on a level to limit the spread of this species. Snail Kites often use more energy extracting *P. maculata* from their shells than the native Florida Applesnail, *P. paludosa*. Some land managers have installed perches closer to waterbodies containing the invasive species to facilitate greater consumption by Snail Kites (Pias et al. 2012).

Cuban Brown Snails (*Zachrysia provisoria*) cause some damage to agricultural crops (and most likely to native plants), but no long-term control strategies have been successfully developed for natural areas. Molluscicides for this species would probably negatively affect our native tree snails, *Drymaeus multilineatus*, *Orthalicus floridensis*, and *Liguus fasciatus*.

The New Guinea Flatworm, *Platydemus manokwari*, has been shown to cause sharp decreases in native land snail populations in the Pacific and is a vector for the Rat Lungworm. To date, no control methods are known for natural areas.

Several invasive ants are known from the Reserve, including the Red Imported Fire Ant (*Solenopsis invicta*), Ghost Ant (*Tapinoma melanocephalum*) and Robust Crazy Ant (*Nylanderia bourbonica*). All three species (the Red Imported Fire Ant from Brazil, Bolivia, Paraguay, and Argentina; the remaining two species from Australasia) were accidental introductions (. *Tapinoma* and *Nylanderia* are primarily household pests and rarely achieve dominance in natural areas; *Solenopsis*, on the other hand, form large colonies in natural and semi-natural areas. All three species have been collected from Monument Trail in the Reserve. *Tapinoma* and *Nylanderia* have little impact on native species (*Tapinoma* may actually help the endangered Miami Blue Butterfly, *Cyclargus thomasi bethenubakeri*, by tending to its larvae [Saarinen and Daniels 2006]). The Red Imported Fire Ant has been shown to cause significant declines in native ant species and to disrupt native plant seeding dispersal. Furthermore, fire ants are known to predate bird and reptile eggs and young. Broad-spectrum insecticides have been used in agricultural and residential areas but are impractical and may cause significant damage to natural areas.

The Mexican Bromeliad Weevil (*Metamasius callizona*) was introduced to Florida in the late 1980s in a shipment of bromeliads from Mexico. Both the larval and adult stages of this insect feed on bromeliad leaves, sometimes causing the death of the plant. Several state-listed *Tillandsia* species are affected by this pest. Current trials of a parasitoid mite (*Lixadontia franki*) to be used as a biocontrol are ongoing, but no other feasible control efforts are currently known for natural areas.

APPENDIX C. PUBLIC INVOLVEMENT

Appendix C. Public Involvement

C.1 / Rookery Bay Advisory Council

The following appendices contain information about who served on the Rookery Bay Advisory Council, when meetings were held, copies of the public advertisements and information on obtaining meeting summaries.

C.1.1 / List of Members and Their Affiliations

Name	Affiliate
Athan Barkoukis	<i>Friends of Rookery Bay</i>
Brad Cornell	<i>Audubon Western Everglades</i>
Dr. James Fourqurean	<i>Florida International University, Institute of the Environment</i>
Jon Iglehart	<i>Florida DEP South District</i>
Lisa Koehler	<i>South Florida Water Management District</i>
Gerald Kurtz	<i>Collier County Growth Management</i>
Katie Laakkonen	<i>City of Naples, Natural Resources Division</i>
Commissioner Rick LoCastro	<i>Collier County Board of Commissioners</i>
Marshall Miller	<i>Collier County Growth Management</i>
Jim Murray	<i>Sea Grant (retired)</i>
Erin Myers	<i>Ten Thousand Islands National Wildlife Refuge</i>
Kevin O'Donnell	<i>Florida DEP, Division of Environmental Assessment and Restoration</i>
Frank Perrucci	<i>Marine Industries Association of Collier County</i>
Dr. Michael Savarese	<i>Florida Gulf Coast University</i>
Daniel Smith	<i>City of Marco Island</i>
Chad Washburn	<i>Naples Botanical Garden</i>
Ryan Westberry	<i>Collier County Public Schools</i>
Kathy Worley	<i>The Conservancy of Southwest Florida</i>
Captain Randy Yanez	<i>Florida Fish and Wildlife Conservation Commission, Division of Law Enforcement</i>

C.2 / Public Meetings

C.2.1 / Advertisements in Local Newspaper

The following public meeting announcements, requesting input from the public were published on February 24, 2022, in the Naples Daily News. An online public meeting was conducted on March 22, 2022, from 5:00 PM to 6:30 PM local time. An in-person public meeting was conducted on March 25, 2022, from 9:00 AM to 12 PM local time at Rookery Bay National Estuarine Research Reserve at 300 Tower Road, Naples, Florida.

Text of Ad: 02/22/2022

Notice of Meeting/Workshop
Hearing
BOARD OF TRUSTEES OF THE
INTERNAL IMPROVEMENT
TRUST FUND
The Florida Department of Environmental Protection, Office of Resilience and Coastal Protection announces a public meeting to which all persons are invited.
DATE AND TIME: Tuesday, March 22, 2022, 5 - 6:30 p.m.
PLACE: This is an online meeting. Please join at <https://floridadep.gov/RBManagementPlan>
GENERAL SUBJECT MATTER TO BE CONSIDERED: A draft management plan for Rookery Bay National Estuarine Research Reserve has been prepared by the Office of Resilience and Coastal Protection. The draft plan is available for viewing or download at <http://publicfiles.dep.state.fl.us/CAMA/plans/Rookery-Bay-NERR-Mgmt-Plan-DRAFT-220127.pdf>. The Office of Resilience and Coastal Protection seeks public comment on the draft. The public is also invited to submit written comments to Keith.Laakkonen@FloridaDEP.gov by April 8, 2022. A copy of the agenda may be obtained by contacting: Jessica McIntosh at Jessica.McIntosh@FloridaDEP.gov. Pursuant to the provisions of the Americans with Disabilities Act, any person requiring special accommodations to participate in this workshop/meeting is asked to advise the agency at least 48 hours before the workshop/meeting by contacting: Jessica McIntosh at Jessica.McIntosh@FloridaDEP.gov. If you are hearing or speech impaired, please contact the agency using the Florida Relay Service, 1(800)955-8771 (TDD) or 1(800)955-8770 (Voice).
Pub Date: February 24, 2022
#5146486

Below is the public notice for the in-person public meeting held on March 25, 2022, from 9:00 AM to 12 PM local time at Rookery Bay National Estuarine Research Reserve at 300 Tower Road, Naples, Florida.

Text of Ad: 02/22/2022

Notice of Meeting/Workshop
Hearing

BOARD OF TRUSTEES OF THE
INTERNAL IMPROVEMENT
TRUST FUND

The Florida Department of Environmental Protection, Office of Resilience and Coastal Protection announces a public meeting to which all persons are invited.

DATE AND TIME: Friday,
March 25, 2022, 9 a.m. - 12
p.m.

PLACE: Rookery Bay National
Estuarine Research Reserve,
300 Tower Road, Naples, FL
34113

GENERAL SUBJECT MATTER
TO BE CONSIDERED: The
Rookery Bay National Estuarine Research Reserve Management Plan Advisory Group will be meeting to review and discuss the draft management plan. The draft management plan is available at <http://publicfiles.dep.state.fl.us/CAMA/plans/Rookery-Bay-NERR-Mgmt-Plan-DRAFT-220127.pdf>. Members of the public are invited to attend and listen to comments. Comments can also be submitted in writing to Keith.Laakkonen@FloridaDEP.gov by April 8, 2022.

A copy of the agenda may be obtained by contacting: Jessica McIntosh at Jessica.McIntosh@FloridaDEP.gov.

Pursuant to the provisions of the Americans with Disabilities Act, any person requiring special accommodations to participate in this workshop/meeting is asked to advise the agency at least 48 hours before the workshop/meeting by contacting: Jessica McIntosh at Jessica.McIntosh@FloridaDEP.gov. If you are hearing or speech impaired, please contact the agency using the Florida Relay Service, 1(800)955-8771 (TDD) or 1(800)955-8770 (Voice).

Pub Date: February 24, 2022
5146498

C.2.2 / Florida Administrative Register Notices

The Florida Department of Environmental Protection, Office of Resilience and Coastal Protection, published two formal announcements seeking public input for the revised management plan draft. These were published in the Florida Administrative Register on February 18 and 25, 2022. The first announcement (Florida Administrative Register 48(34):711–712) advertised the online public meeting on March 22, 2022, at 5:00 PM to 6:30 PM Eastern Time and the in-person public meeting for March 25, 2022, at 9:00 AM Eastern Time. The in-person meeting was re-advertised in a second formal announcement on February 25, 2022 (Florida Administrative Register 48(39):816) due to an error in the first announcement (it stated that the meeting was on a Thursday instead of on a Friday). These announcements are attached in the following pages.

DEPARTMENT OF EDUCATION

The Articulation Coordinating Committee announces a public meeting to which all persons are invited.

DATE AND TIME: February 23, 2022, 1:00 p.m. – 3:00 p.m.

PLACE: GoToWebinar:

<https://attendee.gotowebinar.com/register/4804265899813803533>

GENERAL SUBJECT MATTER TO BE CONSIDERED: Articulation issues regarding secondary and postsecondary education.

A copy of the agenda may be obtained by contacting: articulation@fldoe.org or (850)245-0427.

DEPARTMENT OF EDUCATION

Education Practices Commission

The Education Practices Commission announces a hearing to which all persons are invited.

DATES AND TIMES: A New Member Training is being conducted at 9:00 a.m. or as soon thereafter on March 1, 2022.

A Teacher Hearing Panel will begin at 1:30 p.m. or as soon thereafter as can be heard on March 1, 2022.

A Teacher Hearing Panel will begin at 8:30 a.m. or as soon thereafter as can be heard on March 2, 2022.

An Administrator Hearing Panel will begin at 3:00 p.m. or as soon thereafter as can be heard on March 2, 2022.

An All Member Training is being conducted immediately following the Administrative Hearing Panel on March 2, 2022.

An All Member Workshop will begin at 8:30 a.m. or as soon thereafter on March 3, 2022.

A Business Meeting will begin at 11:00 a.m. or as soon thereafter on March 3, 2022.

A Teacher Hearing Panel will begin at 8:30 a.m. or as soon thereafter as can be heard on March 4, 2022.

PLACE: Embassy Suites Orlando Airport, 5835 T.G. Lee Boulevard, Orlando, Florida 32822, (407)888-9339

GENERAL SUBJECT MATTER TO BE CONSIDERED: The Hearing Panels of the Education Practices Commission will consider final agency action in matters dealing with the disciplining of certified educators. The New Member Training is being held to train members of the Commission. The All Member Workshop is being held to train members of the Commission. The Business Meeting is being held to discuss the business of the Commission.

A copy of the agenda may be obtained by contacting: Lisa Forbess at (850)245-0455.

Pursuant to the provisions of the Americans with Disabilities Act, any person requiring special accommodations to participate in this workshop/meeting is asked to advise the agency at least 5 days before the workshop/meeting by contacting: Lisa Forbess at (850)245-0455. If you are hearing or speech impaired, please contact the agency using the Florida

Relay Service, 1(800)955-8771 (TDD) or 1(800)955-8770 (Voice).

If any person decides to appeal any decision made by the Board with respect to any matter considered at this meeting or hearing, he/she will need to ensure that a verbatim record of the proceeding is made, which record includes the testimony and evidence from which the appeal is to be issued.

For more information, you may contact: Lisa Forbess at (850)245-0455.

BOARD OF TRUSTEES OF THE INTERNAL IMPROVEMENT TRUST FUND

The Florida Department of Environmental Protection, Office of Resilience and Coastal Protection announces a public meeting to which all persons are invited.

DATE AND TIME: Tuesday, March 22, 2022, 5:00 p.m. – 6:30 p.m.

PLACE: This is an online meeting. Please join at <https://floridadep.gov/RBManagementPlan>

GENERAL SUBJECT MATTER TO BE CONSIDERED: A draft management plan for Rookery Bay National Estuarine Research Reserve has been prepared by the Office of Resilience and Coastal Protection. The draft plan is available for viewing or download at <http://publicfiles.dep.state.fl.us/CAMA/plans/Rookery-Bay-NERR-Mgmt-Plan-DRAFT-220127.pdf>. The Office of Resilience and Coastal Protection seeks public comment on the draft. The public is also invited to submit written comments to Keith.Laakkonen@FloridaDEP.gov by April 8, 2022.

A copy of the agenda may be obtained by contacting: Jessica McIntosh at Jessica.McIntosh@FloridaDEP.gov.

Pursuant to the provisions of the Americans with Disabilities Act, any person requiring special accommodations to participate in this workshop/meeting is asked to advise the agency at least 48 hours before the workshop/meeting by contacting: Jessica McIntosh at Jessica.McIntosh@FloridaDEP.gov. If you are hearing or speech impaired, please contact the agency using the Florida Relay Service, 1(800)955-8771 (TDD) or 1(800)955-8770 (Voice).

BOARD OF TRUSTEES OF THE INTERNAL IMPROVEMENT TRUST FUND

The Florida Department of Environmental Protection, Office of Resilience and Coastal Protection announces a public meeting to which all persons are invited.

DATE AND TIME: Thursday, March 25, 2022, 9:00 a.m.

PLACE: Rookery Bay National Estuarine Research Reserve, 300 Tower Road, Naples, FL 34113

GENERAL SUBJECT MATTER TO BE CONSIDERED: The Rookery Bay National Estuarine Research Reserve Management Plan Advisory Group will be meeting to review

and discuss the draft management plan. The draft management plan is available at <http://publicfiles.dep.state.fl.us/CAMA/plans/Rookery-Bay-NERR-Mgmt-Plan-DRAFT-220127.pdf>. Members of the public are invited to attend and listen to comments. Comments can also be submitted in writing to Keith.Laakkonen@FloridaDEP.gov by April 8, 2022. A copy of the agenda may be obtained by contacting: Jessica McIntosh at Jessica.McIntosh@FloridaDEP.gov. Pursuant to the provisions of the Americans with Disabilities Act, any person requiring special accommodations to participate in this workshop/meeting is asked to advise the agency at least 48 hours before the workshop/meeting by contacting: Jessica McIntosh at Jessica.McIntosh@FloridaDEP.gov. If you are hearing or speech impaired, please contact the agency using the Florida Relay Service, 1(800)955-8771 (TDD) or 1(800)955-8770 (Voice).

PUBLIC SERVICE COMMISSION

The Florida Public Service Commission announces its regularly scheduled Commission Conference, to which all interested persons are invited.

DATE AND TIME: Tuesday, March 1, 2022, 9:30 a.m.

PLACE: Room 148, Betty Easley Conference Center, 4075 Esplanade Way, Tallahassee, Florida

GENERAL SUBJECT MATTER TO BE CONSIDERED: To consider those matters ready for decision.

LEGAL AUTHORITY AND JURISDICTION: Chapters 120, 350, 364, 366, and 367, F.S. Persons who may be affected by Commission action on certain items on the Conference agenda may be allowed to address the Commission, either informally or by oral argument, when those items are taken up for discussion, pursuant to Rules 25-22.0021 and 25-22.0022, F.A.C. The Commission Conference Notice, Agenda, related documents, and FPSC contact information are available at www.floridapsc.com.

ADA: In accordance with the Americans with Disabilities Act, persons needing a special accommodation to participate at this proceeding should contact the Office of Commission Clerk no later than five days prior to the conference at 2540 Shumard Oak Boulevard, Tallahassee, Florida 32399-0850 or (850)413-6770 (Florida Relay Service, 1(800)955-8770 Voice or 1(800)955-8771 TDD). Assistive Listening Devices are available upon request from the Office of Commission Clerk, Gerald L. Gunter Building, Room 152.

EMERGENCY CANCELLATION OF CONFERENCE: If a named storm or other disaster requires cancellation of the Conference, Commission staff will attempt to give timely notice. Notice of cancellation will be provided on the Commission's website (www.floridapsc.com) under the Hot

Topics link on the home page. Cancellation can also be confirmed by calling the Office of Commission Clerk at (850)413-6770.

REGIONAL PLANNING COUNCILS

West Florida Regional Planning Council

The Regional Rural Transportation Technical Advisory Committee announces a public meeting to which all persons are invited.

DATE AND TIME: Friday, February 25, 2022, 10:00 a.m.

PLACE: Virtual

GENERAL SUBJECT MATTER TO BE CONSIDERED: The Regional Rural Transportation Technical Advisory Committee (TAC) will hold a public meeting Friday, February 25, 2022, 10:00 a.m. The meeting will be held virtually via GoToMeeting.

GoToMeeting Information:

Please join my meeting from your computer, tablet or smartphone. <https://meet.goto.com/ECRC-PensacolaConference>

PensacolaConference

You can also dial in using your phone. United States: (646)749-3122, Access Code: 860-454-141

Get the app now and be ready when your first meeting starts: <https://meet.goto.com/install>

The TAC will discuss general business; the meeting information can be accessed at www.ecrc.org/RRTP.

PUBLIC FORUM

Public input is valuable to ECRC, we encourage our communities to submit input through a variety of avenues. Comments can be submitted via eComment Card, email, or phone. Visit www.ecrc.org/RRTP to learn more.

A copy of the agenda may be obtained by contacting: Angela Bradley, (850)332-7976, or angela.bradley@ecrc.org.

Pursuant to the provisions of the Americans with Disabilities Act, any person requiring special accommodations to participate in this workshop/meeting is asked to advise the agency at least 48 hours before the workshop/meeting by contacting: Public Involvement at publicinvolvement@ecrc.org. If you are hearing or speech impaired, please contact the agency using the Florida Relay Service, 1(800)955-8771 (TDD) or 1(800)955-8770 (Voice).

AGENCY FOR HEALTH CARE ADMINISTRATION

Medicaid

The Agency for Health Care Administration announces a public meeting to which all persons are invited.

DATE AND TIME: Tuesday, March 22, 2022, 9:30 a.m. – 11:30 a.m.

PLACE: The Post Award Forum will be conducted via webinar. To participate, register for the webinar at: <https://attendee.gotowebinar.com/register/5919739138903850>

Section VI

Notice of Meetings, Workshops and Public Hearings

DEPARTMENT OF EDUCATION

The Florida Rehabilitation Council announces a telephone conference call to which all persons are invited.

DATE AND TIME: March 21, 2:00 p.m. – 3:30 p.m. ET or until complete

PLACE: Conference Line: 1(888)585-9008 and code (873574258)

GENERAL SUBJECT MATTER TO BE CONSIDERED: Florida Rehabilitation Council - General Business

A copy of the agenda may be obtained by contacting: FRC Staff at: FRCCustomers@vr.fldoe.org.

Pursuant to the provisions of the Americans with Disabilities Act, any person requiring special accommodations to participate in this workshop/meeting is asked to advise the agency at least 7 days before the workshop/meeting by contacting: FRC Staff at: FRCCustomers@vr.fldoe.org. If you are hearing or speech impaired, please contact the agency using the Florida Relay Service, 1(800)955-8771 (TDD) or 1(800)955-8770 (Voice).

For more information, you may contact: FRC Staff at: FRCCustomers@vr.fldoe.org.

BOARD OF TRUSTEES OF THE INTERNAL IMPROVEMENT TRUST FUND

The Florida Department of Environmental Protection, Office of Resilience and Coastal Protection announces a public meeting to which all persons are invited.

DATE AND TIME: Friday, March 25, 2022, 9:00 a.m.

PLACE: Rookery Bay National Estuarine Research Reserve, 300 Tower Road, Naples, FL 34113

GENERAL SUBJECT MATTER TO BE CONSIDERED: The Rookery Bay National Estuarine Research Reserve Management Plan Advisory Group will be meeting to review and discuss the draft management plan. The draft management plan is available at <http://publicfiles.dep.state.fl.us/CAMA/plans/Rookery-Bay-NERR-Mgmt-Plan-DRAFT-220127.pdf>. Members of the public are invited to attend and listen to comments. Comments can also be submitted in writing to Keith.Laakkonen@FloridaDEP.gov by April 8, 2022.

This notice is a correction to a notice published Feb. 18 that misstated the date.

A copy of the agenda may be obtained by contacting: Jessica McIntosh at Jessica.McIntosh@FloridaDEP.gov.

Pursuant to the provisions of the Americans with Disabilities Act, any person requiring special accommodations to

participate in this workshop/meeting is asked to advise the agency at least 48 hours before the workshop/meeting by contacting: Jessica McIntosh at Jessica.McIntosh@FloridaDEP.gov. If you are hearing or speech impaired, please contact the agency using the Florida Relay Service, 1(800)955-8771 (TDD) or 1(800)955-8770 (Voice).

REGIONAL PLANNING COUNCILS

Tampa Bay Regional Planning Council

The Tampa Bay Regional Planning Council's Agency on Bay Management announces a public meeting to which all persons are invited.

DATE AND TIME: March 10, 2022, 9:00 a.m.

PLACE: This meeting will be held via a virtual communication platform. Persons wishing to participate in this meeting should dial: (786)635-1003. The meeting ID is: 810 1312 4487. The Passcode is: 1234. The Zoom Meeting Link is: <https://us02web.zoom.us/j/81248305504?pwd=UW1nbFBhOUJLRWJCQTg0U3JwVm12QT09>

GENERAL SUBJECT MATTER TO BE CONSIDERED: To conduct the regular business of the Tampa Bay Regional Planning Council's Agency on Bay Management.

A copy of the agenda may be obtained by contacting: Wren Krahl, Wren@tbrpc.org.

Pursuant to the provisions of the Americans with Disabilities Act, any person requiring special accommodations to participate in this workshop/meeting is asked to advise the agency at least 4 days before the workshop/meeting by contacting: Wren Krahl, Wren@tbrpc.org. If you are hearing or speech impaired, please contact the agency using the Florida Relay Service, 1(800)955-8771 (TDD) or 1(800)955-8770 (Voice).

For more information, you may contact: Wren Krahl, Wren@tbrpc.org.

WATER MANAGEMENT DISTRICTS

Northwest Florida Water Management District

The Northwest Florida Water Management District announces a public meeting to which all persons are invited.

DATES AND TIMES: (1) March 31, 2022, 2:00 p.m. ET; (2) April 8, 2022, 2:00 p.m. ET

PLACE: District Headquarters, 81 Water Management Drive, Havana, FL 32333 and also livestreamed (<https://www.nwfwater.com/Contact-Us/Meetings>)

GENERAL SUBJECT MATTER TO BE CONSIDERED: (1) Opening of proposals for Request for Proposals 22- 002 for Contractual Services – FEMA Risk MAP Program Support; (2) Selection Committee meeting to finalize scores for Request for Proposals 22-002.

A copy of the agenda may be obtained by contacting: Toni Devencenzi at (850)539-5999.

C.2.3 / Advertisement Flyer

The flyer below advertises the March 22, 2022, online meeting, open to the public, for the draft management plan. The online meeting occurred during 5 PM to 6:30 PM Eastern Time on that day.



Rookery Bay National Estuarine Research Reserve

Management Plan Public Meeting

Tuesday, March 22, 2022 5 - 6:30 p.m.

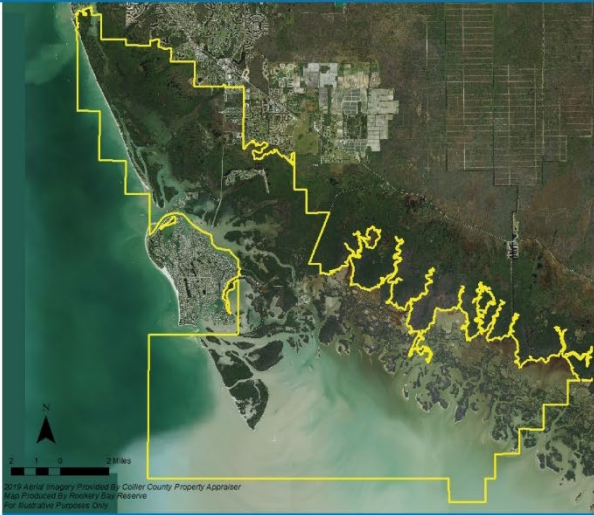
The management plan for Rookery Bay National Estuarine Research Reserve is being updated by the Florida Department of Environmental Protection's Office of Resilience and Coastal Protection. Members of the public are invited to attend a meeting in an online virtual format from 5 to 6:30 p.m., Tuesday, March 22, 2022, to learn about the proposed plans for the reserve and provide comments.

To view the draft, download at <http://publicfiles.dep.state.fl.us/CAMA/plans/Rookery-Bay-NERR-Mgmt-Plan-DRAFT-220127.pdf> A copy of the agenda may be obtained by contacting: Jessica McIntosh at Jessica.McIntosh@FloridaDEP.gov.

The public is also invited to submit written comments to Keith.Laakkonen@FloridaDEP.gov by April 8, 2022.

To learn more about Rookery Bay National Estuarine Research Reserve, visit FloridaDEP.gov/rcp/nerr-rookery-bay

Pursuant to the provisions of the Americans with Disabilities Act, any person requiring special accommodations to participate in this meeting is asked to advise the agency at least 48 hours before the workshop/meeting by contacting: Jessica McIntosh at Jessica.McIntosh@FloridaDEP.gov. If you are hearing or speech impaired, please contact the agency using the Florida Relay Service, 1(800)955-8771 (TDD) or 1(800)955-8770 (Voice).



2019 Aerial Imagery Provided by Collier County Property Appraiser
Map Produced by Rowley Design Services
For Illustrative Purposes Only

This is an online meeting open to the public.

Please Join at

<https://floridadep.gov/RBManagementPlan>

The Florida Department of Environmental Protection's Office of Resilience and Coastal Protection (RCP) manages more than 4.9 million acres of submerged lands and coastland uplands. RCP manages 42 aquatic preserves and three national estuarine research reserves and oversees programs to protect and conserve beaches, coastlines, waterways and Florida's Coral Reef.

C.2.4 / Summary of the Online Public Meeting

The public meeting to discuss the management plan draft was held online on March 22, 2022, from 5 PM to 6:30 PM Eastern Time. Below are the meeting minutes.

In Attendance

Staff: Keith Laakkonen, Jessica McIntosh, Amelia Horadam, Sarah Falkowski, Earl Pearson, Matt Chasse

Agenda

- Welcome and Overview
- Open Public Comment
- Introduction to Rookery Bay
- Strategic Plan
- Open Public Comment
- Closing

Public Comments

Terry Lumb- Thank you for the opportunity. Read 300+ pages start to finish, well worth going through. As a volunteer, works alongside staff at RBNERR, commends work of staff. Would like to zero in on stakeholders.

- Impacts on local economy- tourism, increase in population, tours, etc. People end up in RBNERR at Keewaydin, Cape Romano. Page 120- challenge stakeholders to support RBNERR, fund local support, boater safety (downed channel markers). Urges partners to work together.
- Suggestion- apply method for sharing an experience on/to the beach with HS marine science students on boat trips to stakeholders. Take them on a Saturday afternoon, around 2pm, in season, to allow observation of trash, dogs off leashes, numbers of boats, etc.

Jim Murray- amazing amount of good info, like an almanac of SWFL history. Dozens of needs identified in Mgmt Plan; perhaps prioritizing them? Later addendum as spending authority flexes.

Ryan Young- older structure was organized with priorities and issues, core strategies, contingent strategies, easy to navigate. Current document structure is harder to follow. Will submit further comments at a later time.

Matt Chasse- thanked commenters and shared importance.

Kevin O'Donnell- looks great, lots of info, very thorough. Is RBNERR working with "wind" (SP?) DEAR staff (Denise Miller) to share real time SWMP data?

C.2.5 / Summary of the In-Person Public Meeting

An in-person public meeting to discuss and obtain public input on the draft management plan was conducted on March 25, 2022, from 9:00 AM to 12 PM local time at Rookery Bay National Estuarine Research Reserve at 300 Tower Road, Naples, Florida. Below are the meeting minutes.

In Attendance

Staff: Keith Laakkonen, Jessica McIntosh, Amelia Horadam, Sarah Falkowski, Amy Gray, John Castle, Jeffrey Carter, Donna Young

Advisory Committee: Athan Barkoukis (Friends of Rookery Bay), Frank Perucci (Marine Industries Association of Collier County), Dr. James Fourqurean (Florida International University), Jim Murley (Retired, Sea Grant), Jon Iglehart (Florida Department of Environmental Protection South District), Kathy Worley (Conservancy of Southwest Florida), Katie Laakkonen (City of Naples), Marshall Miller (Collier County Stormwater Management), Commissioner Rick LoCastro (Collier County District 1), Ryan Westberry (Collier County Public Schools), Chris Thurkettle (Florida Fish and Wildlife Commission, Division of Law Enforcement), Kevin Balfour (Florida Fish and Wildlife Commission Law Enforcement)

Objectives

- Increase understanding of the Reserve's mission and goals
- Receive feedback on the draft management plan

Announcement

The Florida Department of Environmental Protection, Office of Resilience and Coastal Protection announces a public meeting to which all persons are invited.

DATE AND TIME: **Friday, March 25, 2022, 9 a.m. - 12 p.m.**

PLACE: Rookery Bay National Estuarine Research Reserve, 300 Tower Road, Naples, FL 34113

GENERAL SUBJECT MATTER TO BE CONSIDERED: The Rookery Bay National Estuarine Research Reserve Management Plan Advisory Group will be meeting to review and discuss the draft management plan. The draft management plan is available at

<http://publicfiles.dep.state.fl.us/CAMA/plans/Rookery-Bay-NERR-Mgmt-Plan-DRAFT-220127.pdf>. Members of the public are invited to attend and listen to comments. Comments can also be submitted in writing to Keith.Laakkonen@FloridaDEP.gov by April 8, 2022.

Agenda

8:30 AM Gate and building open at 300 Tower Road, Naples FL 34113

9:00 AM **Introductions & Overview**

After the Management Plan Advisory Committee introduces themselves, Director Keith Laakkonen will welcome the group and give a presentation on the Rookery Bay National Estuarine Research Reserve. This will include accomplishments since the last management plan.

Review Chapters 1-4

The Management Plan Advisory Committee will be invited to submit written comments on index cards for discussion with the group at large.

10:15 AM Break

10:30 AM **Review Chapters 5-12**

The Management Plan Advisory Committee will be invited to submit written

comments on index cards directly to Rookery Bay staff about the following chapters:

- Ch. 5 Research and Monitoring
- Ch.6 Education Program
- Ch.7 Coastal Training Program
- Ch.8 Volunteer Program
- Ch.9 Communications Program
- Ch.10 Resource Protection Plan
- Ch.11 Facilities Plan and Construction
- Ch.12 Administrative Plan

12:00 PM Adjourn

Public Comments

Jim Murray (Sea Grant, retired)- are the 4 goals chosen by NOAA? Do they nest in a national NERRs framework? SeaGrant was able to address Congress's concerns by linking to National SeaGrant plans on a local level.

Kevin Balfour (FWC Law Enforcement)- Picayune Restoration, are we seeing changes yet?

Jim Fourqurean (Florida International University)- does not mention Inclusion and Diversity; is it called out? Not tokenism, it's important to include in a high-level document like a strategic plan.

Commissioner Rick LoCastro (Collier County District 1)- where does funding come from? Did FGCU incorporate us into their new Water School? He anticipates outreach to increase and possibly funding from the college as a result.

Chris Thurkettle (FWC Law Enforcement)- any changes to Shell Island Road boat ramp? Very popular, only ramp without a fee. Heated exchanges between motorized and kayakers. Not a lot of parking area.

Kathy Worley (Conservancy of Southwest Florida)- SIR "boatramp" land is owned by CSF, it was never a boat ramp, but rather a mining ramp when building lagoon and using for road materials. It is use at your own risk. CSF toyed with idea of fencing off, but would cause alarm. CSF does not want it advertised.

Athan Barkoukis (Direct of Friends of Rookery Bay)- Goal 2 & 3- ability to successfully accomplish... is the Reserve closer to calculating annual visitation in Reserve?

Jon Iglehart (Florida DEP, South District)- Diversity- photo in slide shows female in hat with symbol that's been extricated from MLB. What are the hiring outlooks- can you afford to fill positions?

Dr. James Fourqurean (Florida International University)- FL Keys Marine Sanctuary program offers 2x salary vs RBNERR

Kathy Worley (Conservancy of Southwest Florida)- robust plan, all good, but caution that we may be biting off more than we can chew due to lack of housing and staffing resources. Doing some things well rather than many things mediocre. CSF is facing the same issues.

Katie Laakkonen (City of Naples, Natural Resources Division)- buffer designation- entire county, conservation now, no acreage quantification. Is buffer ever adjusted? Intent is to protect resource... how are buffers determined and do they change as watershed becomes urbanized?

Jon Iglehart (Florida DEP, South District)- are any lands leased outside of the AP land?

aquatic or submerged. Is there a lease from the governor's cabinet? If a state park lease lands by the State of FL, it offers protection (like mangroves). This gives the park an extra level of protection. Think about a vendor wanting to put on a concert. If there is a lease on the land, it could preclude activities such as this. Is this based on resources? including uplands?

Jim Murray (Sea Grant, retired)- is there an evaluation process at the end of 5 years by state or feds?

Frank Perucci (Marine Industries Association of Collier County)- funding and resources- Marine Industries discovered that tax on fuel at marinas was \$32 million, \$1.4 came back to Marine Industries for ramps, etc. The other \$30 million was going to road improvements, etc., and they lobbied to have that changed.

Summary of gallery walk:

Keith Laakkonen (Rookery Bay Reserve, Environmental Administrator)

1. Working with Everglades National Park- solicit researchers to work within the Reserve
2. Increase Inclusion and Diversity in Strategic Plan
3. Incentivize research (matching funds, etc.)- money, time, resources

Sarah Falkowski (Rookery Bay Reserve, Education Coordinator)

1. Update with post-pandemic language regarding programs (significant changes in numbers, etc.)
2. How are strategic goals measured?
3. Relabel CSF as COSWFL
4. Remove Cambridge program from SURVIVORS
5. Replace iSTEM with STEAM
6. Remove iFilm Festival
7. REword MA/NA explanation- confusing
8. Include ELC on museum passport in south Florida to attract Miami area visitors
9. Possible collaboration with Marine Industries new dock on Keewaydin Island, student education

Jessica McIntosh (Rookery Bay Reserve, Coastal Training Program Coordinator)

1. Update language to include real estate professionals as a key audience for training
2. Include sea level rise as part of training program
3. Outreach and education with legislative reps

Donna Young (Rookery Bay Reserve, Visitor Services & Volunteer Coordinator)

1. No comments

Amy Gray (Rookery Bay Reserve, Communications Coordinator)

1. Updating learning center displays in Spanish and Creole

Jeffrey Carter (Rookery Bay Reserve, Stewardship Coordinator)

1. Challenges- budget, staffing, cost of living, correlate rate of pay to attract and keep staff
2. Funding exotic invasives
3. Restoration project challenges
4. Tap into infrastructure funding
5. Visitor use challenges- larger size ecotour operators, huge groups, staying for longer periods of time in Reserve, impacts, bathroom waste, law enforcement proving intent
6. Leveraging partners

7. Downsizing of staff and budget

John Castle (Rookery Bay Reserve, Facilities Coordinator)

1. Catclaw Lagoon at the end of SIR- remove posting labeling as boat launch, change to private property and no trespassing

Amelia Horadam (Rookery Bay Reserve, Environmental Manager)

1. Create better salaries for staff
2. Challenges in recruiting and keeping staff
3. Utilize partner assistance in achieving this
4. Reiterate opportunities with partners for translations, DEI

C.2.6 / Summary of Public Comments and Responses

All public comments received regarding the revised management plan draft during the public comment period are summarized in the table starting on the following page.

Comment Number	Comments from the Public Received During the Public Comment Period	Chapter/ Page #	How is it addressed?	Who Addressed?	Notes
EMAIL AND LETTER FROM COLLIER MOSQUITO CONTROL DISTRICT RCVD 22 MARCH 2022					
1	1.(in body of email): District staff has looked over the draft management plan for Rookery Bay NERR, and appreciates the acknowledgement for mosquito control activities. We generally support the statements within the current document, and would like to provide comment for consideration by your staff and the management plan advisory group. Please see the attached letter with CMCD comment. The letter specifically asks for: ☐ Consideration to include <i>Aedes taeniorhynchus</i> as a nuisance species in the reserve. ☐ Consideration to include <i>Aedes scapularis</i> as a invasive non-native species in the reserve. ☐ Language that may allow for temporary arthropod management plans under a demonstratable need outside the scope of a public health emergency in the future ☐ Specification that proposed mosquito control activities would “have to demonstrate no impacts to ecosystem process as well as nontarget wildlife and insect populations.” Thank you for your time and review of this matter. Please let us know if there are any questions. Keira J. Lucas, PhD Deputy Executive Director	Ch. 10	See Notes	Rookery Bay Reserve	The Rookery Bay Reserve management team appreciates your input into the management plan and has considered the changes suggested but have decided against such changes at this time. The need for any proposed mosquito control program to demonstrate no impacts to ecosystem process as well as nontarget wildlife and insect populations is already part of the mgmt plan (Ch. 10, Resource Protection Challenges).
2	2.(in a letter dated March 18, 2022 and included in the March 22, 2022 email): Arthropod management plans are designed to protect the integrity of environmentally sensitive and biologically highly productive public lands, such as Rookery Bay NERR. Typically, any mosquito control activities on public lands requires a demonstratable need, approval by the land management agency and is strictly performed through larviciding using <i>Bacillus thuringiensis israelensis</i> (Bti)-based larvicide. Arthropod management plans are not foreign to public lands, nor are they unheard of for National Estuarine Research Reserves. The District currently holds an arthropod management plan with Delnor Wiggins Pass State Park, which allows larvicide applications using Bti-based products upon a demonstratable need. Anastasia Mosquito Control District in St. Johns County currently holds an arthropod management plan with Guana Tolomato Matanzas National Estuarine Research Reserve. The plan specifies the use of Bti and <i>Bacillus sphaericus</i> (Bs)-based larvicide subject to land managers approval. The District asks the Rookery Bay National Estuarine Research Reserve Management Plan Advisory Group to include <i>Aedes taeniorhynchus</i> as a nuisance species in the reserve in Appendix B4.4. We also ask to include <i>Aedes scapularis</i> as an invasive non-native species in the reserve in Appendix B.4.2.	Appen. B.4.2 and B.4.4	See Notes	Rookery Bay Reserve	The Rookery Bay Reserve management team appreciates your input into the management plan and has considered the changes suggested but have decided against such changes at this time.
3	3.(in a letter dated March 18, 2022 and included in the March 22, 2022 email): The current draft management plan specifies that “[a]ny proposed mosquito control within the Reserve would have to demonstrate no impacts to ecosystem process as well as wildlife and insect populations.” It is important to note that Bti-based larvicides are used to control <i>Aedes</i> mosquito species, black fly and some midges – which are all classified as insects. The manner by which Bti-based larvicides are used for <i>Aedes</i> mosquito control minimizes off target impacts to black fly and midges, including the low application rate used for mosquito control, specific habitats the material is applied and location adjacent to human populations. Bti-based larvicides are accepted for use in other sensitive areas due to its target specificity and low risk to nontarget wildlife and insect populations. The District respectfully asks the Rookery Bay National Estuarine Research Reserve Management Plan Advisory Group to include the potential for temporary arthropod management plans to be set aside under a demonstratable need (such as increased nuisance or disease vector populations) and land manager approval for larvicide applications in the Rookery Bay NERR management plan on page 109.	pg 109	See Notes	Rookery Bay Reserve	The spraying of larvicide, and the truck-mounted spraying of adulticide in public use areas is typically allowed and is stated as-such in the mgmt plan. Mosquito control plans temporarily may be set aside under declared threats to public or animal health, or as a result of applicable emergency proclamation by the Florida governor. The Rookery Bay Reserve management team appreciates your input into the management plan and has considered the additional changes suggested but have decided against such changes at this time.

Comment Number	Comments from the Public Received During the Public Comment Period	Chapter/ Page #	How is it addressed?	Who Addressed?	Notes
EMAIL AND LETTER FROM THE CONSERVANCY OF SOUTHWEST FLORIDA RCVD 09 MARCH 2022					
4	4. Page ES-5 in the Executive Summary within the section Reserve Programs Overview, Plan Statement: <i>“To accomplish this function, the Reserve works with many strategic partners such as Collier County, City of Marco Island, City of Naples, USFWS, South Florida Water Management District, Florida Park Service, Florida Forest Service, National Park Service, FIU, Florida Gulf Coast University, The Conservancy of Southwest Florida, Audubon Florida, and Mote Marine Laboratory”.</i> Comment: Please remove “The” as it should be “Conservancy of Southwest Florida” not The Conservancy of Southwest Florida. This also occurs on pages 5, 64, page 136 in particular, and Appendices A-5 and C-1.1. We realize that sometimes there needs to be a “the” in front of our organization for sentence structure.	ES-5, pgs 5, 64, 136, Appendices A.5 and C.1.1.	Changed as suggested in the management plan and in Appendices A.5 and C.1.1	Rookery Bay Reserve & ANAMAR	
5	Page 13 within the section Allowable/Unallowable Uses, Plan Statement: <i>“Off-road vehicles are prohibited in all areas of the Reserve”</i> Comment: Rookery Bay staff and Conservancy staff use ATV and UTV vehicles on areas within the Reserve for research, maintenance and other activities. Additionally, private landowners often use them to traverse the beaches on Keewaydin Island. Perhaps consider saying they are prohibited unless permissible for use or some such verbiage to alleviate confusion.	pg 13	Wording was changed to: "Off-road vehicles are prohibited throughout the Reserve except for specific research, maintenance, and related activities conducted by Reserve staff and CSF staff."	ANAMAR	
6	Page 16 within the section Buffer Zones of the Rookery Bay National Estuarine Research Reserve, Plan Statement; <i>“Additionally, buffer zones are established to accommodate a reasonably expected occurring shift of the core area resulting from biological, ecological, or climate change and related sea-level rise”.</i> Comment: Since the buffer zone includes the entire watershed containing roads, infrastructure, private property (developed, undeveloped, PUD’s and agriculture) there would be difficulty if not impossibility for the Reserve to be accommodated by these zones as vegetative shifts occur as a result of climate change. We are seeing changes already that are likely not able to be “accommodated’ within the buffer zone. Suggest qualifying that statement to conservation areas north of the reserve.	pg 16	Changed text to read: "Additionally, conservation areas within these buffer zones are established to help accommodate a reasonably expected shift of the core area resulting from biological, ecological, or climate change and related sea-level rise."	ANAMAR	
7	Page 23 within the section Climate Change (Reserve Sensitivity and Vulnerability), Plan Statement: <i>“The effect of SLR is likely to be evenly distributed across Florida’s Gulf coast. However, unanticipated changes in wind, wave, and current patterns may cause short- or long-term differences that may accelerate SLR at some coastal locations”</i> Comment: Suggest qualifying these statements as the ACUNE models shows differences in impacts derived from local topography, man-made structures and vegetative type and extent, which can also cause localized differences in predicted SLR intrusion.	pg 23	Changed text to: "The effect of SLR is likely to vary across Florida’s Gulf coast based on local topography, the presence of coastal man-made structures, and the presence and extent of coastal vegetative types. Additionally, unanticipated changes in wind, wave, and current patterns may cause short- or long-term differences that may accelerate SLR at some coastal locations (Mitchum et al. 2017)."	ANAMAR	

Comment Number	Comments from the Public Received During the Public Comment Period	Chapter/ Page #	How is it addressed?	Who Addressed?	Notes
8	Page 23 within the section Climate Change (Reserve Sensitivity and Vulnerability), Plan Statement: “ <i>The long-term impacts of SLR will likely be the single most significant threat to the ecological integrity of Rookery Bay Reserve due to the potential for catastrophic and irreversible change</i> .” In total agreement with this statement, along with current anthropogenic stressors that exacerbate the threat.	pg 23	This is a statement of agreement with the text. No action is needed.	(not applicable)	
9	Table 1. Question: Is it a government requirement to state what each department within RB is going to handle for each objective? Reason for the inquiry is that the table could be shortened significantly and have less statements that basically say the same thing. You could just state the objective, followed by a brief summation of the tasks that will be employed to meet that objective.	Table 1 in Ch. 3 (strategic plan)	These edits cannot be made. The format taken in the management plan is a function of regulatory requirements.	(not applicable)	Yes, this is a requirement under NOAA.
10	Page 63 within the section Research and Monitoring Program Context 2. Wildlife Population Change and Habitat Use (bullet 2), Plan Statement: “ <i>The Conservancy of Southwest Florida and the Ten Thousand Islands National Wildlife Refuge were close partners in this joint research-stewardship effort</i> ”. Comment: Suggest change the tense from “were” to “are” since the Conservancy and Rookery Bay are still working together today.	pg 63	Changed this sentence to read: "Conservancy of Southwest Florida and the Ten Thousand Islands National Wildlife Refuge were are close partners in this joint research-stewardship effort. All data are shared with cooperating agencies and non-governmental organizations."	Rookery Bay Reserve & ANAMAR	
11	Page 76 within Goal 3: [RESILIENCE] Objective 3.1, in the section Action: Coordinate with partners to develop citizen/community science programs. Plan Statement: “ <i>These programs can be modified from community science programs at other NERRs, including oyster monitoring at the Guana Tolomato Matanzas NERR and the plastic nurdle observation program developed by Mission-Aransas NERR</i> ”. Comment: Consider defining “nurdle” as general public likely doesn’t know what a nurdle is.	pg 76	Changed this sentence to read: "These programs can be modified from community science programs at other NERRs, including oyster monitoring at the Guana Tolomato Matanzas NERR and the plastic nurdle (a pre-production plastic pellet) observation program developed by Mission-Aransas NERR."	Rookery Bay Reserve & ANAMAR	
12	Page 76 within Objective 3.3 Action: Promote research on interacting climate effects on natural resources. Comment: Consider rewording this statement is open to varying interpretation. (i.e. What is the Reserve’s interpretation of “interacting”? Are you referring to how climate change affects individual species and the way they interact with other organisms and their habitats? Or are you referring to the interaction of predicted climate effects such as increased temp and say sea level rise on resources?).	pg 76	Changed this sentence to read: "Action: Promote research on the interacting interaction between climate effects onchange and natural resources." Also changed the text in Table 1 to read: "Promote research on the interacting interaction between climate effects onchange and natural resources"	Rookery Bay Reserve & ANAMAR	

Comment Number	Comments from the Public Received During the Public Comment Period	Chapter/ Page #	How is it addressed?	Who Addressed?	Notes
13	Pages 107 and 108: These 2 pages discuss the PSRP and Belle Meade Projects as if they will be implemented. PSRP is certainly going to be finished in some fashion, albeit the quality of that water being directed towards the Reserve is still an issue. However, there is no guarantee that the Belle Meade project will come to fruition as designed given the private inholdings required under the current construction plan, so you might want to qualify these statements in some manner. This project will also need further governmental approvals.	pgs 107-108	Added the following sentence regarding the Collier County Comprehensive Watershed Improvements Project (involving Belle Meade): "It is important to note that completion of this project, as currently designed, will depend on obtaining private inholding and further governmental approvals."	Rookery Bay Reserve & ANAMAR	
14	Page 117 within Short-term (5-year) actions, Plan Statement: "Farm Creek Mangrove Restoration Project is already shovel-ready with funding in place through the Florida Fish and Wildlife Conservation Commission (FWC). Reserve staff are renewing permits for this project as it is presently moving soon into construction phase" Comment: suggest updating verbiage to reflect current state, as permits have been renewed and the project is presently in the construction phase.	pg 117	Changed this sentence to: "Fruit Farm Creek Mangrove Restoration Project is already shovel-ready with funding in place through the Florida Fish and Wildlife Conservation Commission (FWC). Reserve staff are have renewing the permits and this project is now in the for this project as it is presently moving soon into construction phase."	Rookery Bay Reserve & ANAMAR	
15	Page 136 within the section Current and Potential Stewardship Partners, Plan Statement: "The Conservancy of Southwest Florida: (CSF) The stewardship program has a long and strong partnership with CSF on many projects including invasive species control (Burmese Pythons, Cane Toads, other amphibians and reptiles), Fruit Farm Creek Hydrologic Restoration Project, sea turtle monitoring on Keewaydin Island, nuisance mammal control, SLR and habitat monitoring for change, and Gopher Tortoise (Gopherus Polyphemus) monitoring." Comment: Consider adding "In addition, CSF also provides considerable knowledge and history relating to various local, state and federal policy issues, including issues related to the Deltona Settlement Agreement. CSF serves as the main initial point of contact for the Settlement's 5 environmental signatories and work closely with all parties to resolve issues when they arise". Also please remove "The" from our name.	pg 136	Added the following sentences to this paragraph: "CSF also provides considerable knowledge and history relating to various local, state, and federal policy issues including those related to the Deltona Settlement Agreement. CSF serves as the initial point of contact for the Deltona Settlement Agreement's five environmental signatories and works closely with all parties to resolve issues when they arise."	Rookery Bay Reserve & ANAMAR	
16	Page 144 within Reserve Field Stations bullet e, Plan Statement: " <i>The Briggs Center, located on state lands on Shell Island Road, was completed in 1982. It is owned and operated by the Conservancy of Southwest Florida (CSF) and has been subleased to the Florida Fish and Wildlife Conservation Commission (FWC) to serve as a field office for 21 marine law enforcement officers</i> ". Comment: Suggest changing to " <i>The Briggs Nature Center, located on state lands on Shell Island Road, was established in 1982 by the Conservancy of Southwest Florida (CSF). This building has been recently donated to the Florida Fish and Wildlife Conservation Commission (FWC) by CSF and serves as a field office for 21 marine law enforcement officers</i> ". This is also mentioned in the Executive Summary ES-4 and Appendix A-2 detailing Sublease(s): " <i>One sublease to the Conservancy of Southwest Florida</i> ", which is no longer applicable.	pg 144	Changed text to read: "e.The Briggs Center, located on state lands on Shell Island Road, was established in 1982 by the Conservancy of Southwest Florida (CSF). The building was recently donated to the Florida Fish and Wildlife Conservation Commission (FWC) and now serves as a field office for 21 marine law enforcement officers." ES-5 and A.1 now say: "Sublease(s): None"	Rookery Bay Reserve & ANAMAR	

Comment Number	Comments from the Public Received During the Public Comment Period	Chapter/ Page #	How is it addressed?	Who Addressed?	Notes
17	Page 145 within section Existing Facilities #5. Plan Statement: “<i>The Catclaw Lagoon boat ramp and Dearholt Facility are located at the west end of Shell Island Road and are owned by CSF. The primitive boat launch provides recreational boat access to Rookery</i>”. Comment: Cat Claw Lagoon was originally dredged in the mid-20th century to mine shell material. The shell material was hauled out by truck to build roads in Naples. These activities created a gradual slope of submerged land that abuts Cat Claw Lagoon. The area is not maintained and although the public utilizes it, they were never given permission to do so. Those who use this slope to launch boats do this at their own risk, since it is trespassing and since posted we are not responsible for anyone or property that uses it. This is not advertised by CSWF as a boat ramp, since it is not maintained and is just an artifact of the mining operation a long time ago. Additionally, since it is still our property at this time, we insist that all references to this area be either deleted or changed everywhere in the document to say something like, “The primitive ramp is privately owned and not open to the public for boat launching.”	pg 145	Changed this text to: "The remains of the old Dearholt Facility, consisting of a dilapidated building and dock, are located at the west end of Shell Island Road, near Catclaw Lagoon. These structures are owned by CSF. The facility is adjacent to a gradual slope of submerged land at Catclaw Lagoon (where trespassing is currently not allowed) that, if managed by the Reserve, could be used by the public as a primitive boat launch to Rookery Bay. The Reserve has been working with CSF for several years to establish an agreement to transfer management of the building and dock, and the adjacent area of Catclaw Lagoon, from CSF to the Reserve."	Rookery Bay Reserve & ANAMAR	
18	Page 146 FIGURE 30: FACILITY LOCATIONS AT ROOKERY BAY NATIONAL ESTUARINE RESEARCH RESERVE. Comment: Remove the “catclaw boat ramp” from the Figure as is just an historic mining remnant and since any use by non-authorized personnel is considered trespassing while under the ownership of the Conservancy.	Fig. 30 on pg 146	Figure 30 was updated by omitting the Catclaw Lagoon "boat ramp" and re-numbering the remaining facilities.	Rookery Bay Reserve & ANAMAR	
19	Pages 146-147 within Facility Descriptions 2d, Plan Statement: “Briggs Center boardwalk: This existing boardwalk on Rookery Bay Reserve property along Shell Island Road is owned by CSF, which has expressed interest in transferring ownership of this boardwalk to the State of Florida. If, and when, a transfer of ownership occurs, maintenance or repairs to the existing boardwalk will be required”. Comment: this has been transferred from the Conservancy to Rookery Bay.	pgs 146-147	Changed text to: "Briggs Center boardwalk: This existing boardwalk is on Rookery Bay Reserve property along Shell Island Road. The boardwalk was, previously owned by CSF but ownership has recently been transferred to the State of Florida. This boardwalk is a worthwhile addition to the Reserve's public access facilities. The existing boardwalk requires maintenance and repairs if it is to be kept. However, a better investment may be to rebuild the entire boardwalk with additional extensions or overlooks to improve environmental interpretation."	Rookery Bay Reserve & ANAMAR	

Comment Number	Comments from the Public Received During the Public Comment Period	Chapter/ Page #	How is it addressed?	Who Addressed?	Notes
----------------	--	--------------------	----------------------	----------------	-------

20	Page 150 within Facility Descriptions 2d, Plan Statement: “Shell Island Road boat launch: The boat launch is a shallow limerock slope with no human design or engineering. The current ramp is extremely busy during winter, and there are often conflicts between power boaters and paddlecraft users. Also, the lagoon is very shallow and the outlet is inaccessible to all but kayaks and other paddlecraft on many tidal cycles which may result in user conflicts and resource impacts such as prop-scarring. At the time of plan, Rookery Bay Reserve does not have ownership, oversight, or management responsibility or authority for the Shell Island Road boat ramp but continues to work with CSF toward an agreement that would allow the Reserve to manage and maintain this facility. In anticipation of this agreement, initial planning to improve the parking area and boat launch and to install restroom facilities and other amenities has begun. Once the agreement is executed, a detailed plan will be developed and the funding needed for the project will be determined and requested. Coordination with Collier County will be needed for this project.” Comment: see above comments 13 and 14 this is not a boat ramp and cannot be referred to as such in writing or advertised as such and any reference should be removed from the document or only say that it is Rookery Bay’s intent to acquire this artifact and maintain it as a boat ramp in the future.	pg 150	This paragraph was removed completely as it was under Facility Descriptions and is not technically a facility. I also removed the text "a limited use boat ramp" from a summary of public access areas on page 120.	Rookery Bay Reserve & ANAMAR	
----	--	--------	---	------------------------------	--

21	Page D11 within Appendix D section Goal: Habitat and Species Management. Improve the conservation of native biodiversity Facility Descriptions 2d. Plan Statement: “<i>A new partnership with Denison University (Dr. Paul Andreadis), the Conservancy of Southwest Florida (Ian Bartoszek), and the Florida Fish and Wildlife Conservation Commission (FWC) regarding tagging and telemetry monitoring of Burmese Pythons active within the Reserve was started in 2013</i>” Comment: Is this still considered a “new” project? It may not be necessary, but could update the statement to say the partnership with the Conservancy and FWC continues today as Paul is currently out of the picture.	pg D-11 of Appen. D	Changed text to read: "•A partnership with Denison University (Dr. Paul Andreadis), the Conservancy of Southwest Florida (Ian Bartoszek), and the Florida Fish and Wildlife Conservation Commission (FWC) regarding tagging and telemetry monitoring of Burmese Pythons active within the Reserve was started in 2013. This work has resulted in a better understanding of habitat use and movement of pythons. This information has been used by staff and partners to capture and remove pythons from Reserve lands, reducing the effects of python predation on native species. The partnership between CSF and FWC continues although Denison University is no longer involved."	Rookery Bay Reserve & ANAMAR	
----	---	---------------------	---	------------------------------	--

22	Overall: The Plan provides a thorough look at the Reserves programs, along with robust goals and objectives. It may be beneficial to include a brief summary of the Deltona Settlement and the stakeholders role today. Additionally, consider being careful in promising more than the resources and staff can reasonably accomplish. The Plan does state in the education and CTP program section that more staff and resources will be needed to achieve the results, but I didn’t see this in the other department sections. This is addressed toward the end of the document but could be overlooked by the reader considering the robustness of this document!	Various chapters	See notes.	Rookery Bay Reserve & ANAMAR	The Deltona Settlement is briefly discussed in several parts of the mgmt plan already, along with the roles of CSF, Florida DEP, and Audubon as they relate to this settlement. The need to seek out and obtain additional resources (particularly funding) is stated in several sections of the mgmt plan in addition to the Education and CTP: Volunteer Program (Ch. 8), Communications Program (Ch. 9), and the Resource Protection Plan (Stewardship Plan) (Ch. 10). The Rookery Bay Reserve management team appreciates your input into the management plan and has considered adding a summary of the Deltona Settlement as suggested but have decided against such changes at this time.
----	--	------------------	------------	------------------------------	---

Comment Number	Comments from the Public Received During the Public Comment Period	Chapter/ Page #	How is it addressed?	Who Addressed?	Notes
23	One comment on the management plan is to replace “29” with “30” for number of reserves and add Connecticut to the map on page 3.	Figure 1 on pg 3, text of "29 NERRs" on several other pgs of the plan	Updated Figure 1 and changed text to read 30 NERRs throughout plan	Rookery Bay Reserve & ANAMAR	
COMMENTS FROM PUBLIC ONLINE MEETING, 22 MARCH 2022					
24	Terry Lumb- Thank you for the opportunity. Read 300+ pages start to finish, well worth going through. As a volunteer, works alongside staff at RBNERR, commends work of staff. Would like to zero in on stakeholders. •Impacts on local economy- tourism, increase in population, tours, etc. People end up in RBNERR at Keewaydin, Cape Romano. Page 120- challenge stakeholders to support RBNERR, fund local support, boater safety (downed channel markers). Urges partners to work together. •Suggestion- apply method for sharing an experience on/to the beach with HS marine science students on boat trips to stakeholders. Take them on a Saturday afternoon, around 2pm, in season, to allow observation of trash, dogs off leashes, numbers of boats, etc.	pg. 120, etc.	This does not require editing of the mgmt plan. See Notes	Rookery Bay Reserve	The Reserve plans to continue taking stakeholders on field visits into the Reserve, including high visitation areas.
25	Jim Murray- amazing amount of good info, like an almanac of SWFL history. Dozens of needs identified in Mgmt Plan; perhaps prioritizing them? Later addendum as spending authority flexes.	Not applicable	See Notes	Not applicable	There is no mechanism for prioritizing actions under NOAA or DEP guidelines. All actions will be completed as allotted budget allows.
26	Ryan Young- older structure was organized with priorities and issues, core strategies, contingent strategies, easy to navigate. Current document structure is harder to follow. Will submit further comments at a later time.	Not applicable	See Notes	Not applicable	This is a general comment that does not request specific edits, additions, or deletions to the mgmt plan.
27	Matt Chasse- thanked commenters and shared importance	Not applicable	No edits needed.	Not applicable	
28	Kevin O'Donnell- looks great, lots of info, very thorough.	Not applicable	No edits needed.	Not applicable	
COMMENTS FROM ADVISORY COUNCIL IN-PERSON MEETING, 25 MARCH 2022					
29	Jim Murray (Retired, Sea Grant): are the 4 goals chosen by NOAA? Do they nest in a national NERRs framework? SeaGrant was able to address Congress's concerns by linking to National SeaGrant plans on a local level.		See Notes		This comment is directed towards the Advisory Council.
30	Kevin Balfour (FWC, Division of Law Enforcement) Picayune Restoration, are we seeing changes yet?		See Notes		This comment is directed towards the Advisory Council.
31	Dr. James Fourqurean (Florida International University): does not mention Inclusion and Diversity; is it called out? Not tokenism, it's important to include in a high-level document like a strategic plan.		See Notes		Rookery Bay Reserve is an equal opportunity employer and as-such, diversity and inclusion of personnel is important. Florida DEP and Rookery Bay Reserve acknowledge these comments regarding diversity, equity, and inclusion.
32	Commissioner Rick LoCastro (Collier County District 1): where does funding come from? Did FGCU incorporate us into their new Water School? He anticipates outreach to increase and possibly funding from the college as a result.		See Notes		This comment is directed towards the Advisory Council.
33	Chris Thurkettle (FWC, Division of Law Enforcement): any changes to Shell Island Road boat ramp? Very popular, only ramp without a fee. Heated exchanges between motorized and kayakers. Not a lot of parking area.		(See comment below, by K. Worley of CSF)		
34	Kathy Worley (CSF): SIR “boat ramp” land is owned by CSF, it was never a boat ramp, but rather a mining ramp when building lagoon and using for road materials. It is use at your own risk. CSF toyed with idea of fencing off, but would cause alarm. CSF does not want it advertised.		(Addresses FWC Law Enforcement comment above.)		
35	Athan Barkoukis (Director of Friends of Rookery Bay): Goal 2 & 3- ability to successfully accomplish... is the Reserve closer to calculating annual visitation in Reserve?		See Notes		This comment is directed towards the Advisory Council.

Comment Number	Comments from the Public Received During the Public Comment Period	Chapter/ Page #	How is it addressed?	Who Addressed?	Notes
36	Jon Iglehart (Florida DEP South District): Diversity- photo in slide shows female in hat with symbol that's been extricated from MLB. What are the hiring outlooks- can you afford to fill positions?		See Notes		This comment is directed towards the Advisory Council.
37	Dr. James Fourqurean (Florida International University): FL Keys Marine Sanctuary program offers 2x salary vs RBNERR		See Notes		This comment is directed towards the Advisory Council.
38	Kathy Worley (CSF): robust plan, all good, but caution that we may be biting off more than we can chew due to lack of housing and staffing resources. Doing some things well rather than many things mediocre. CSF is facing the same issues.		See Notes column for Comment #22 above.		
39	Katie Laakkonen (City of Naples, Natural Resources Division): buffer designation- entire county, conservation now, no acreage quantification. Is buffer ever adjusted? Intent is to protect resource... how are buffers determined and do they change as watershed becomes urbanized?		See Notes		This comment is directed towards the Advisory Council.
40	Jon Iglehart (Florida DEP South District): are any lands leased outside of the AP land? aquatic or submerged. Is there a lease from the governor's cabinet? If a state park lease lands by the State of FL, it offers protection (like mangroves). This gives the park an extra level of protection. Think about a vendor wanting to put on a concert. If there is a lease on the land, it could preclude activities such as this. Is this based on resources? including uplands?		See Notes		This comment is directed towards the Advisory Council.
41	Jim Murray (Retired, Sea Grant): is there an evaluation process at the end of 5 years by state or feds?		See Notes		This comment is directed towards the Advisory Council.
42	Frank Perucci (Marine Industries Association of Collier County): funding and resources- Marine Industries discovered that tax on fuel at marinas was \$32 million, \$1.4 came back to Marine Industries for ramps, etc. The other \$30 million was going to road improvements, etc., and they lobbied to have that changed.		See Notes		This comment is directed towards the Advisory Council.
43	Keith Laakkonen (Rookery Bay Reserve, Environmental Administrator): 1.Working with Everglades National Park- solicit researchers to work within the Reserve 2.Increase Inclusion and Diversity in Strategic Plan 3.Incentivize research (matching funds, etc.)- money, time, resources		See Notes		This comment addresses research and is directed towards the Advisory Council.
44	Sarah Falkowski (Rookery Bay Reserve, Education Coordinator): 1.Update with post-pandemic language regarding programs (significant changes in numbers, etc.) 2.How are strategic goals measured? 3.Relabel CSF as COSWFL 4.Remove Cambridge program from SURVIVORS 5.Replace iSTEM with STEAM 6.Remove iFilm Festival 7.REword MA/NA explanation- confusing 8.Include ELC on museum passport in south Florida to attract Miami area visitors 9.Possible collaboration with Marine Industries new dock on Keewaydin Island, student education	Ch. 6	The Cambridge program has been removed from the plan. The iSTEM program is replaced with STEAM as suggested. The iFilm Festival has been removed from the plan.	Rookery Bay Reserve & ANAMAR	The Conservancy of Southwest Florida prefers the initialism CSF (see question 15 above) and so 'CSF' is used throughout the management plan.
45	Jessica McIntosh (Rookery Bay Reserve, Coastal Training Program Coordinator): 1.Update language to include real estate professionals as a key audience for training 2.Include sea level rise as part of training program 3.Outreach and education with legislative reps		See Notes		This comment addresses education and outreach and is directed towards the Advisory Council.
46	Donna Young (Rookery Bay Reserve, Visitor Services & Volunteer Coordinator): 1.No comments		See Notes		(not a change for the plan)

Comment Number	Comments from the Public Received During the Public Comment Period	Chapter/ Page #	How is it addressed?	Who Addressed?	Notes
47	Amy Gray (Rookery Bay Reserve, Communications Coordinator): 1.Updating learning center displays in Spanish and Creole	Ch. 11, pg 149	added the following sentence: "Refreshing and (or) replacing current exhibits. These changes are needed to better align the exhibits with the current science in interpretation and technology and to ensure inclusivity for all audiences. Changes may include adding interpretive displays in both Spanish and Haitian Creole languages."	Rookery Bay Reserve	
48	Jeffrey Carter (Rookery Bay Reserve, Stewardship Coordinator): 1.Challenges- budget, staffing, cost of living, correlate rate of pay to attract and keep staff 2.Funding exotic invasives 3.Restoration project challenges 4.Tap into infrastructure funding 5.Visitor use challenges- larger size ecotour operators, huge groups, staying for longer periods of time in Reserve, impacts, bathroom waste, law enforcement proving intent 6.Leveraging partners 7.Downsizing of staff and budget		See Notes	Rookery Bay Reserve	Florida DEP and Rookery Bay Reserve acknowledges these comments regarding funding and staffing challenges.
49	John Castle (Rookery Bay Reserve, Facilities Coordinator): 1.Catclaw Lagoon at the end of SIR- remove posting labeling as boat launch, change to private property and no trespassing		This was addressed under Comments 17, 18, and 20 above.	Rookery Bay Reserve & ANAMAR	
50	Amelia Horadam (Rookery Bay Reserve, Environmental Manager): 1.Create better salaries for staff 2.Challenges in recruiting and keeping staff 3.Utilize partner assistance in achieving this 4.Reiterate opportunities with partners for translations, DEI		See Notes (and the Notes for Comment 22 above)	Rookery Bay Reserve	Florida DEP and Rookery Bay Reserve acknowledge these comments regarding improving staff salaries, challenges in recruiting and retaining staff, and in partnering with other agencies to achieve goals. The need for additional resources (funding) and in additional staff to achieve goals is mentioned several times in the mgmt plan. See also, the Notes for Comment #22 above for further information.

C.3 / Federal Review

C.3.1 / Federal Review and Public Commenting

Development of the Rookery Bay National Estuarine Research Reserve management plan occurred over two years and included direct input from all Rookery Bay Reserve staff members and the National Oceanic and Atmospheric Administration's (NOAA) National Estuarine Research Reserve (NERR) System staff. Public meetings, offering opportunities for input from the public, were also held to gather input from the local community. In addition, special meetings and opportunities for input into the management plan were offered to all representative groups that have members sitting on the advisory board for Rookery Bay Reserve. Groups that provided input were: Marine Industries Association of Collier County, City of Naples, Conservancy of Southwest Florida, Florida Department of Environmental Protection, Florida Gulf Coast University, Florida International University, Florida Fish and Wildlife Conservation Commission Division of Law Enforcement, and Friends of Rookery Bay. All appropriate comments and input were integrated into the final version of the management plan and were submitted and posted during the period of the NOAA notice in the Federal Register.

NOAA's NERR System staff reviewed and approved the plan after ensuring sufficient opportunity for comment by the public, per 15 Code of Federal Regulations 921.33. Once the management plan was approved by NOAA's NERR staff, a Federal Register notice announcing a 30-day public comment period was published on March, 2022. The comment period ended on April 13, 2022. After the required 30-day public comment period, and having received no comments, no additional revisions were made to the document.

C.3.2 / Federal Register Notice

A formal request for public comments was published in the Federal Register on March 14, 2022. The Federal Register posting is attached in the following two pages.

meeting of its Law Enforcement Technical Committee (LETC).

DATES: The meeting will convene on Wednesday, March 30, 2022, from at 10 a.m. to 12 p.m., EDT in CLOSED SESSION.

ADDRESSES: The meeting will be held virtually. Please visit the Gulf Council website at www.gulfcouncil.org for meeting materials and webinar registration information.

Council address: Gulf of Mexico Fishery Management Council, 4107 W Spruce Street, Suite 200, Tampa, FL 33607; telephone: (813) 348-1630.

FOR FURTHER INFORMATION CONTACT: Dr. Ava Lasseter, Anthropologist, Gulf of Mexico Fishery Management Council; ava.lasseter@gulfcouncil.org, telephone: (813) 348-1630.

SUPPLEMENTARY INFORMATION:

Wednesday, March 30, 2022; Beginning at 10 a.m. Until 12 p.m., EDT

Meeting will be in a CLOSED SESSION with introductions and review of nominations for the 2021 Officer/Team of the Year Award, followed by a discussion of the Council process for federal fishing violation checks. There will be no report out to the public on these items until the Gulf of Mexico Fishery Management Council discusses these recommendations at a future Council meeting. After that time, any decisions on the 2021 Officer/Team of the Year Award and proposed changes to the Statement of Organization Practices and Procedures (SOPPs) addressing the process for conducting federal fishing violations will be discussed in open Council session.

Meeting Adjourns.

The Agenda is subject to change, and the latest version along with other meeting materials will be posted on www.gulfcouncil.org.

The Law Enforcement Technical Committee consists of principal law enforcement officers in each of the Gulf States, as well as the NOAA Office of Law Enforcement, U.S. Fish and Wildlife Service and the NOAA Office of General Counsel for Law Enforcement.

Although other non-emergency issues not on the agenda may come before this group for discussion, in accordance with the Magnuson-Stevens Fishery Conservation and Management Act, those issues may not be the subject of formal action during this meeting. Actions will be restricted to those issues specifically identified in the agenda and any issues arising after publication of this notice that require emergency action under Section 305(c) of the

Magnuson-Stevens Fishery Conservation and Management Act, provided the public has been notified of the Council's intent to take-action to address the emergency.

Authority: 16 U.S.C. 1801 *et seq.*

Dated: March 8, 2022.

Tracey L. Thompson,

Acting Deputy Director, Office of Sustainable Fisheries, National Marine Fisheries Service.

[FR Doc. 2022-05265 Filed 3-11-22; 8:45 am]

BILLING CODE 3510-22-P

DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

Draft Revised Management Plan for the Rookery Bay National Estuarine Research Reserve

AGENCY: Office for Coastal Management, National Ocean Service, National Oceanic and Atmospheric Administration, U.S. Department of Commerce.

ACTION: Request for comments on draft revised management plan.

SUMMARY: The National Oceanic and Atmospheric Administration (NOAA) is soliciting comments from the public regarding a proposed revision of the management plan for the Rookery Bay National Estuarine Research Reserve. A management plan provides a framework for the direction and timing of a reserve's programs; allows reserve managers to assess a reserve's success in meeting its goals and to identify any necessary changes in direction; and is used to guide programmatic evaluations of the reserve. Plan revisions are required of each reserve in the National Estuarine Research Reserve System at least every five years. This revised plan is intended to replace the plan approved in 2012.

DATES: Comments are due by April 13, 2022.

ADDRESSES: The draft revised management plan is available at: <http://publicfiles.dep.state.fl.us/CAMA/plans/Rookery/Bay/NERR/Mgmt/Plan/DRAFT/220127.pdf>, or by emailing Matt Chasse of NOAA's Office for Coastal Management at matt.chasse@noaa.gov.

Submit comments by the following method:

Electronic Submission: Submit all electronic public comments by email to matt.chasse@noaa.gov. Include "Comments on the draft Rookery Bay Management Plan" in the subject line of the message.

FOR FURTHER INFORMATION CONTACT: Matt Chasse of NOAA's Office for Coastal

Management, by email at matt.chasse@noaa.gov, phone at 240-628-5417.

SUPPLEMENTARY INFORMATION:

Pursuant to 15 CFR 921.33(c), a state must revise the management plan for the research reserve at least every five years. If approved by NOAA, the Rookery Bay Reserve's revised plan will replace the plan previously approved in 2012.

The draft revised management plan outlines the reserve's strategic goals and objectives; administrative structure; programs for conducting research and monitoring, education, and training; resource protection, restoration, volunteer, and communications plans; prescribed fire and invasive species plans; consideration for future land acquisition; and facility development to support reserve operations. In particular, this draft revised management plan focuses on building upon past successes and accomplishments. Research and monitoring will focus on habitat mapping, wildlife communities, resource management and restoration, coastal change and resilience, and ecosystem services. Reserve education programming will focus on informed community and individual action as related to ecosystems, human connections, resilience, and outreach. The reserve is also planning on enhancing the use of technology in education programming and on building a robust interpretation program with volunteer staff. Coastal training will continue offering programs to professional audiences and conduct an updated needs assessment. The plan also includes the reserve monitoring the health of fish and bird communities, invasive species control efforts, and the use of prescribed fire as a management tool. In addition, the reserve is expecting to expand its strategic partnership with Florida International University.

Since 2012, the reserve has developed a map of reserve habitats, installed surface elevation tables in the Henderson Creek area to support the sentinel site program, and continued a host of habitat and species monitoring programs. The reserve has conducted projects that assess and value freshwater within the reserve supporting the Collier County watershed improvement plans and mangrove habitat restoration efforts. A new partnership with Florida International University is supporting reserve staffing needs and various research projects. Mangrove and research symposiums hosted by the reserve highlighted the diversity of reserve activities and partnerships. Post

Hurricane Irma, the reserve has rebuilt the Ten Thousand Islands field station and other infrastructure to be more resilient to future extreme storm impacts. Furthermore, no reserve boundary changes are incorporated into the revised management plan. The revised management plan, once approved, would serve as the guiding document for the 110,000-acre research reserve for the next five years.

NOAA's Office for Coastal Management analyzes the environmental impacts of the proposed approval of this draft revised management plan in accordance with section 102(2)(C) of the National Environmental Policy Act of 1969, as amended, 42 U.S.C. 4332(2)(C), and the Council on Environmental Quality Regulations for Implementing the Procedural Provisions of NEPA (40 CFR 1500–1508). The public is invited to comment on the draft revised management plan. NOAA will take these comments into consideration in deciding whether to approve the draft revised management plan in whole or in part.

(Authority: 16 U.S.C. 1451 *et seq.*; 15 CFR 921.33)

Keelin S. Kuipers,

Deputy Director, Office for Coastal Management, National Ocean Service, National Oceanic and Atmospheric Administration.

[FR Doc. 2022–05277 Filed 3–11–22; 8:45 am]

BILLING CODE 3510–NK22–P

CORPORATION FOR NATIONAL AND COMMUNITY SERVICE

Agency Information Collection Activities; Submission to the Office of Management and Budget for Review and Approval; Comment Request; National Service Criminal History Check Recordkeeping Requirement

AGENCY: The Corporation for National and Community Service.

ACTION: Notice of information collection; request for comment.

SUMMARY: In accordance with the Paperwork Reduction Act of 1995, the Corporation for National and Community Service (operating as AmeriCorps) is proposing to renew an information collection.

DATES: Written comments must be submitted to the individual and office listed in the **ADDRESSES** section by May 13, 2022.

ADDRESSES: You may submit comments, identified by the title of the information

collection activity, by any of the following methods:

(1) *By mail sent to:* AmeriCorps, Attention: Elizabeth Appel, Office of General Counsel, 250 E Street SW, Washington, DC 20525.

(2) By hand delivery or by courier to the AmeriCorps mailroom at the mail address given in paragraph (1) above, between 9 a.m. and 4 p.m. Eastern Time, Monday through Friday, except Federal holidays.

(3) Electronically through www.regulations.gov.

Comments submitted in response to this notice may be made available to the public through regulations.gov. For this reason, please do not include in your comments information of a confidential nature, such as sensitive personal information or proprietary information. If you send an email comment, your email address will be automatically captured and included as part of the comment that is placed in the public docket and made available on the internet. Please note that responses to this public comment request containing any routine notice about the confidentiality of the communication will be treated as public comment that may be made available to the public, notwithstanding the inclusion of the routine notice.

FOR FURTHER INFORMATION CONTACT:

Elizabeth Appel, Associate General Counsel, 202–967–5070 or by email at eappel@cns.gov.

SUPPLEMENTARY INFORMATION: *Title of Collection:* National Service Criminal History Check Recordkeeping Requirement.

OMB Control Number: 3045–0150.

Type of Review: Renewal.

Respondents/Affected Public:

Businesses and organizations (AmeriCorps grantees and subgrantees).

Total Estimated Number of Annual Responses: 337,071.

Total Estimated Number of Annual Burden Hours: 28,089.

Abstract: Section 189D of the National and Community Service Act of 1990, as amended, requires AmeriCorps grantees and subgrantees to conduct a National Service Criminal History Check on individuals in covered positions. Documenting compliance with the requirement is critical to that responsibility. The currently approved information collection is due to expire on July 31, 2022. This notice announces AmeriCorps' intention to seek renewal of the information collection approval.

Comments submitted in response to this notice will be summarized and/or included in the request for OMB approval. Comments are invited on: (a)

Whether the collection of information is necessary for the proper performance of the functions of the agency, including whether the information shall have practical utility; (b) the accuracy of the agency's estimate of the burden of the collection of information; (c) ways to enhance the quality, utility, and clarity of the information to be collected; (d) ways to minimize the burden of the collection of information on respondents, including through the use of automated collection techniques or other forms of information technology; and (e) estimates of capital or start-up costs and costs of operation, maintenance, and purchase of services to provide information. Burden means the total time, effort, or financial resources expended by persons to generate, maintain, retain, disclose or provide information to or for a Federal agency. This includes the time needed to review instructions; to develop, acquire, install, and utilize technology and systems for the purpose of collecting, validating and verifying information, processing and maintaining information, and disclosing and providing information; to train personnel and to be able to respond to a collection of information, to search data sources, to complete and review the collection of information; and to transmit or otherwise disclose the information. All written comments will be available for public inspection on regulations.gov.

Dated: March 9, 2022.

Fernando Laguarda,
General Counsel.

[FR Doc. 2022–05320 Filed 3–11–22; 8:45 am]

BILLING CODE 6050–28–P

CORPORATION FOR NATIONAL AND COMMUNITY SERVICE

Agency Information Collection Activities; Submission to the Office of Management and Budget for Review and Approval; Comment Request; Application Package for Request for Medical or Religious Reasonable Accommodation

AGENCY: The Corporation for National and Community Service.

ACTION: Notice of information collection; request for comment.

SUMMARY: In accordance with the Paperwork Reduction Act of 1995, the Corporation for National and Community Service (operating as AmeriCorps) is proposing a new information collection.

DATES: Written comments must be submitted to the individual and office

APPENDIX D. GOALS AND OBJECTIVES

Appendix D. Goals, Objectives, and Strategies Table

D.1 / Current Goals, Objectives and Strategies Table

The following table is a summary of the issues, goals, objectives, strategies, and performance measures identified in Chapter 3 (Strategic Plan) and elsewhere in the Rookery Bay Reserve Management Plan. The “Status” column identifies the current state (initiated or not initiated) of the activity. An “I” in this column indicates if this is an activity that is already underway. The “Type” column indicates if the activity will be repeated (typically annually) and the “Cost Estimate” column identifies the anticipated costs associated with the strategy not including infrastructure maintenance or personnel. Budget categories identified correlate with the CAMA Management Program Teams and NOAA Funded Programs and translate to those used by the Land Management Uniform Cost Accounting Council (pursuant to 259.037, F.S.) Headings: Ecosystem Science, Education and Outreach, and Resource management. Please see Chapters 11 and 12 for an overview of Rookery Bay Reserve’s Facilities Plan and Administration Plan, respectively.

Funding for the goals, objectives, and integrated strategies listed in the table below are provided by National Oceanic and Atmospheric Administration and the Land Acquisition Trust Fund. All actions listed below are current and ongoing.

Goals, Objectives & Integrated Strategies	Length of Initiative	Estimated Average Yearly Cost	2022-23	2023-24	2024-25	2025-26	2026-27
RESEARCH & MONITORING STRATEGIES:							
Goal 1 [ECOSYSTEMS] Habitats and species within the Reserve exhibit long-term integrity, function, and biodiversity.							
Objective 1.1 Ecological conditions are monitored to understand trends and drivers of change.							
Action: Monitor and communicate environmental and physical conditions of coastal and watershed ecosystems.	5	\$50,000	\$47,000	\$49,000	\$51,000	\$53,000	\$55,000
Action: Monitor and communicate habitat structure, vegetation, and wildlife community compositions. (Note: This includes at least six sub-actions.)	5	\$30,000	\$27,000	\$29,000	\$31,000	\$33,000	\$35,000
Action: Engage partners to link monitoring data with current research.	5	\$40,000	\$37,000	\$39,000	\$41,000	\$43,000	\$45,000
Action: Foster the development of new tools and technologies that bolster monitoring efforts.	5	\$30,000	\$27,000	\$29,000	\$31,000	\$33,000	\$35,000
Objective 1.2 Habitats are assessed to support the management of vulnerable species.							
Action: Maintain updated habitat maps that may include exotic species, fire habitat, and wildlife habitat use.	5	\$44,887	\$37,887	\$39,000	\$41,000	\$45,000	\$48,000
Action: Evaluate the effects of management actions on wildlife and ecosystems to inform adaptive management.	5	\$10,000	\$7,000	\$9,000	\$11,000	\$13,000	\$15,000
Action: Identify the effects of influencing factors (e.g., human activities, exotic species presence) on wildlife and ecosystems.	5	\$10,000	\$7,000	\$9,000	\$11,000	\$13,000	\$15,000
Action: Evaluate trends of loss or recovery by natural communities to prioritize restoration and management needs.	5	\$3,500	\$3,200	\$3,400	\$3,600	\$3,800	\$4,000
Goal 2: [HUMAN CONNECTIONS] Connections among people and resources in the Reserve are understood and enhanced.							
Objective 2.1 Cultural resources within Rookery Bay Reserve are identified and conserved.							

Goals, Objectives & Integrated Strategies	Length of Initiative	Estimated Average Yearly Cost	2022-23	2023-24	2024-25	2025-26	2026-27
Action: Maintain a spatial assessment of cultural resources.	5	\$7,500	\$6,700	\$6,900	\$7,300	\$7,300	\$8,000
Action: Support research activities to identify, study, and conserve cultural resources.	5	\$6,500	\$6,200	\$6,400	\$6,600	\$6,800	\$7,000
Objective 2.2 Natural resources protection is enhanced by improved communications between scientists and stakeholders.							
Action: Engage in expert working groups to advise natural resource management and scientific development.	5	\$9,500	\$9,200	\$9,400	\$9,600	\$9,800	\$10,000
Action: Promote visiting scientist engagement and communication with reserve staff, partners, and stakeholders.	5	\$50,000	\$47,000	\$49,000	\$51,000	\$53,000	\$55,000
Action: Facilitate researcher community collaboration and develop or support communities of practice.	5	\$50,000	\$47,000	\$49,000	\$51,000	\$53,000	\$55,000
Action: Maintain the research library and other databases as information repositories for Reserve studies, data, and literature.	5	\$6,922	\$6,622	\$6,800	\$7,100	\$7,300	\$7,922
Objective 2.3 Southwest Florida communities understand the socioeconomic values of local ecosystems.							
Action: Develop social science research priorities.	5	\$40,000	\$37,000	\$39,000	\$41,000	\$43,000	\$45,000
Goal 3: [RESILIENCE] Strong science-to-management connections ensure that ecosystems and communities are resilient and adaptable to environmental change and episodic events.							
Objective 3.1 Communities are engaged through collaborative projects to monitor and manage effects of coastal watershed change.							
Action: Identify and monitor downstream indicators of local or watershed-scale restoration actions.	5	\$60,000	\$57,000	\$59,000	\$61,000	\$63,000	\$65,000
Action: Coordinate with partners to develop citizen/community science programs.	5	\$25,000	\$22,000	\$24,000	\$26,000	\$28,000	\$30,000

Goals, Objectives & Integrated Strategies	Length of Initiative	Estimated Average Yearly Cost	2022-23	2023-24	2024-25	2025-26	2026-27
Objective 3.2 Coastal practitioners use observations of ongoing change to support proactive management actions for future conditions and events.							
Action: Develop assessments that identify vulnerabilities and (or) opportunities for enhanced resilience for natural and human communities.	5	\$25,000	\$22,000	\$24,000	\$26,000	\$28,000	\$30,000
Objective 3.3 Rookery Bay Reserve serves as a living laboratory to understand how change impacts ecosystems and ecosystem services.							
Action: Engage with the international coastal research community to promote the Reserve as a valuable place and resource for ecosystem studies through in-situ and comparative studies.	5	\$25,000	\$22,000	\$24,000	\$26,000	\$28,000	\$30,000
Action: Use episodic events as an opportunity for long-term monitoring of habitat change and recovery.	5	\$25,000	\$22,000	\$24,000	\$26,000	\$28,000	\$30,000
Action: Promote research on interacting climate effects on natural resources.	5	\$25,000	\$22,000	\$24,000	\$26,000	\$28,000	\$30,000
Action: Support research to understand ongoing ecosystem change and model scenarios of future change.	5	\$25,000	\$22,000	\$24,000	\$26,000	\$28,000	\$30,000
Goal 4: [OUTREACH] Value of the coastal environment drives informed stewardship actions.							
Objective 4.1 Residents and visitors have a greater awareness of the Reserve and understand how to protect it.							
Action: Publish a review of research at the Reserve.	5	\$25,000	\$22,000	\$24,000	\$26,000	\$28,000	\$30,000
Objective 4.2 Students experience the coastal environment through place-based learning.							
Action: Support and mentor student and early-career researchers.	5	\$25,000	\$22,000	\$24,000	\$26,000	\$28,000	\$30,000
Objective 4.3 Stakeholders and partners apply science-based knowledge to make informed decisions.							

Goals, Objectives & Integrated Strategies	Length of Initiative	Estimated Average Yearly Cost	2022-23	2023-24	2024-25	2025-26	2026-27
Action: Support decision science applications for natural resource management.	5	\$25,000	\$22,000	\$24,000	\$26,000	\$28,000	\$30,000
EDUCATION STRATEGIES:							
Goal 1 [ECOSYSTEMS] Habitats and species within the Reserve exhibit long-term integrity, function, and biodiversity.							
Objective 1.1 Ecological conditions are monitored to understand trends and drivers of change.							
Action: Incorporate monitoring data into student and visitor programming.	5	\$45,000	\$42,000	\$44,000	\$46,000	\$48,000	\$50,000
Objective 1.2 Habitats are enhanced to support vulnerable species through science-led management activities.							
Action: Share research updates through interpretive programs.	5	\$35,000	\$32,000	\$34,000	\$36,000	\$38,000	\$40,000
Goal 2: [HUMAN CONNECTIONS] Connections among people and resources in the Reserve are understood and enhanced.							
Objective 2.1 Cultural resources within Rookery Bay Reserve are identified and conserved.							
Action: Highlight findings in education programming.	5	\$30,000	\$27,000	\$29,000	\$31,000	\$33,000	\$35,000
Objective 2.2 Southwest Florida communities understand the socioeconomic values of local ecosystems.							
Action: Coordinate science-based lectures for the general public.	5	\$40,000	\$37,000	\$39,000	\$41,000	\$43,000	\$45,000
Action: Highlight cultural resources in exhibits and programs.	5	\$30,000	\$27,000	\$29,000	\$31,000	\$33,000	\$35,000
Goal 3: [RESILIENCE] Strong science-to-management connections ensure that ecosystems and communities across the Gulf of Mexico are resilient and adaptable to environmental changes and episodic events.							

Goals, Objectives & Integrated Strategies	Length of Initiative	Estimated Average Yearly Cost	2022-23	2023-24	2024-25	2025-26	2026-27
Objective 3.3 Rookery Bay Reserve serves as a living laboratory to understand how change impacts ecosystems and ecosystem services.							
Action: Volunteer interpreters are informed about ongoing research in the Reserve.	5	\$30,000	\$27,000	\$29,000	\$31,000	\$33,000	\$35,000
Action: Enhance field-based education programs to address latest science on impacts to Reserve ecosystems.	5	\$50,000	\$47,000	\$49,000	\$51,000	\$53,000	\$55,000
Goal 4: [OUTREACH] Value of the coastal environment drives informed stewardship actions.							
Objective 4.1 Residents and visitors have a greater awareness of Rookery Bay Reserve and understand how to protect it.							
Action: Conduct outreach throughout the community.	5	\$40,000	\$37,000	\$39,000	\$41,000	\$43,000	\$45,000
Action: Offer an array of onsite public programs.	5	\$50,000	\$47,000	\$49,000	\$51,000	\$53,000	\$55,000
Action: Host topic-specific training for staff and volunteers who interact with the public.	5	\$35,000	\$32,000	\$34,000	\$36,000	\$38,000	\$40,000
Objective 4.2 Students experience the coastal environment through place-based learning.							
Action: Provide a high quality, field-based science education program for students pre-K through grade 20.	5	\$40,000	\$37,000	\$39,000	\$41,000	\$43,000	\$45,000
Objective 4.3 Stakeholders and partners apply science-based knowledge to make informed decisions.							
Action: Represent Rookery Bay Reserve at community forums.	5	\$30,000	\$27,000	\$29,000	\$31,000	\$33,000	\$35,000
Action: Conduct annual Teacher on the Estuary workshops.	5	\$30,143	\$27,000	\$29,000	\$31,000	\$33,000	\$35,143
COASTAL TRAINING PROGRAM STRATEGIES:							
Goal 1 [ECOSYSTEMS] Habitats and species within the Reserve exhibit long-term integrity, function, and biodiversity.							

Goals, Objectives & Integrated Strategies	Length of Initiative	Estimated Average Yearly Cost	2022-23	2023-24	2024-25	2025-26	2026-27
Objective 1.1 Ecological conditions are monitored to understand trends and drivers of change.							
Action: Provide training on Reserve monitoring data applications and lessons learned.	5	\$5,000	\$3,500	\$4,400	\$5,600	\$5,800	\$6,000
Objective 1.2 Habitats are enhanced to support vulnerable species through science-led management activities.							
Action: Provide training on invasive and vulnerable species.	5	\$10,000	\$7,000	\$9,000	\$11,000	\$13,000	\$15,000
Action: Provide training on restoration techniques to natural resource managers and other professional audiences.	5	\$10,000	\$7,000	\$9,000	\$11,000	\$13,000	\$15,000
Goal 2: [HUMAN CONNECTIONS] Connections among people and resources in the Reserve are understood and enhanced.							
Objective 2.1 Cultural resources within Rookery Bay are identified and conserved.							
Action: Collaborate with partners to provide cultural resource training.	5	\$10,000	\$7,000	\$9,000	\$11,000	\$13,000	\$15,000
Objective 2.2 Natural resources protection is enhanced by improved communications between scientists and stakeholders.							
Action: Implement information exchanges within the natural resource management community.	5	\$10,000	\$7,000	\$9,000	\$11,000	\$13,000	\$15,000
Action: Facilitate collaborative working groups to address environmental issues along the coast.	5	\$10,000	\$7,000	\$9,000	\$11,000	\$13,000	\$15,000
Objective 2.3 Southwest Florida communities understand the socioeconomic values of local ecosystems.							
Action: Host training sessions for decision makers on ecosystem services and socioeconomic indicators.	5	\$20,000	\$17,000	\$19,000	\$21,000	\$23,000	\$25,000
Action: Collaborate with social scientists to understand community values of estuaries.	5	\$10,000	\$7,000	\$9,000	\$11,000	\$13,000	\$15,000

Goals, Objectives & Integrated Strategies	Length of Initiative	Estimated Average Yearly Cost	2022-23	2023-24	2024-25	2025-26	2026-27
Action: Collaborate with partners to establish socioeconomic indicators to develop a monitoring program.	5	\$10,000	\$7,000	\$9,000	\$11,000	\$13,000	\$15,000
Goal 3: [RESILIENCE] Strong science-to-management connections ensure that ecosystems and communities across the Gulf of Mexico are resilient and adaptable to environmental changes and episodic events.							
Objective 3.1 Communities are engaged through collaborative projects to monitor and manage effects of coastal watershed change.							
Action: Provide technical assistance to collaborative working groups to address coastal resilience.	5	\$20,000	\$17,000	\$19,000	\$21,000	\$23,000	\$25,000
Action: Enhance collaborative relationships with the CTPs of other reserves through attending conferences, workshops, and digital meetings.	5	\$13,000	\$11,000	\$12,500	\$13,500	\$14,000	\$15,000
Objective 3.2 Coastal practitioners use observations of ongoing change to support proactive management actions for future conditions and events.							
Action: Provide training on new technology, techniques, and tools to monitor, model, and adapt to environmental changes.	5	\$5,000	\$3,500	\$4,400	\$5,600	\$5,800	\$6,000
Objective 3.3 Rookery Bay Reserve serves as a living laboratory to understand how change impacts ecosystems and ecosystem services.							
Action: Enhance training opportunities relevant to extreme storm management and response tools and applications.	5	\$17,695	\$14,695	\$16,695	\$18,695	\$20,695	\$21,695
Goal 4: [OUTREACH] Value of the coastal environment drives informed stewardship actions.							
Objective 4.1 Residents and visitors have a greater awareness of Rookery Bay Reserve and understand how to protect it.							

Goals, Objectives & Integrated Strategies	Length of Initiative	Estimated Average Yearly Cost	2022-23	2023-24	2024-25	2025-26	2026-27
Action: Host communication skills workshop for target audiences.	5	\$15,000	\$12,000	\$14,000	\$16,000	\$18,000	\$20,000
Objective 4.3 Stakeholders and partners apply science-based knowledge to make informed decisions.							
Action: Provide educational events for elected officials and community leaders.	5	\$15,000	\$12,000	\$14,000	\$16,000	\$18,000	\$20,000
Action: Host science-based workshops for business audiences.	5	\$2,000	\$1,700	\$1,900	\$2,100	\$2,300	\$2,500
Action: Provide Best Management Practices training for landscape professionals.	5	\$10,000	\$7,000	\$9,000	\$11,000	\$13,000	\$15,000
Action: Implement a needs assessment of coastal decision makers.	5	\$15,000	\$12,000	\$14,000	\$16,000	\$18,000	\$20,000
VOLUNTEER PROGRAM STRATEGIES:							
Goal 1 [ECOSYSTEMS] Habitats and species within the Reserve exhibit long-term integrity, function, and biodiversity.							
Objective 1.1 Ecological conditions are monitored to understand trends and drivers of change.							
Action: Ensure that volunteers support monitoring efforts by recruiting and qualifying candidates for this type of work.	5	\$25,000	\$22,000	\$24,000	\$26,000	\$28,000	\$30,000
Action: Share all milestones and research data in the Environmental Learning Center through updated exhibits, publications.	5	\$25,000	\$22,000	\$24,000	\$26,000	\$28,000	\$30,000
Objective 1.2 Habitats are enhanced to support vulnerable species through science-led management activities.							
Action: Ensure that volunteers are trained and qualified to support science-led management activities.	5	\$25,000	\$22,000	\$24,000	\$26,000	\$28,000	\$30,000
Action: Provide up-to-date data for visitors by keeping Reserve publications up-to-date and available.	5	\$10,000	\$7,000	\$9,000	\$11,000	\$13,000	\$15,000
Action: Team OCEAN will provide on-the-water outreach services to boaters on how to best protect sensitive species.	5	\$15,000	\$12,000	\$14,000	\$16,000	\$18,000	\$20,000

Goals, Objectives & Integrated Strategies	Length of Initiative	Estimated Average Yearly Cost	2022-23	2023-24	2024-25	2025-26	2026-27
Goal 2: [HUMAN CONNECTIONS] Connections among people and resources in the Reserve are understood and enhanced.							
Objective 2.1 Cultural resources within Rookery Bay Reserve are identified and conserved.							
Action: Trained and qualified volunteers will relay educational messages and findings to visitors.	5	\$12,500	\$10,500	\$11,500	\$12,750	\$13,000	\$13,500
Objective 2.3 Southwest Florida communities understand the socioeconomic values of local ecosystems.							
Action: Encourage trained and qualified volunteers to participate in community outreach programs educating the general public.	5	\$12,500	\$10,500	\$11,500	\$12,750	\$13,000	\$13,500
Goal 3: [RESILIENCE] Strong science-to-management connections ensure that ecosystems and communities are resilient and adaptable to environmental change and episodic events.							
Objective 3.1 Communities are engaged through collaborative projects to monitor and manage effects of coastal watershed change. The public is invited to lectures by staff who provide annual updates on these changes.							
Action: Train volunteers to support Reserve research and monitoring.	5	\$13,500	\$11,500	\$12,500	\$13,000	\$13,500	\$14,000
Action: Recruit volunteers to participate in collaborative projects.	5	\$9,551	\$9,251	\$9,400	\$9,651	\$9,800	\$10,051
Objective 3.3 Rookery Bay Reserve serves as a living laboratory to understand how change impacts ecosystems and ecosystem services.							
Action: Strengthen how visitors learn about the latest research in the Environmental Learning Center and encourage volunteer interpreters to give programs with this information.	5	\$7,500	\$6,700	\$6,900	\$7,300	\$7,300	\$8,000
Goal 4: [OUTREACH] Value of the coastal environment drives informed stewardship actions.							

Goals, Objectives & Integrated Strategies	Length of Initiative	Estimated Average Yearly Cost	2022-23	2023-24	2024-25	2025-26	2026-27
Objective 4.1 Residents and visitors have a greater awareness of Rookery Bay Reserve and understand how to protect it.							
Action: Enhance the visitor experience at the Environmental Learning Center using the latest technology.	5	\$4,500	\$4,200	\$4,400	\$4,600	\$4,800	\$5,000
Action: Utilize Team OCEAN to provide on-the-water education for boaters to protect Reserve habitats and species.	5	\$10,000	\$7,000	\$9,000	\$11,000	\$13,000	\$15,000
Action: Provide a safe and welcoming environment at the Environmental Learning Center.	5	\$3,500	\$3,200	\$3,400	\$3,600	\$3,800	\$4,000
COMMUNICATIONS PROGRAM STRATEGIES:							
Goal 1: [ECOSYSTEMS] Habitats and species within the Reserve exhibit long-term integrity, function, and biodiversity.							
Objective 1.1 Monitor ecological conditions to understand trends and drivers of change.							
Action: Share monitoring data on the website.	5	\$25,000	\$22,000	\$24,000	\$26,000	\$28,000	\$30,000
Objective 1.2 Enhance habitats through science-led management activities to support vulnerable species.							
Action: Communicate activities to the public and to managing partners.	5	\$16,500	\$13,400	\$14,100	\$17,500	\$19,000	\$21,500
Goal 2: [HUMAN CONNECTIONS] Connections among people and resources in the Reserve are understood and enhanced.							
Objective 2.1 Cultural resources within Rookery Bay Reserve are identified and conserved.							
Action: Ensure exhibits reflect current cultural resources and protective efforts.	5	\$10,000	\$7,000	\$9,000	\$11,000	\$13,000	\$15,000
Action: Highlight cultural resources and protective actions the community can take on websites and social media.	5	\$13,000	\$11,000	\$12,500	\$13,500	\$14,000	\$15,000

Goals, Objectives & Integrated Strategies	Length of Initiative	Estimated Average Yearly Cost	2022-23	2023-24	2024-25	2025-26	2026-27
Objective 2.3 Southwest Florida communities understand the socioeconomic values of local ecosystems.							
Action: Communicate the economic and social value of the Reserve and healthy estuaries and coast to the public.	5	\$13,600	\$11,600	\$12,600	\$13,000	\$13,600	\$14,600
Goal 3: [RESILIENCE] Strong science-to-management connections ensure that ecosystems and communities along the Gulf Coast are resilient and adaptable to environmental changes and episodic events.							
Objective 3.1 Communities are engaged through collaborative projects to monitor and manage effects of coastal watershed change.							
Action: Engage people and groups through social media.	5	\$11,500	\$10,900	\$11,000	\$11,600	\$12,600	\$13,000
Action: Communicate watershed change findings through various media by press release, posting on the News section of the website and through social media.	5	\$16,000	\$13,750	\$14,500	\$17,000	\$19,000	\$21,000
Objective 3.3 Rookery Bay Reserve serves as a living laboratory to understand how change impacts ecosystems and ecosystem services.							
Action: Share information about how episodic events impact ecosystems by engaging visitors at the Environmental Learning Center through lectures including the popular lunch and learn lectures series and after-hours science night gatherings.	5	\$13,000	\$11,000	\$12,500	\$13,500	\$14,000	\$15,000
Goal 4: [OUTREACH] Value of the coastal environment drives informed stewardship actions.							
Objective 4.1 Residents and visitors have a greater awareness of the Reserve and understand how to protect it.							
Action: Update content for exhibits and websites as needed.	5	\$12,500	\$10,500	\$11,500	\$12,750	\$13,000	\$13,500

Goals, Objectives & Integrated Strategies	Length of Initiative	Estimated Average Yearly Cost	2022-23	2023-24	2024-25	2025-26	2026-27
Action: Enhance use of social media to raise awareness of natural resource issues.	5	\$11,671	\$10,971	\$11,000	\$11,671	\$12,600	\$13,671
Action: Promote visitation to the Environmental Learning Center.	5	\$24,000	\$21,000	\$23,000	\$26,000	\$28,000	\$30,000
Objective 4.3 Stakeholders and partners apply science-based knowledge to make informed decisions.							
Action: Produce and disseminate Rookery Bay Review.	5	\$15,000	\$12,000	\$14,000	\$16,000	\$18,000	\$20,000
RESOURCE MANAGEMENT STRATEGIES:							
Goal 1: [ECOSYSTEMS] Habitats and species within the Reserve exhibit long-term integrity, function, and biodiversity.							
Objective 1.1 Ecological conditions are monitored to understand trends and drivers of change.							
Action: Prescribed fire (planned burn) effects are monitored.	10	\$110,320	\$104,220	\$108,100	\$112,000	\$116,000	\$120,000
Action: Effects of invasive plant control and removal efforts are monitored.	10	\$65,000	\$59,000	\$63,000	\$67,000	\$71,000	\$75,000
Action: Work with partners to monitor changes.	5	\$20,070	\$17,070	\$19,000	\$21,000	\$23,000	\$25,000
Action: Participate in continued monitoring of FWC and USFWS priority species.	10	\$14,000	\$11,000	\$13,000	\$15,000	\$17,000	\$19,000
Action: Stewardship staff and Team OCEAN support monitoring efforts to protect sensitive species. Stewardship staff will partner with Team OCEAN to support and train volunteers in monitoring public access and visitor use.	10	\$200,000	\$194,000	\$198,000	\$202,000	\$206,000	\$210,000
Objective 1.2 Habitats are enhanced to support vulnerable species through science-led management activities.							
Action: Use prescribed fire to manage Reserve habitats.	5	\$100,000	\$89,000	\$93,000	\$102,000	\$106,000	\$110,000
Action: Utilize invasive species removal program to manage Reserve habitats.	5	\$69,000	\$63,000	\$67,000	\$71,000	\$75,000	\$79,500

Goals, Objectives & Integrated Strategies	Length of Initiative	Estimated Average Yearly Cost	2022-23	2023-24	2024-25	2025-26	2026-27
Action: Conduct natural resource adaptive management protocols based on relevant monitoring and research.	5	\$5,000	\$3,500	\$4,400	\$5,600	\$5,800	\$6,000
Action: Coordinate management of disturbance-sensitive species, such as nesting birds, with FWC.	10	\$25,000	\$22,000	\$24,000	\$26,000	\$28,000	\$30,000
Goal 2: [HUMAN CONNECTIONS] Connections among people and resources in the Reserve are understood and enhanced.							
Objective 2.1 Cultural resources within the Reserve are identified and conserved.							
Action: Search for new sites using existing anecdotal data, aerial imagery, and GIS/LIDAR to locate possible unknown sites.	5	\$6,000	\$5,700	\$5,900	\$6,100	\$6,300	\$6,500
Action: Perform cultural resource assessments (vulnerability, status updates).	5	\$2,500	\$2,200	\$2,400	\$2,600	\$2,800	\$3,000
Action: Collect new information about known cultural resources and sites.	5	\$3,000	\$2,700	\$2,900	\$3,100	\$3,300	\$3,500
Action: Participate in collaborative working groups to exchange information and provide input regarding the Reserve's watershed.	5	\$40,000	\$37,000	\$39,000	\$41,000	\$43,000	\$45,000
Action: Engage with partners to expand knowledge of known and unknown cultural sites throughout the Reserve.	5	\$7,500	\$6,700	\$6,900	\$7,300	\$7,300	\$8,000
Objective 2.2 Natural resources protection is enhanced by improved communications between scientists and stakeholders.							
Action: Participate in collaborative working groups to exchange information and provide input regarding Rookery Bay Reserve's watershed, such as the aforementioned CISMA partnership of land managers and shareholders of southwest Florida.	5	\$27,500	\$24,200	\$26,400	\$28,600	\$31,800	\$34,000
Action: Engage with partners to explore innovative funding opportunities for the Reserve's habitat restoration projects.	5	\$67,000	\$62,000	\$64,000	\$67,000	\$69,000	\$70,000
Objective 2.3 Southwest Florida communities understand the socioeconomic values of local ecosystems.							

Goals, Objectives & Integrated Strategies	Length of Initiative	Estimated Average Yearly Cost	2022-23	2023-24	2024-25	2025-26	2026-27
Action: Share information regarding the importance of prescribed fire.	5	\$50,319	\$44,319	\$48,319	\$52,319	\$56,319	\$60,319
Goal 3: [RESILIENCE] Strong science-to-management connections ensure that ecosystems and communities across the Gulf of Mexico are resilient and adaptable to environmental changes and episodic events.							
Objective 3.1 Communities are engaged through collaborative projects to monitor and manage effects of coastal watershed change.							
Action: Research and social science tools are used to inform management of Reserve resources.	5	\$65,000	\$60,500	\$63,400	\$66,600	\$68,800	\$71,000
Action: Provide input regarding development projects being proposed within the Rookery Bay Reserve watershed.	5	\$26,072	\$22,772	\$23,772	\$25,772	\$27,772	\$29,772
Objective 3.2 Coastal practitioners use observations of ongoing change to support proactive management actions for future conditions and events.							
Action: Prioritize management actions based upon sensitivity and vulnerability of habitats and species.	5 to 10	\$36,500	\$33,200	\$35,400	\$37,600	\$38,800	\$41,000
Goal 4: [OUTREACH] Value of the coastal environment drives informed stewardship actions.							
Objective 4.1 Residents and visitors have a greater awareness of the Reserve and understand how to protect it.							
Action: Rookery Bay Reserve's director and stewardship coordinator and aquatic preserve manager, RCP staff, and FDEP general counsel will partner with Collier County general counsel and staff to address sanctioned events held within the Reserve and elsewhere within the county.	5	\$88,508	\$84,508	\$86,508	\$88,508	\$90,508	\$93,508

D.2 / Budget Summary Table

The following table provides a summary of cost estimates for conducting the management activities identified in this plan.

Fiscal Year	Research & Monitoring	Education & Outreach	Resource Management	Total
2022-2023	\$607,809	\$909,367	\$948,589	\$2,465,765
2023-2024	\$647,900	\$997,195	\$994,399	\$2,639,494
2024-2025	\$689,200	\$1,090,667	\$1,048,099	\$2,827,966
2025-2026	\$732,000	\$1,174,595	\$1,093,499	\$3,000,094
2026-2027	\$774,922	\$1,261,660	\$1,140,099	\$3,176,681
Totals	\$3,451,831	\$5,433,484	\$5,224,685	\$14,110,000

D.3 / Major Accomplishments Since Approval of the Previous Management Plan

Goal: Public Use. Ensure user experiences are sustainable and consistent with natural and cultural resource protection for the benefit of existing and future generations.

- The Friends of Rookery Bay (FORB) have begun a formal partnership with an ecotour operator to offer kayak and boat tours for the public. These programs have been very popular with local residents and visitors to provide sustainable user experiences to more than 14,000 guests.
- Team OCEAN (Ocean, Conservation, Education, Action, Network) continues to grow and address a variety of visitor-use challenges by engaging directly with visitors through its on-the-water boating activities. From 2013 through 2021 the group volunteered over 36,000 hours of assistance to the Reserve.
- In 2016, FORB began an Adopt-a-Nest program to directly fund interns to assist with sea turtle nest monitoring and protection efforts in Cape Romano. The program has helped support 17 paid interns to monitor 1,251 nests producing 52,140 hatchlings.

Goal: Habitat and Species Management. Improve the conservation of native biodiversity

- The Reserve has treated 2,868 acres with prescribed fire and 13,319 acres for exotic plants since 2013.
- A grant was received from the U.S. Fish and Wildlife Service (USFWS) to improve nesting areas used by American Crocodiles in the Reserve through exotic plant removal and substrate improvement. In 2018, hatchlings from a successful nest were documented in the Reserve, making it the northern-most American Crocodile nest recorded on Florida's Gulf coast.
- A new partnership with Denison University (Dr. Paul Andreadis), the Conservancy of Southwest Florida (Ian Bartoszek), and the Florida Fish and Wildlife Conservation Commission (FWC) regarding tagging and telemetry monitoring of Burmese Pythons active within the Reserve was started in 2013. This work has resulted in a better understanding of habitat use and movement of pythons. This information has been used by staff and partners to capture and remove pythons from Reserve lands, reducing the effects of python predation on native species.
- Rookery Bay partnered with USFWS, South Florida Water Management District, the U.S. Army Corps of Engineers, and Picayune Strand State Forest to develop a new Florida Manatee mitigation feature in 2016.
- A new research project was started in 2018 using acoustic tagging of juvenile sharks and (in collaboration with NOAA-National Centers for Coastal and Ocean Science [NCCOS]) resident fishes in two bays in the Ten Thousand Islands to bolster ongoing fish and shark research. Partnerships with NCCOS and Florida International University (FIU) have created the opportunity to begin data analysis on the fish and shark long-term datasets, and two scientific publications are in draft form.
- The Reserve's water quality data are now used by Florida DEP programs, including the Division of Environmental Assessment and Restoration (DEAR) starting in August 2014 and SEACAR beginning in 2017.

Goal: Cultural Resource Management. Enhance the preservation of Rookery Bay National Estuarine Research Reserve's (NERR) cultural resources through good science resulting in informed management practices.

- Partnered with Florida Public Archaeology Network (FPAN) to incorporate stakeholder input from archaeologists to complete a vulnerability assessment for Collier County as part of a sea level rise modeling effort led by University of Florida and Florida Gulf Coast University. After Hurricane Irma, the partnership was also leveraged to perform a rapid assessment of some of the Reserve's archaeological sites with FPAN and University of South Florida (USF) in 2017 and 2018.
- Strengthened partnership with Marco Island Historical Museum to develop new educational displays in the Environmental Learning Center on cultural resources. The museum provided historical documents including photos for new pioneer settler exhibits, which were installed in 2013.
- A project was completed in 2017 to gather and summarize all historical information the Reserve holds on the Kirkland family's history. In addition to historical documents, all identified family graves now have place markers of unknown or known persons with available information

Goal: Land Use Impacts. Minimize adverse environmental impacts from land use while restoring the ecosystem services.

- Funding was secured and permits obtained for the Fruit Farm Creek mangrove restoration project in partnership with FWC to restore over 200 acres of mangrove forest. Groundbreaking on the final phase of the project occurred in October 2021. This will be one of the largest mangrove restoration projects ever completed in Florida.
- Two NERR Science Collaborative Science Catalyst projects were awarded in 2018. The first project led by USF focused on habitat mapping and change for terrestrial and submerged habitats. The second project, led by Duke University, focused on creating a conceptual model of ecosystem services in mangrove forests, including a specific model for the Fruit Farm Creek restoration project. Both projects built toward a 3-year NERR Science Collaborative grant, received in 2020. This project led by Duke University focuses on understanding the links between degradation, recovery, and community benefits in mangrove ecosystems impacted by hurricanes.

Goal: Informed Community and Individual Action. To increase the community's level of awareness, knowledge, skills, and sense of value for the coastal environment that would result in positive attitudinal and behavioral change.

- In 2013 the Reserve's Environmental Learning Center (ELC) joined the Coastal America's prestigious network of Coastal Ecosystem Learning Centers. Since then, the center has welcomed 178,606 visitors. New interactive displays have been installed to improve visitor experience, including a touch tank Estuary Encounter (2017), Science on the Sphere (2018), and the Lives on the Line campaign to reduce monofilament debris (2021).
- The education department began offering annual Teachers on the Estuary (TOTE) programs in 2015. Each summer, a 15-hour workshop focused on Estuary 101 curriculum is conducted for up to 15 teachers of all subjects, grades, and locations.

- A new documentary titled *Southwest Florida's Mangrove Coast* aired on PBS on Earth Day in 2019 to celebrate the 40-year anniversary of the Reserve. The film was produced by Elam Stoltzfus and featured several Reserve staff. It highlights the importance of mangroves and how the Reserve started as a grassroots effort in the 60s.

Goal: Global and Regional Change Events. To determine appropriate level of response and serve as a regional clearinghouse of accurate and credible science-based information and a coordinator of appropriate response for partners and the general public related to global and meteorological change events, catastrophic environmental events (both natural and human-induced) and harmful algal blooms.

- New monitoring sites were established to track long-term changes in the Reserve. A secondary water quality monitoring station (Pumpkin Bay) was designated in October 2016 following sample collection that started in 2012. The Reserve's Sentinel Site team submitted a draft plan for the Henderson Creek Sentinel Site in June 2018. Surface elevation tables established by USGS in Rookery Bay and the Ten Thousand Islands have been monitored and maintained by the Reserve since 2017.
- In 2018, the Reserve convened a Mangrove Symposium with keynote speakers discussing the rich history of mangrove research in south Florida, scientists sharing new research, and a full day of facilitated discussions on emerging challenges and opportunities in subtropical coastal management.
- A new partnership was initiated with the Naples Botanical Garden to collect and propagate rare plant species from the Reserve that are threatened by climate change. The Florida thatch palm (*Thrinax radiata*) was targeted first due to its vulnerability to sea level rise. The partnership has enabled the collection of 1,062 thatch palm seeds, 446 of which germinated and are growing in the garden's nursery.

APPENDIX E. STATE LAND REQUIREMENTS

Appendix E. Division of State Lands/Acquisition and Restoration Council Requirements

E.1 / Acquisition and Restoration Council Management Plan Compliance Checklist

The table below summarizes where each requirement of the Acquisition and Restoration Council can be found in the Rookery Bay Reserve management plan.

Land Management Plan Compliance Checklist

This checklist is required for state-owned conservation lands over 160 acres.

Section A: Acquisition Information Items

Item #	Requirement	Statute/Rule	Page Numbers and/or Appendix
1	The common name of the property.	18-2.018 & 18-2.021	Ex. Sum.
2	The land acquisition program, if any, under which the property was acquired.	18-2.018 & 18-2.021	p. 2
3	Degree of title interest held by the Board, including reservations and encumbrances such as leases.	18-2.021	p. 2, 6-11
4	The legal description and acreage of the property.	18-2.018 & 18-2.021	Ex. Sum
5	A map showing the approximate location and boundaries of the property, and the location of any structures or improvements to the property.	18-2.018 & 18-2.021	p. 15, 147
6	An assessment as to whether the property, or any portion, should be declared surplus. <i>Provide Information regarding assessment and analysis in the plan, and provide corresponding map.</i>	18-2.021	p. 13
7	Identification of other parcels of land within or immediately adjacent to the property that should be purchased because they are essential to management of the property. <i>Please clearly indicate parcels on a map.</i>	18-2.021	p. 122 - 26
8	Identification of adjacent land uses that conflict with the planned use of the property, if any.	18-2.021	p. 21
9	A statement of the purpose for which the lands were acquired, the projected use or uses as defined in 253.034 and the statutory authority for such use or uses.	259.032(10)	p. 6-7
10	Proximity of property to other significant State, local or federal land or water resources.	18-2.021	p. 20

Section B: Use Items

Item #	Requirement	Statute/Rule	Page Numbers and/or Appendix
11	The designated single use or multiple use management for the property, including use by other managing entities.	18-2.018 & 18-2.021	p. 6
12	A description of past and existing uses, including any unauthorized uses of the property.	18-2.018 & 18-2.021	p. 12-15, 36, 82-89
13	A description of alternative or multiple uses of the property considered by the lessee and a statement detailing why such uses were not adopted.	18-2.018	N/A
14	A description of the management responsibilities of each entity involved in the property's management and how such responsibilities will be coordinated.	18-2.018	p. 6-11, 64-89
15	Include a provision that requires that the managing agency consult with the Division of Historical Resources, Department of State before taking actions that may adversely affect archeological or historical resources.	18-2.021	p. 72, 73, App. E.2
16	Analysis/description of other managing agencies and private land managers, if any, which could facilitate the restoration or management of the land.	18-2.021	p. 39-43
17	A determination of the public uses and public access that would be consistent with the purposes for which the lands were acquired.	259.032(10)	p. 82-89
18	A finding regarding whether each planned use complies with the 1981 State Lands Management Plan, particularly whether such uses represent "balanced public utilization," specific agency statutory authority and any other legislative or executive directives that constrain the use of such property.	18-2.021	p. 6-11
19	Letter of compliance from the local government stating that the LMP is in compliance with the Local Government Comprehensive Plan.	BOT requirement	App. E.3
20	An assessment of the impact of planned uses on the renewable and non-renewable resources of the property, including soil and water resources, and a detailed description of the specific actions that will be taken to protect, enhance and conserve these resources and to compensate/mitigate damage caused by such uses, including a description of how the manager plans to control and prevent soil erosion and soil or water contamination.	18-2.018 & 18-2.021	p. 18-27, 64-89

21	*For managed areas larger than 1,000 acres, an analysis of the multiple-use potential of the property which shall include the potential of the property to generate revenues to enhance the management of the property provided that no lease, easement, or license for such revenue-generating use shall be entered into if the granting of such lease, easement or license would adversely affect the tax exemption of the interest on any revenue bonds issued to fund the acquisition of the affected lands from gross income for federal income tax purposes, pursuant to Internal Revenue Service regulations.	18-2.021 & 253.036	N/A
22	If the lead managing agency determines that timber resource management is not in conflict with the primary management objectives of the managed area, a component or section, prepared by a qualified professional forester, that assesses the feasibility of managing timber resources pursuant to section 253.036, F.S.	18-021	N/A
23	A statement regarding incompatible use in reference to Ch. 253.034(10).	253.034(10)	p. 82-89

* The following taken from 253.034(10) is not a land management plan requirement; however, it should be considered when developing a land management plan: The following additional uses of conservation lands acquired pursuant to the Florida Forever program and other state-funded conservation land purchase programs shall be authorized, upon a finding by the Board of Trustees, if they meet the criteria specified in paragraphs (a)-(e): water resource development projects, water supply development projects, storm-water management projects, linear facilities and sustainable agriculture and forestry. Such additional uses are authorized where: (a) Not inconsistent with the management plan for such lands; (b) Compatible with the natural ecosystem and resource values of such lands; (c) The proposed use is appropriately located on such lands and where due consideration is given to the use of other available lands; (d) The using entity reasonably compensates the titleholder for such use based upon an appropriate measure of value; and (e) The use is consistent with the public interest.

Section C: Public Involvement Items

Item #	Requirement	Statute/Rule	Page Numbers and/or Appendix
24	A statement concerning the extent of public involvement and local government participation in the development of the plan, if any.	18-2.021	App. C
25	The management prospectus required pursuant to paragraph (9)(d) shall be available to the public for a period of 30 days prior to the public hearing.	259.032(10)	N/A
26	LMPs and LMP updates for parcels over 160 acres shall be developed with input from an advisory group who must conduct at least one public hearing within the county in which the parcel or project is located. <i>Include the advisory group members and their affiliations, as well as the date and location of the advisory group meeting.</i>	259.032(10)	App. C.1
27	Summary of comments and concerns expressed by the advisory group for parcels over 160 acres	18-2.021	App. C.1.3

28	During plan development, at least one public hearing shall be held in each affected county. Notice of such public hearing shall be posted on the parcel or project designated for management, advertised in a paper of general circulation, and announced at a scheduled meeting of the local governing body before the actual public hearing. <i>Include a copy of each County's advertisements and announcements (meeting minutes will suffice to indicate an announcement) in the management plan.</i>	253.034(5) & 259.032(10)	App. C.2
29	The manager shall consider the findings and recommendations of the land management review team in finalizing the required 10-year update of its management plan. <i>Include manager's replies to the team's findings and recommendations.</i>	259.036	N/A
30	Summary of comments and concerns expressed by the management review team, if required by Section 259.036, F.S.	18-2.021	N/A
31	If manager is not in agreement with the management review team's findings and recommendations in finalizing the required 10-year update of its management plan, the managing agency should explain why they disagree with the findings or recommendations.	259.036	N/A

Section D: Natural Resources

Item #	Requirement	Statute/Rule	Page Numbers and/or Appendix
32	Location and description of known and reasonably identifiable renewable and non-renewable resources of the property regarding soil types. <i>Use brief descriptions and include USDA maps when available.</i>	18-2.021	p. 23-25
33	Insert FNAI based natural community maps when available.	ARC consensus	p. 30
34	Location and description of known and reasonably identifiable renewable and non-renewable resources of the property regarding outstanding native landscapes containing relatively unaltered flora, fauna and geological conditions.	18-2.021	Ex. Sum
35	Location and description of known and reasonably identifiable renewable and non-renewable resources of the property regarding unique natural features and/or resources including but not limited to virgin timber stands, scenic vistas, natural rivers and streams, coral reefs, natural springs, caverns and large sinkholes.	18-2.018 & 18-2.021	p. 28-34, 37-39
36	Location and description of known and reasonably identifiable renewable and non-renewable resources of the property regarding beaches and dunes.	18-2.021	p. 18-23
37	Location and description of known and reasonably identifiable renewable and non-renewable	18-2.018 & 18-2.021	p. 23

	resources of the property regarding mineral resources, such as oil, gas and phosphate, etc.		
38	Location and description of known and reasonably identifiable renewable and non-renewable resources of the property regarding fish and wildlife, both game and non-game, and their habitat.	18-2.018 & 18-2.021	p. 28-35, App. B.3.1
39	Location and description of known and reasonably identifiable renewable and non-renewable resources of the property regarding State and Federally listed endangered or threatened species and their habitat.	18-2.021	p. 28-35, App. B.3.2
40	The identification or resources on the property that are listed in the Natural Areas Inventory. <i>Include letter from FNAI or consultant where appropriate.</i>	18-2.021	p. 28-34
41	Specific description of how the managing agency plans to identify, locate, protect and preserve or otherwise use fragile, nonrenewable natural and cultural resources.	259.032(10)	p. 28-36, 71-78, App. E.2
42	Habitat Restoration and Improvement	259.032(10) & 253.034(5)	
42-A.	Describe management needs, problems and a desired outcome and the key management activities necessary to achieve the enhancement, protection and preservation of restored habitats and enhance the natural, historical and archeological resources and their values for which the lands were acquired.	259.032(10) & 253.034(5)	p. 28-36, 71-78
42-B.	Provide a detailed description of both short (2-year planning period) and long-term (10-year planning period) management goals, and a priority schedule based on the purposes for which the lands were acquired and include a timeline for completion.	259.032(10) & 253.034(5)	App. D.1
42-C.	The associated measurable objectives to achieve the goals.	259.032(10) & 253.034(5)	p. 76-78, App. D.1
42-D.	The related activities that are to be performed to meet the land management objectives and their associated measures. <i>Include fire management plans - they can be in plan body or an appendix.</i>	259.032(10) & 253.034(5)	p. 76-78, App. D.1
42-E.	A detailed expense and manpower budget in order to provide a management tool that facilitates development of performance measures, including recommendations for cost-effective methods of accomplishing those activities.	259.032(10) & 253.034(5)	App. D.1
43	***Quantitative data description of the land regarding an inventory of forest and other natural resources and associated acreage. <i>See footnote.</i>	253.034(5)	Ex. Sum
44	Sustainable Forest Management, including implementation of prescribed fire management	18-2.021, 253.034(5) & 259.032(10)	
44-A.	Management needs, problems and a desired outcome (see requirement for # 42-A).	18-2.021, 253.034(5) & 259.032(10)	App. B.6

44-B.	Detailed description of both short and long-term management goals (see requirement for # 42-B).	18-2.021, 253.034(5) & 259.032(10)	p. 110; App. B.6
44-C.	Measurable objectives (see requirement for #42-C).	18-2.021, 253.034(5) & 259.032(10)	p. 110
44-D.	Related activities (see requirement for #42-D).	18-2.021, 253.034(5) & 259.032(10)	N/A
44-E.	Budgets (see requirement for #42-E).	18-2.021, 253.034(5) & 259.032(10)	App. D.1
45	Imperiled species, habitat maintenance, enhancement, restoration or population restoration	259.032(10) & 253.034(5)	
45-A.	Management needs, problems and a desired outcome (see requirement for # 42-A).	259.032(10) & 253.034(5)	p. 34-35, 67-78, 81-89
45-B.	Detailed description of both short and long-term management goals (see requirement for # 42-B).	259.032(10) & 253.034(5)	p. 75-78, 81-89, App. D.1
45-C.	Measurable objectives (see requirement for #42-C).	259.032(10) & 253.034(5)	p. 75-78, 81-89, App. D.1
45-D.	Related activities (see requirement for #42-D).	259.032(10) & 253.034(5)	p. 75-78, 81-89, App. D.1, App. D.4
45-E.	Budgets (see requirement for #42-E).	259.032(10) & 253.034(5)	App. D.1
46	***Quantitative data description of the land regarding an inventory of exotic and invasive plants and associated acreage. <i>See footnote.</i>	253.034(5)	App. B.3.3
47	Place the Arthropod Control Plan in an appendix. If one does not exist, provide a statement as to what arrangement exists between the local mosquito control district and the management unit.	BOT requirement via lease language	App. B.4
48	Exotic and invasive species maintenance and control	259.032(10) & 253.034(5)	
48-A.	Management needs, problems and a desired outcome (see requirement for # 42-A).	259.032(10) & 253.034(5)	p. 35-36, 75, 82, App. D.1
48-B.	Detailed description of both short and long-term management goals (see requirement for # 42-B).	259.032(10) & 253.034(5)	p. 75, 82, App. D.1
48-C.	Measurable objectives (see requirement for #42-C).	259.032(10) & 253.034(5)	p. 75, 82, App. D.1
48-D.	Related activities (see requirement for #42-D).	259.032(10) & 253.034(5)	p. 75, 82, App. D.1
48-E.	Budgets (see requirement for #42-E).	259.032(10) & 253.034(5)	App. D.1

Section E: Water Resources

Item #	Requirement	Statute/Rule	Page Numbers and/or Appendix
49	A statement as to whether the property is within and/or adjacent to an aquatic preserve or a designated area of critical state concern or an area under study for such designation. <i>If yes, provide a list of the appropriate managing agencies that have been notified of the proposed plan.</i>	18-2.018 & 18-2.021	p. 1-4
50	Location and description of known and reasonably identifiable renewable and non-renewable resources of the property regarding water resources, including water classification for each water body and the identification of any such water body that is designated as an Outstanding Florida Water under Rule 62-302.700, F.A.C.	18-2.021	Ex. Sum, p. 1-4, 27
51	Location and description of known and reasonably identifiable renewable and non-renewable resources of the property regarding swamps, marshes and other wetlands.	18-2.021	p. 29-31
52	***Quantitative description of the land regarding an inventory of hydrological features and associated acreage. <i>See footnote.</i>	253.034(5)	Ex. Sum, p.32
53	Hydrological Preservation and Restoration	259.032(10) & 253.034(5)	
53-A.	Management needs, problems and a desired outcome (see requirement for # 42-A).	259.032(10) & 253.034(5)	p. 64-89, App. D.1
53-B.	Detailed description of both short and long-term management goals (see requirement for # 42-B).	259.032(10) & 253.034(5)	p. 64-89, App. D.1
53-C.	Measurable objectives (see requirement for #42-C).	259.032(10) & 253.034(5)	p. 64-89, App. D.1
53-D.	Related activities (see requirement for #42-D).	259.032(10) & 253.034(5)	p. 64-89, App. D.1, App. D.4
53-E.	Budgets (see requirement for #42-E).	259.032(10) & 253.034(5)	App. D.1

Section F: Historical, Archaeological and Cultural Resources

Item #	Requirement	Statute/Rule	Page Numbers and/or Appendix
54	**Location and description of known and reasonably identifiable renewable and non-renewable resources of the property regarding archeological and historical resources. <i>Include maps of all cultural resources except Native American sites, unless such sites are major points of interest that are open to public visitation.</i>	18-2.018, 18-2.021 & per DHR's request	Ex. Sum, p. 36, App. B.5
55	***Quantitative data description of the land regarding an inventory of significant land, cultural or historical features and associated acreage.	253.034(5)	Ex. Sum, p. 36, App. B.5
56	A description of actions the agency plans to take to locate and identify unknown resources such as surveys of unknown archeological and historical resources.	18-2.021	p. 78, App. D.1, App. E.2

57	Cultural and Historical Resources	259.032(10) & 253.034(5)	
57-A.	Management needs, problems and a desired outcome (see requirement for # 42-A).	259.032(10) & 253.034(5)	p. 78, App. D.1, App. E.2
57-B.	Detailed description of both short and long-term management goals (see requirement for # 42-B).	259.032(10) & 253.034(5)	p. 78, App. D.1, App. E.2
57-C.	Measurable objectives (see requirement for #42-C).	259.032(10) & 253.034(5)	p. 78, App. D.1, App. E.2
57-D.	Related activities (see requirement for #42-D).	259.032(10) & 253.034(5)	p. 78, App. D.1, App. E.2
57-E.	Budgets (see requirement for #42-E).	259.032(10) & 253.034(5)	App. D.1

** While maps of Native American sites should not be included in the body of the management plan, the DSL urges each managing agency to provide such information to the Division of Historical Resources for inclusion in their proprietary database. This information should be available for access to new managers to assist them in developing, implementing and coordinating their management activities.

Section G: Facilities (Infrastructure, Access, Recreation)

Item #	Requirement	Statute/Rule	Page Numbers and/or Appendix
58	***Quantitative data description of the land regarding an inventory of infrastructure and associated acreage. <i>See footnote.</i>	253.034(5)	p. 92-93
59	Capital Facilities and Infrastructure	259.032(10) & 253.034(5)	
59-A.	Management needs, problems and a desired outcome (see requirement for # 42-A).	259.032(10) & 253.034(5)	p. 92-93, App. D.1
59-B.	Detailed description of both short and long-term management goals (see requirement for # 42-B).	259.032(10) & 253.034(5)	App. D.1
59-C.	Measurable objectives (see requirement for #42-C).	259.032(10) & 253.034(5)	App. D.1
59-D.	Related activities (see requirement for #42-D).	259.032(10) & 253.034(5)	App. D.1
59-E.	Budgets (see requirement for #42-E).	259.032(10) & 253.034(5)	App. D.1
60	*** Quantitative data description of the land regarding an inventory of recreational facilities and associated acreage.	253.034(5)	p. 39-43, 82-89
61	Public Access and Recreational Opportunities	259.032(10) & 253.034(5)	
61-A.	Management needs, problems and a desired outcome (see requirement for # 42-A).	259.032(10) & 253.034(5)	p. 86-89, App. D.1
61-B.	Detailed description of both short and long-term management goals (see requirement for # 42-B).	259.032(10) & 253.034(5)	p. 86-89, App. D.1
61-C.	Measurable objectives (see requirement for #42-C).	259.032(10) & 253.034(5)	p. 86-89, App. D.1
61-D.	Related activities (see requirement for #42-D).	259.032(10) & 253.034(5)	p. 86-89, App. D.1, D.4
61-E.	Budgets (see requirement for #42-E).	259.032(10) & 253.034(5)	App. D.1

Section H: Other/ Managing Agency Tools

Item #	Requirement	Statute/Rule	Page Numbers and/or Appendix
62	Place this LMP Compliance Checklist at the front of the plan.	ARC and managing agency consensus	Front & App. E.1
63	Place the Executive Summary at the front of the LMP. Include a physical description of the land.	ARC and 253.034(5)	Ex. Sum
64	If this LMP is a 10-year update, note the accomplishments since the drafting of the last LMP set forth in an organized (categories or bullets) format.	ARC consensus	App. D.3
65	Key management activities necessary to achieve the desired outcomes regarding other appropriate resource management.	259.032(10)	p.64-89
66	Summary budget for the scheduled land management activities of the LMP including any potential fees anticipated from public or private entities for projects to offset adverse impacts to imperiled species or such habitat, which fees shall be used to restore, manage, enhance, repopulate, or acquire imperiled species habitat for lands that have or are anticipated to have imperiled species or such habitat onsite. The summary budget shall be prepared in such a manner that it facilitates computing an aggregate of land management costs for all state-managed lands using the categories described in s. 259.037(3) which are resource management, administration, support, capital improvements, recreation visitor services, law enforcement activities.	253.034(5)	App. D.1
67	Cost estimate for conducting other management activities which would enhance the natural resource value or public recreation value for which the lands were acquired, include recommendations for cost-effective methods in accomplishing those activities.	259.032(10)	App. D.1
68	A statement of gross income generated, net income and expenses.	18-2.018	N/A

*** The referenced inventories shall be of such detail that objective measures and benchmarks can be established for each tract of land and monitored during the lifetime of the plan. All quantitative data collected shall be aggregated, standardized, collected, and presented in an electronic format to allow for uniform management reporting and analysis. The information collected by the DEP pursuant to s. 253.0325(2) shall be available to the land manager and his or her assignee.

E.2 / Letter of Compliance of the Management Plan with the Local Government Comprehensive Plan

(The new letter of compliance will be added when this management plan is finalized.)

E.3 / Management Prospectus

No prospectus was required or prepared when Rookery Bay National Estuarine Research Reserve was purchased.

E.4 / Management Procedures for Archaeological and Historical Sites and Properties on State-Owned or Controlled Lands

(Revised June 2021)

These procedures apply to state agencies, local governments, and non-profits that manage state-owned properties.

A. Historic Property Definition

Historic properties include archaeological sites and historic structures as well as other types of resources. Chapter 267, Florida Statutes states: “ ‘Historic property’ or ‘historic resource’ means any prehistoric district, site, building, object, or other real or personal property of historical, architectural, or archaeological value, and folklife resources. These properties or resources may include, but are not limited to, monuments, memorials, Indian habitations, ceremonial sites, abandoned settlements, sunken or abandoned ships, engineering works, treasure trove, artifacts, or other objects with intrinsic historical or archaeological value, or any part thereof, relating to the history, government, and culture of the state.”

B. Agency Responsibilities

Per Chapter 267, F.S. and state policy related to historic properties, state agencies of the executive branch must provide the Division of Historical Resources (Division) the opportunity to comment on any undertakings with the potential to affect historic properties that are listed, or eligible for listing, in the National Register of Historic Places, whether these undertakings directly involve the state agency, i.e., land management responsibilities, or the state agency has indirect jurisdiction, i.e. permitting authority, grants, etc. No state funds should be expended on the undertaking until the Division has the opportunity to review and comment on the undertaking. (267.061(2)(a)).

State agencies must consult with the Division when, as a result of state action or assistance, a historic property will be demolished or substantially altered in a way that will adversely affect the property. State agencies must take timely steps to consider feasible and prudent alternatives to the adverse effect. If no feasible or prudent alternatives exist, the state agency must take timely steps to avoid or mitigate the adverse effect. (267.061(2)(b)).

State agencies must consult with Division to establish a program to locate, inventory and evaluate all historic properties under ownership or controlled by the agency. (267.061(2)(c)).

State agencies are responsible for preserving historic properties under their control. State agencies are directed to use historic properties available to the agency when that use is consistent with the historic property and the agency’s mission. State agencies are also directed to pursue preservation of historic properties to support their continued use. (267.061(2)(d)).

C. Statutory Authority

The full text of Chapter 267, F.S. and additional information related to the treatment of historic properties is available at:

<https://dos.myflorida.com/historical/preservation/compliance-and-review/regulations-guidelines/>

D. Management Implementation

Although the Division sits on the Acquisition and Restoration Council and approves land management plans, these plans are conceptual and do not include detailed project information. Specific information for individual projects must be submitted to the Division for review and comment.

Managers of state lands must coordinate any land clearing or ground disturbing activities with the Division to allow for review and comment on the proposed project. The Division's recommendations may include, but are not limited to: approval of the project as submitted, recommendation for a cultural resource assessment survey by a qualified professional archaeologist, and modifications to the proposed project to avoid or mitigate potential adverse effects.

Projects such as additions or alterations to historic structures as well as new construction must also be submitted to the Division for review. Projects involving structures fifty years of age or older must be submitted to the Division for a significance determination. In rare cases, structures under fifty years of age may be deemed historically significant.

Adverse effects to historic properties must be avoided when possible, and if avoidance is not possible, additional consultation with the Division is necessary to develop a mitigation plan. Furthermore, managers of state property should make preparations for locating and evaluating historic properties, both archaeological sites and historic structures.

E. Archaeological Resource Management (ARM) Training

The ARM Training Course introduces state land managers to the nature of archaeological resources, Florida archaeology, and the role of the Division in managing state-owned archaeological resources. Participants gain a better understanding of the requirements of state and federal laws with regard to protecting and managing archaeological sites on state managed lands. Participants also receive a certificate recognizing their ability to conduct limited monitoring activities in accordance with the Division's Review Procedure, thereby reducing the time and money spent to comply with state regulations.

Additional information regarding the ARM Training Course is available at:
<https://dos.myflorida.com/historical/archaeology/education/arm-training-courses/>

F. Matric for Ground Disturbance on State Lands

The matrix is a tool designed to help streamline the Division's Review Procedure. The matrix allows state land managers to make decisions about balancing ground disturbance and stewardship of historic resources. The matrix establishes types of undertakings that are either minor or major disturbances and then guides the land manager to consult the Division, conduct ARM-trained project monitoring, or proceed with the project.

Additional information regarding the matrix is available at:
<https://dos.myflorida.com/historical/archaeology/education/dhr-matrix-for-ground-disturbance-on-state-lands/>

G. Human Remains Treatment

Chapter 872, Florida Statutes makes it illegal to willfully and knowingly disturb human remains. In

the event human remains are discovered, cease all activity in the area that may disturb the remains. Leave the bones and nearby items in place. Immediately notify law enforcement or the local district medical examiner of the discovery and follow the provisions of Chapter 872, FS.

Additional information regarding the treatment of human remains and cemeteries is available at:
<https://dos.myflorida.com/historical/archaeology/human-remains/>
<https://dos.myflorida.com/historical/archaeology/human-remains/abandoned-cemeteries/what-are-the-applicable-laws-and-regulations/>

H. Division of Historical Resources Review Procedure

Projects on state owned or controlled properties may submit projects to the Division for review using the streamlined State Lands Consultation Form. The form provides instructions to submit projects for review and outlines the necessary information for the Division to complete the review process. The State Lands Consultation Form and additional information about the Division's review process is available at:

<https://dos.myflorida.com/historical/preservation/compliance-and-review/state-lands-review/>

Questions relating to the treatment of archaeological and historic resources on state lands should be directed to:

Compliance and Review Section

Bureau of Historic Preservation Division of Historical Resources

R. A. Gray Building

500 South Bronough Street

Tallahassee, FL 32399-0250

StateLandsCompliance@dos.myflorida.com

Phone: (850) 245-6333

Toll Free: (800) 847-7278

Fax: (850) 245-6435

E.5 / Analysis of Contracting Potential

The following restoration and management activities have been considered for outsourcing to private entities. In general, most day-to-day operations on Rookery Bay Reserve can be handled more efficiently and at a lesser cost with Florida Department of Environmental Protection (DEP) staff. Projects requiring excavation and engineering must be outsourced. The table below contains potentially outsourced activities with categories as follows: "approved" designates items that Florida DEP does not have expertise to complete and/or those that can be done at less cost with equivalent results by outside sources; "conditional" designates items that can be done by Florida DEP or outside sources for equivalent cost and results; "rejected" designates items that can be done with Florida DEP expertise and/or at less cost than outside sources.

The table below summarizes the potential contracting for activities at Rookery Bay Reserve.

Activity	Approved	Conditional	Rejected
Mowing and landscape maintenance	Yes		
Cleaning and janitorial services	Yes		
Interpretive boat, kayak, hiking tours		Yes	
Translation services for bilingual education materials	Yes		
Aquarium and life support system maintenance for live exhibits	Yes		
Nuisance animal control			
Coastal Vulnerability Assessment	Yes		
Border Security: Installation of fences, signage, and gates	Yes		
Visitor-use enhancements: facilities, fencing, boardwalks, roads, gates, and signage	Yes		
Cultural resource surveying, mapping, assessment, and excavation		Yes	
Eradication and control of invasive/exotic species		Yes	
Survey and installation of sentinel site infrastructure	Yes		
Economic valuation study for ecological services of the Reserve	Yes		
Visitor use study		Yes	
Environmental restoration projects		Yes	
Watershed hydrologic modeling and needs assessment	Yes		

E.6 / Land Management Review Team Recommendations

Land management review teams were established by Section 259.036, Florida Statutes, to evaluate management of conservation, preservation, and recreation lands titled in the name of the Board of Trustees of the Internal Improvement Trust Fund. The teams determine whether the lands are being managed for the purposes for which they were acquired and in accordance with a land management plan adopted pursuant to Section 259.032, Florida Statutes, by the Board of Trustees of the Internal Improvement Trust Fund, acting through Florida DEP. The managing agency is to consider the findings and recommendations of the land management review team in finalizing the required 10-year update of its management plan.

2019 Land Management Review Team Report for Rookery Bay National Estuarine Research Reserve

Table of Contents

1. Introduction	16
1.1. Property Reviewed in this Report	17
1.2 Property Map	18
1.3. Overview of Land Management Review Results	18
1.3.1 Consensus Commendations for the Managing Agency	19
1.3.2. Consensus Recommendations to the Managing Agency	20
2. Field Review Details	21
2.1 Field Review Checklist Findings	21
2.2. Items Requiring Improvement Actions in the Field	25
2.3. Field Review Checklist and Scores	26
3. Land Management Plan Review Details	26
3.1 Items Requiring Improvements in the Management Plan	29
3.2 Management Plan Review Checklist and Scores	29
Appendix A: Scoring System Detail	33

1. Introduction

Section 259.036, F.S. requires a periodic on-site review of conservation and recreation lands titled in the name of the Board of Trustees to determine (1) whether the lands are being managed for the purposes for which they were acquired and (2) whether they are being managed in accordance with their land management plan adopted pursuant to Section 259.032, F.S. In cases where the managed areas exceed 1,000 acres in size, such a review must be scheduled at least every five years. In conducting this review, a statutorily constructed review team “shall evaluate the extent to which the existing management plan provides sufficient protection to threatened or endangered species, unique or important natural or physical features, geological or hydrological functions or archaeological features. The review shall also evaluate the extent to which the land is being managed for the purposes for which it was acquired and the degree to which actual management practices, including public access, are in compliance with the adopted management plan.”

The land management review teams are coordinated by the Division of State Lands and consist of representatives from the Florida Division of Recreation and Parks (DRP), the Florida Forest Service (DACS), the Florida Fish and Wildlife Conservation Commission, the local government in which the property is located, the Florida DEP District in which the parcel is located, the local soil and water conservation district or jurisdictional water management district, a conservation organization member, and a local private land manager.

Each Land Management Review Report is divided into three sections. Section 1 provides the details of the property being reviewed as well as the overall results of the report. Section 2 provides details of the Field Review, in which the Review Team inspects the results of management actions on the site. Section 3 provides details of the Land Management Plan Review, in which the team determines the extent to which the Management Plan provides for and documents adequate natural and recreational resource protection.

Finally, each report may also contain an Appendix that lists individual team member comments. This is a compilation of feedback, concerns or other thoughts raised by individual team members, but not necessarily indicative of the final consensus reached by the Land Management Review Team.

1.1. Property Reviewed in this Report

Name of Site: Rookery Bay National Estuarine Research Reserve

Managed by: Florida Department of Environmental Protection, Office of Resilience and Coastal Protection

Acres: 37,876

County: Collier

Purpose(s) for Acquisition: to protect and restore the natural and cultural values of the property and provide the greatest benefit to the citizens of the state.

Acquisition Program(s): EEL/CARL/Donation

Original Acquisition Date: 1977

Area Reviewed: Entire Property

Last Management Plan Approval Date: 2/16/2012

Review Date: 1/25/19

Agency Manager and Key Staff Present:

- Jeff Carter, Manager
- Keith Laakkonen, Reserve Manager
- Jill Schmid
- Steven Bertone
- Greg Curry
- Jared Franklin
- Sarah Norris

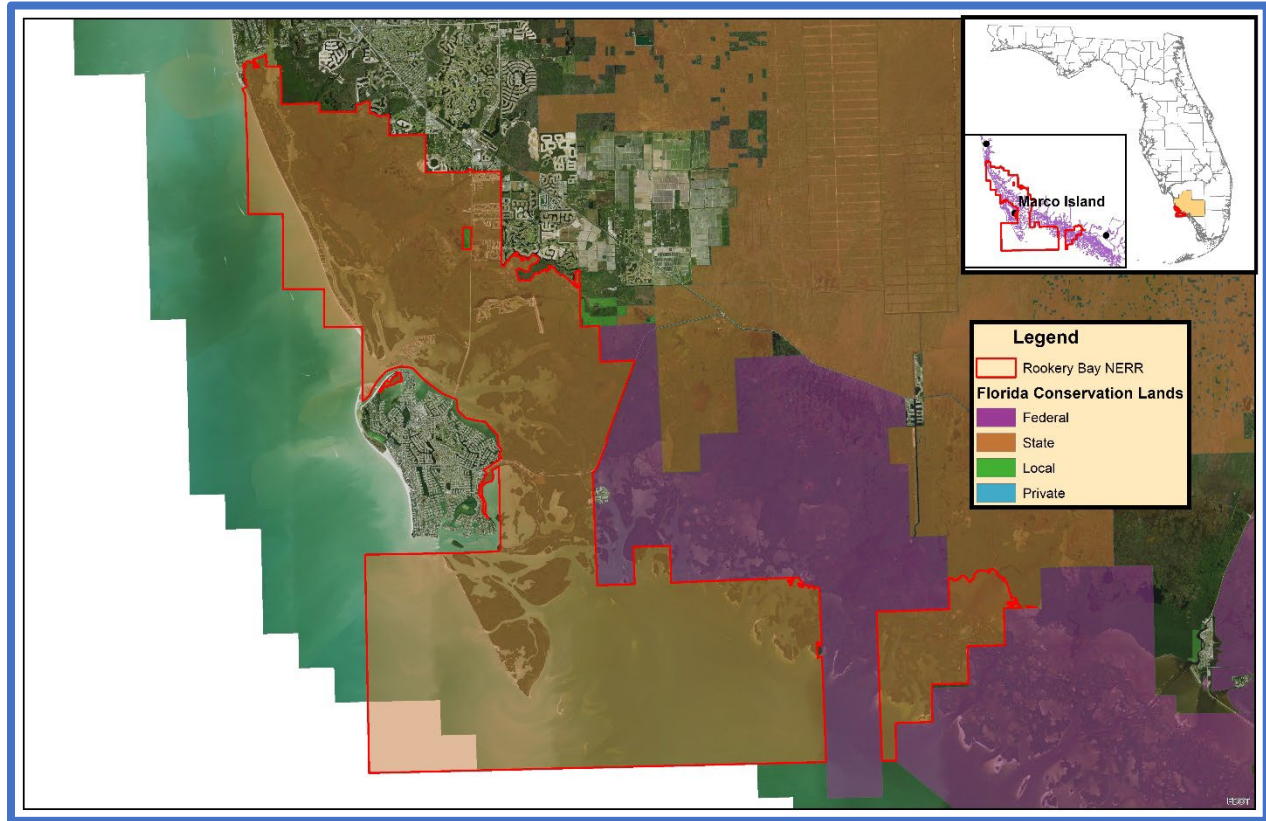
Review Team Members Present (voting)

- Matthew Hodge, Florida DRP District
- Local Gov't., None
- Dan Mitchell, FWC
- Qiara Perez, Florida DEP District
- Clark Ryals, FFS
- Joe Bozzo, SFWMD
- Kara Driscoll, Cons. Organization
- Vanessa Booher, Private Land Manager

Other Non-Team Members Present (attending)

- Keith Singleton, Florida DEP/DSL
- Earl Pearson, Florida DEP/FCO

1.2 Property Map



1.3. Overview of Land Management Review Results

Is the property managed for purposes that are compatible with conservation, preservation, or recreation?

Yes = 7, No = 0

Yes = 7, No = 0

Table 1 shows the average scores received for each applicable category of review. *Field Review* scores refer to the adequacy of management actions in the field, while *Management Plan Review* scores refer to adequacy of discussion of these topics in the management plan. Scores range from 1 to 5 with 5 signifying excellence. For a more detailed key to the scores, please see *Appendix A*.

Table 1: Results at a glance.

Major Land Management Categories		Field Review	Management Plan Review
Natural Communities / Forest Management		3.91	4.09
Prescribed Fire / Habitat Restoration		4.52	4.31
Hydrology		4.48	4.02
Imperiled Species		4.53	3.90
Exotic / Invasive Species		4.07	3.96
Cultural Resources		4.93	4.50
Public Access / Education / Law Enforcement		4.20	3.90
Infrastructure / Equipment / Staffing		3.86	N/A

Color Code (See Appendix A for detail)

Excellent	Above Average	Below Average	Poor
-----------	---------------	---------------	------

1.3.1 Consensus Commendations for the Managing Agency

The following commendations resulted from discussion and vote of the review team members:

1. The team commends the staff for tirelessly seeking additional funding opportunities to further the conservation, restoration and mission of Rookery Bay NERR. (7+, 0-)
 - **Managing Agency Response:** Today's fiscal demands require that Rookery Bay Reserve continue to remain diligent and successful at identifying funding sources that are a perfect match for a variety of different funding needs. Being proficient at identifying the right funding sources is crucial to our past and continued successes. Rookery Bay Reserve's staff have a keen insight into the specific needs that we have in order to do the best job possible with limited direct annual funding sources. Staff will continue to seek out and acquire available outside funds to support our priority land management needs here at the Reserve.
2. The team commends the staff for their dedicated prescribed fire program despite challenges such as nearby residential areas, smoke-sensitive roads/powerlines, and limited resources. (7+, 0-)
 - **Managing Agency Response:** Most of the Rookery Bay Reserve's fire dependent lands happen to be located in the northern half of the Reserve where we also have our most intense interfaces with urban developed lands. This tight and close urban interface demands that we establish and maintain close partnerships with the developers, owners, and managing entities of these urban areas. Additionally, our excellent education and outreach staff and tools, as well as, our communications sector empowers us with a strong ability to educate our neighbors about the importance of having a robust and active prescribed fire program here at Rookery Bay Reserve. Our fire program keeps the natural resources that we manage healthy and the urban interfaces safe from unnecessary and dangerous wildfires. Additionally, our burn boss and burn team have built and continue to maintain great partnerships with to share resources with a broad array of local state, federal agencies and county/city municipalities. Also, close partnerships with the local electric power utilities staff (FPL, LCEC), and all the local law enforcement entities are actively maintained. All these strong partnerships help us maintain a top-notch prescribed fire program that is safe and effective.
3. The team commends the staff for continued efforts to enrich the park's resources by fostering community outreach/relationships. (7+, 0-)
 - **Managing Agency Response:** Again, Rookery Bay Reserve's well educated and knowledgeable education staff, coastal Training staff, and communications staff empower the Rookery Bay Reserve to be extremely effective at doing well-targeted successful education and outreach with all our local communities, decision-makers, and elected officials....these abilities are crucial to doing successful land management of the public's lands for which we are responsible.

4. The team commends the Rookery Bay Reserve for their knowledge and consideration of the recommendations set forth in the reports of cultural resource surveys conducted on Reserve lands. (7+, 0-)

- **Managing Agency Response:** Cultural resource management here at the Reserve is a passion of ours. As with all management activities here at the Rookery Bay Reserve, science-to-management is key. Comprehensive identification of cultural resources, good monitoring and targeted assessments are very important. It is also important that we use the information and data gathered from all these activities to empower staff to carry out effective management and protection of the public cultural resources that we manage.

1.3.2. Consensus Recommendations to the Managing Agency

The following recommendations resulted from a discussion and vote of review team members. The next management plan update should include information about how these recommendations have been addressed:

5. The team recommends that the Florida thatch palm (*Thrinax radiata*) management be added to the upcoming revision of the unit management plan. (7+, 0-)

Managing Agency Response: *Rookery Bay Reserve staff are very thankful the Division of State Lands for the knowledgeable and insightful recommendations that we have received this year from an extremely experienced Land Management Review team. All the recommendations including Thrinax radiata management are being added into our new management plan that we are currently working on.*

6. The team recommends that the FCO update and amend the management plan's list of state and federally listed plants to include locally rare species and species listed as critically imperiled, imperiled, or rare by the Florida Natural Areas Inventory, and the Institute for Regional Conservation, if it is not already added to the upcoming management plan revision. (7+, 0-)

Managing Agency Response: *Rookery Bay Reserve staff are presently updating our T & E plant species list to include locally rare species and species listed as critically imperiled, imperiled, or rare by the Florida Natural Areas Inventory, and the Institute for Regional Conservation.*

7. The team recommends ongoing monitoring and seed collection of Tillandsia species affected by the bromeliad weevil (especially giant air plant and the fuzzy wuzzy). (7+, 0-)

Managing Agency Response: *As recommended Rookery Bay Reserve staff will continue to maintain ongoing monitoring and seed collection of Tillandsia species affected by the bromeliad weevil (esp. giant air plant and the fuzzy wuzzy). Our active partnership with the local Naples Botanical Garden will also continue to be strengthened and built upon.*

8. The team recommends ongoing monitoring and seed collection of *Persea* species affected by the laurel wilt (esp. individual plants that appear to be resistant to the fungus). (7+, 0-)

Managing Agency Response: *As recommended Rookery Bay Reserve staff will continue to maintain ongoing monitoring and seed collection of Persea species affected by the laurel wilt (esp. individual plants that appear to be resistant to the fungus).*

9. The team recommends ongoing monitoring and targeted management (where necessary) of state or federally listed plant species, and locally rare plants as defined, especially rare plant species within the park identified as being impacted by present or future sea level rise, and rare plant species with very few individuals/local populations. (7+, 0-)

Managing Agency Response: *As recommended Reserve staff will continue to maintain ongoing monitoring and targeted management (where necessary) of state or federally listed plant species, and locally rare plants as defined, especially rare plant species within the Reserve identified as being impacted by present or future sea level rise, and rare plant species with very few individuals/local populations.*

2. Field Review Details

2.1 Field Review Checklist Findings

The following items received high scores on the review team checklist, which indicates that management actions exceeded expectations.

1. **Natural communities, specifically mesic flatwoods/wet flatwoods, coastal strand, coastal xeric scrub/scrubby flatwoods, mesic hammock, open water, mangrove swamp, dome/strand swamp, seagrass, and beach/interdunal swale.**
 - **Managing Agency Response:** All these natural communities, especially those areas located on our outer islands, have been and will continue to be areas of focus as they can be logistically challenging habitats to manage. We will continue to apply all the most up-to-date and technologically advanced management tools and techniques available to maintain these communities in a top-notch management state.
2. **Listed species, animals in general, and specifically manatee, sea turtle, shorebirds, and crocodile.**
 - **Managing Agency Response:** Intense resource focus regarding all T & E species and especially those mentioned by name here will always be a priority to the Reserve's staff and management.
3. **Natural resource survey/monitoring resources, specifically listed species or their habitat monitoring, fire effects monitoring, and invasive species survey/monitoring.**
 - **Managing Agency Response:** The Reserve is extremely lucky to have some of the best GIS trained staff in all Florida DEP. Additionally we will soon have two staff that are trained and permitted to operate Drones and related monitoring

technology. Highly trained and knowledgeable staff have been and will continue to empower the Reserve to do a stellar job at the monitoring, data collection, and resource management of our listed species within our managed lands and waters.

4. Cultural resources, specifically cultural resource survey and protection and preservation.

- **Managing Agency Response:** Cultural resources is an often-overlooked part of land management, however, our staff here at the Reserve remain laser-focused on the monitoring, assessment, and protection of all known Cultural resource sites within our boundary. Additionally, we continue to use high tech GIS, Lidar, and spectral imaging mapping techniques to assess known sites, as well as, searching areas for yet to be discovered new sites.

5. Resource management (prescribed fire), specifically area being burned, frequency and quality.

- **Managing Agency Response:** The Reserve has one of the best prescribed fire management programs around. Our fire program is able to exponentially empower our staff and available resources, through the many strong and powerful partnerships that we have built over the past 10 years. Having an extremely knowledgeable and active Burn Boss and burn team allows us to apply that resource here on the Reserve and also share that resource with our various agency and local municipality partners.

6. Restoration, specifically hydrologic restoration.

- **Managing Agency Response:** As with all things, restoration costs money. However, in the case of restoration it costs ALOT of money! Luckily the Reserve staff and management are experienced at successfully competing for grants and other funding sources at a local, state, and national level. Literally millions of dollars have been brought into the Reserve in the past 2 decades to support multiple hydrologic restoration projects. Staff are determined to continue this focus and trend.

7. Forest management, specifically timber inventory/assessment.

- **Managing Agency Response:** In February 2000, the Reserve engaged the Florida Forest Service to complete a Timber Management Assessment for Reserve-managed uplands. Recommendations included an active and targeted prescribed fire program, active efforts to eradicate and control invasive/exotic plant species, completion of a "Timber Stand Description," and targeted thinning. This assessment also determined that "the Reserve is located 300 miles or more from most of the markets for products of a timber harvests.....the cost of hauling the

trees to large mills will keep timber revenues down or make them unmarketable.” The team has met much of what the 2000 Timber Assessment recommended regarding prescribed fire and invasive/exotic plant control actions and a new timber assessment is presently underway and we look forward to addressing any guidance and recommendations that result from the new survey.

8. Non-native, invasive, and problem species, specifically prevention and control of plants and animals.

- **Managing Agency Response:** Reserve staff fight what is probably one of the most invasive species beleaguered managed land areas in all Florida. This is because of being located in a sub-tropical zone where continuous warm temps and little to no freezing temps provide a breeding ground for all manner of invasive/exotic species of flora and fauna. However, our staff have spent millions of dollars in the past 2 decades alone fighting, removing, and eradicating as many invasive species as possible. We are determined to be the best at assessing and applying the latest technology and science available to this problem. We also will continue to apply our well-developed abilities at successfully landing outside funding to apply to this problem. The full scope of this issue, however, begs for greater and continued growing sources of funding to keep the ground we have gained in this fight.

9. Hydrologic/geologic function Hydro alteration, specifically roads/culverts, ditches, hydro-period alteration, water level alteration, and wave erosion.

- **Managing Agency Response:** As with all things, restoration costs money. However, in the case of hydrologic restoration it costs a lot of money! Luckily here at Rookery Bay Reserve we have staff and management that are experienced at successfully competing for grants and other funding sources at a local, state, and national level. Literally millions of dollars have been brought into Rookery Bay Reserve in the past two decades to support multiple hydrologic restoration projects. Staff are determined to continue this focus and trend. At present we are involved in various stages of funding or active restoration for 8 different projects totaling in the tens of millions of dollars.

10. Surface water monitoring, specifically quality and quantity.

- **Managing Agency Response:** As a National Estuarine Research Reserve, the Reserve is very lucky to have been taking part in a nation-wide NERRS water quality monitoring program called SWMP (System Wide Monitoring Program) which is a NOAA NERR System contract required and mandated program that has continued for decades and continues to grow its technological ability to be better and better. Also, the Reserve staff acquired nearly a million in grant funding to contract the creation of a new and extremely accurate hydrologic model for the

Reserve. This model's resolution is higher than both of the two most utilized models in SW Florida.

11. Resource protection, specifically law enforcement presence.

- **Managing Agency Response:** Over the past three decades the Reserve has continually grown and developed a very strong relationship with our local FWC wildlife law enforcement officers and their Captain. At present we have partnered with them to establish their offices on Shell Island Road on Reserve lands. This relationship working along with our volunteer-based Team OCEAN program has given the Reserve the best law enforcement presence ever to exist for us. We are VERY proud of this and very thankful to the dedicated FWC officers that partner so closely with Reserve staff.

12. Adjacent property concerns, land use, specifically expanding development, fresh water allocation, and inholdings/additions.

- **Managing Agency Response:** The land management Stewardship team here at the Reserve works very closely with our research staff and Aquatic Preserve manager (Which is also our land manager) to provide the best and quickest accurate assessment and response to the ever-growing and ever-changing use of and development of both private in-holdings and adjacent lands. GIS and mapping technology will continue to play a huge roll in our assessment and response activities. Drone use and related imaging abilities will also be crucial in the future as development continues.

13. Public access, specifically roads parking, and boat access.

- **Managing Agency Response:** Over the years the Reserve has continued to assess how we can responsibly develop new points of access and use for the public onto Reserve-managed lands and waters. We have a continued strong partnership with the county to continue our responsible growth regarding public use and visitation.

14. Environmental education and outreach, specifically wildlife, invasive species, habitat management activities, interpretive facilities and signs, recreational opportunities, and management of visitor impacts.

- **Managing Agency Response:** The Reserve is lucky to have a very strong educational sector, as well as, a very active and effective Coastal Training Program. Both of these sectors continue to provide one of the most comprehensive and educational marine and estuarine education programs in the state. All of the communication avenues assessed as part of this finding are utilized and implemented with the best and latest educational knowledge and

teaching/outreach tools and techniques available. Also, the Reserve has been key in acquiring the funding for and the development of a statewide effort to contract economic scientists to develop one of the strongest and most scientifically rigorous set of methods and protocols for accurately counting visitation numbers within the Reserve and statewide within all the NERR System and Aquatic Preserves in Florida.

15. Management resources, specifically waste disposal, sanitary facilities, buildings and equipment.

- **Managing Agency Response:** The facilities team here at the Reserve are top notch. As with all departments and sectors here at the Reserve, the facilities team uses the newest technologies available to assess the status of and address and resolve all facilities needs to remain in tip top running order. Of course all facilities continue to be fully permitted and inspected at all levels.

2.2. Items Requiring Improvement Actions in the Field

The following items received low scores on the review team checklist, which indicates that management actions noted during the Field Review were not considered sufficient (less than 3.0 score on average). Please note that overall good scores do not preclude specific recommendations by the review team requiring remediation. **The management plan update should include information on how these items have been addressed:**

1. *The maintenance condition of the Natural Communities, specifically maritime hammock and shell mound, received below average scores. The review team is asked to evaluate, based on their perspective, what percent of the natural community is in maintenance condition. The scores range from 1 to 5, with 1 being 0-20% in maintenance condition, 2 being 21-40%, 3 being 41-60%, 4 being 61-80% and 5 being 81-100%.*

- **Managing Agency Response:** Maritime Hammock and shell-mound communities are some of the most remotely located and logistically difficult to manage. Rookery Bay Reserve staff are proud to see this score has increased from our last LMR 5 years ago and we will continue to bring all our knowledge and abilities to bear regarding the continued improvement in our management of these sensitive and important habitat types. Additionally, the Reserve staff will insure that our new management plan being presently written will include information as to how we are addressing this very important Required Improvement Action.

2. *Management Resources, specifically equipment, staff, and funding, received below average scores. The review team is asked to evaluate, based on information provided by the managing agency, whether management resources are sufficient.*

- **Managing Agency Response:** The direct budgetary funding that we receive for our management resources is acknowledged to be low and has remained so since we experienced strong budget cuts after the past 2008 economic downturn.

Rookery Bay Reserve has yet to recover those lost resources in state funding. Rookery Bay Reserve staff have, however, worked extremely hard over the past 10 years to compete for and bring in outside sources of grant and other types of competitive funding. Our successes have been extremely helpful in us realizing the gains that we have made, however, these types of funding sources do not traditionally support the addition of staff and equipment. Additionally, Rookery Bay Reserve staff will insure that our new management plan being presently written will include information as to how we are addressing this very important Required Improvement Action.

2.3. Field Review Checklist and Scores

Field Review Item	Reference #	Anonymous Team Members								Average
		1	2	3	4	5	6	7	8	
Natural Communities (I.A)										
Mesic Flatwoods/Wet Flatwoods	I.A.1	5	4	4	4	4	5	4		4.29
Coastal Strand	I.A.2	5	5	5	4	4	4	4		4.43
Coastal Xeric Scrub/Scrubby Flatwoods	I.A.3	5	5	4	5	5	4	5		4.71
Mesic Hammock	I.A.4	4	4	4	4	5	4	4		4.14
Maritime Hammock	I.A.5	2	2	2	2	4	2	2		2.29
Open Water	I.A.6	5	5	5	5	4	5	5		4.86
Mangrove Swamp	I.A.7	5	5	5	5	5	5	5		5.00
Saltwater Marsh	I.A.8	3	3	3	4	4	4			3.50
Freshwater Marsh	I.A.9		4	4	4	4	4	3		3.83
Dome/Strand Swamp	I.A.10	5	5	5	3	5	5	5		4.71
Seagrass	I.A.11	5	5	4	4	4	5	5		4.57
Beach/Interdunal Swale	I.A.12	5	5	5	4	5	4	5		4.71
Shell Mound	I.A.13	3	3	3	3	3	2	3		2.86
Natural Communities Average Score										4.15
Listed species: Protection & Preservation (I.B)										
Animals	I.B.1	4	5	5	4	4		5		4.50
Manatee	I.B.1.a	4	5	5	4	5	5	4		4.57
Sea Turtle	I.B.1.b	5	5	5	5	5	5	5		5.00
Shorebirds	I.B.1.c	4	5	5	4	5	5	4		4.57
Crocodile	I.B.1.d	4	5	5	5	5	5	4		4.71
Plants	I.B.2	4	4	4			4	3		3.80
Listed Species Average Score										4.53
Natural Resources Survey/Monitoring Resources (I.C)										
Listed species or their habitat monitoring	I.C.2	5	5	5	5	5	4	3		4.57
Fire effects monitoring	I.C.4	4	5	5	5	5	4	4		4.57
Invasive species survey / monitoring	I.C.6	4	5	5	5	5	4	4		4.57

Field Review Item	Reference #	Anonymous Team Members								Average
		1	2	3	4	5	6	7	8	
Cultural Resources (Archeological & Historic sites) (II.A, II.B)										
Cultural Res. Survey	II.A	5	5	5	5	5	5	5		5.00
Protection and preservation	II.B	5	5	5	5	5	4	5		4.86
Cultural Resources Average Score										4.93
Resource Management, Prescribed Fire (III.A)										
Area Being Burned (no. acres)	III.A1	4	4	4	4	4	4	5		4.14
Frequency	III.A.2	4	4	4	4	4	5	5		4.29
Quality	III.A.3	4	4	4	5	5	5	5		4.57
Resource Management, Prescribed Fire Average Score										4.33
Restoration (III.B)										
Hydrologic Restoration	III.B.1	5	5	4	5	5	4	5		4.71
Restoration Average Score										4.71
Forest Management (III.C)										
Timber Inventory	III.C.1	3	3	x	5	3	4	4		3.67
Forest Management Average Score										3.67
Non-Native, Invasive & Problem Species (III.D)										
Prevention										
prevention - plants	III.D.1.a	4	4	4	5	4	4	5		4.29
prevention - animals	III.D.1.b	5	4	4	5	4	4	5		4.43
prevention - pests/pathogens	III.D.1.c	4	4	4	5	3	4	3		3.86
Control										
control - plants	III.D.2.a	4	4	4	4	4	4	5		4.14
control - animals	III.D.2.b	5	4	4	3	4	4	5		4.14
control - pest/pathogens	III.D.2.c	4	4	4	3	3	4	3		3.57
Non-Native, Invasive & Problem Species Average Score										4.07
Hydrologic/Geologic function Hydro-Alteration (III.E.1)										
Roads/culverts	III.E.1.a	4	4	4	5	4	4	5		4.29
Ditches	III.E.1.b	4	4	4	5	4	5	4		4.29
Hydro-period Alteration	III.E.1.c	4	4	4	5	4	4	4		4.14
Water Level Alteration	III.E.1.d	4	4	4	5	4	4	4		4.14
Wave Erosion	III.E.1.f	4	4	3	5	4	4	4		4.00
Hydrologic/Geologic function, Hydro-Alteration Average Score										4.17
Surface Water Monitoring (III.E.3)										
Surface water quality	III.E.3.a	5	5	4	5	4	5	5		4.71
Surface water quantity	III.F.3.b	5	5	5	5	4	5	5		4.86
Surface Water Monitoring Average Score										4.79

Field Review Item	Reference #	Anonymous Team Members								Average
		1	2	3	4	5	6	7	8	
Resource Protection (III.F)										
Boundary survey	III.F.1	3	3	3	3	3	3	3		3.00
Gates & fencing	III.F.2	4	4	4	3	4	4	4		3.86
Signage	III.F.3	3	3	3	4	3	4	3		3.29
Law enforcement presence	III.F.4	5	5	5	5	4	4	5		4.71
Resource Protection Average Score										3.71
Adjacent Property Concerns (III.G)										
Land Use										
Expanding development	III.G.1.a	4	4	4	4	4	4	4		4.00
Fresh Water Allocation	III.G.1.b	4	4	4	4	4	4	4		4.00
Inholdings/additions	III.G.2	4	3	4	3	4	4	4		3.71
Public Access & Education (IV.1, IV.2, IV.3, IV.4, IV.5)										
Public Access										
Roads	IV.1.a	4	4	5	5	4	4	5		4.43
Parking	IV.1.b	4	5	4	5	4	4	5		4.43
Boat Access	IV.1.c	4	5	4	5	5	4	5		4.57
Environmental Education & Outreach										
Wildlife	IV.2.a	5	5	5	5	5	4	5		4.86
Invasive Species	IV.2.b	5	5	5	5	5	4	5		4.86
Habitat Management Activities	IV.2.c	5	5	5	5	5	4	5		4.86
Interpretive facilities and signs	IV.3	5	5	5	5	5	4	5		4.86
Recreational Opportunities	IV.4	5	5	5	3	5	4	5		4.57
Management of Visitor Impacts	IV.5	5	5	5	4	5	4	5		4.71
Public Access & Education Average Score										4.68
Management Resources (V.1, V.2, V.3, V.4)										
Maintenance										
Waste disposal	V.1.a	4	5	5	4	4	5	4		4.43
Sanitary facilities	V.1.b	4	5	5	4	4	5	4		4.43
Infrastructure										
Buildings	V.2.a	4	5	5	4	5	4	4		4.43
Equipment	V.2.b	4	4	5	4	5	4	4		4.29
Staff	V.3	2	2	4	4	3	2	2		2.71
Funding	V.4	2	3	4	4	3	2	2		2.86
Management Resources Average Score										3.86

Color Code:

Excellent

Above
Average

Below
Average

Poor

Missing
Vote

Insufficient
Information

See
Appendix A
for details

3. Land Management Plan Review Details

3.1 Items Requiring Improvements in the Management Plan

The following items received low scores on the review team checklist, which indicates that the text noted in the Management Plan Review does not sufficiently address this issue (less than 3.0 score on average.). Please note that overall good scores do not preclude specific recommendations by the review team requiring remediation. The next management plan update should address the checklist items identified below:

- 1. Adjacent Property Concerns, specifically discussion of potential surplus land determination, received a below average score. This is an indication that the management plan does not sufficiently address adjacent property.**

Managing Agency Response: Rookery Bay Reserve staff are actually writing our new management plan presently and will be following the LMR team's and State Lands staff's direction to directly discuss and address potential surplus land determination in our newly forming Management Plan.

Managed area uses, existing uses, specifically overnight anchorage, received a below average score. This is an indication that the management plan does not sufficiently address managed area uses.

Managing Agency Response: Again, Rookery Bay Reserve staff are actually writing our new management plan presently and will be following the LMR team's and State Lands staff's direction to directly discuss and Managed area uses, existing uses, and specifically overnight anchorage in our newly forming Management Plan.

3.2 Management Plan Review Checklist and Scores

Plan Review Item	Reference #	Anonymous Team Members								Avg.
		1	2	3	4	5	6	7	8	
Natural Communities (I.A)										
Mesic Flatwoods/Wet Flatwoods	I.A.1	4	4	5	4	5	4	4		4.29
Coastal Strand	I.A.2	4	4	5	4	5	4	4		4.29
Coastal Xeric Scrub/Scrubby Flatwoods	I.A.3	4	4	5	4	5	4	4		4.29
Mesic Hammock	I.A.4	4	4	5	4	5	4	4		4.29
Maritime Hammock	I.A.5	4	4	4	4	5	4	4		4.14
Open Water	I.A.6	4	4	5	4	4	4	4		4.14
Mangrove Swamp	I.A.7	4	4	5	4	5	4	4		4.29
Saltwater Marsh	I.A.8	4	4	4	4	5	4	4		4.14
Freshwater Marsh	I.A.9	4	4	4	4	5	4	4		4.14
Dome/Strand Swamp	I.A.10	4	4	4	4	5	4	4		4.14
Seagrass	I.A.11	4	4	4	4	4	4	4		4.00
Beach/Interdunal Swale	I.A.12	4	4	4	4	5	4	4		4.14
Shell Mound	I.A.13	4	4	4	4	4	4	4		4.00
Natural Communities Average Score										4.18

Plan Review Item	Reference #	Anonymous Team Members								Avg.
		1	2	3	4	5	6	7	8	
Listed species: Protection & Preservation (I.B)										
Animals	I.B.1	4	4	4	3	5	4	3		3.86
Manatee	I.B.1.a	4	4	5	3	5	4	3		4.00
Sea Turtle	I.B.1.b	4	4	5	3	5	4	3		4.00
Shorebirds	I.B.1.c	4	4	5	3	5	4	3		4.00
Crocodile	I.B.1.d	4	4	4	3	5	4	3		3.86
Plants	I.B.2	4	4	3		5	4	2		3.67
Listed Species Average Score										3.90
Natural Resources Survey/Monitoring Resources (I.C)										
Listed species or their habitat monitoring	I.C.2	4	4	5	4	5	4			4.33
Fire effects monitoring	I.C.4	4	4	5	4	5	4	4		4.29
Invasive species survey / monitoring	I.C.6	4	4	5	4	5	4	4		4.29
Cultural Resources (Archeological & Historic sites) (II.A,II.B)										
Cultural Res. Survey	II.A	4	4	5	4	5	4	5		4.43
Protection and preservation	II.B	4	4	5	4	5	5	5		4.57
Cultural Resources Average Score										4.50
Resource Management, Prescribed Fire (III.A)										
Area Being Burned (no. acres)	III.A.1	4	4	4	4	4	4	4		4.00
Frequency	III.A.2	4	4	4	4	4	4	5		4.14
Quality	III.A.3	4	4	5	4	5	4	5		4.43
Resource Management, Prescribed Fire Average Score										4.19
Restoration (III.B)										
Hydrologic Restoration	III.B.1	4	4	5	5	4	4	5		4.43
Restoration Average Score										4.43
Forest Management (III.C)										
Timber Inventory	III.C.1	4	4	4	4	4	4	4		4.00
Forest Management Average Score										4.00
Non-Native, Invasive & Problem Species (III.D)										
Prevention										
prevention - plants	III.E.1.a	4	4	4	4	5	4			4.17
prevention - animals	III.E.1.b	4	4	4	4	4	4			4.00
prevention - pests/pathogens	III.E.1.c	4	4	4	4	3	4	2		3.57
Control										
control - plants	III.E.2.a	4	4	4	4	5	4	5		4.29
control - animals	III.E.2.b	4	4	4	4	4	4	5		4.14
control - pest/pathogens	III.E.2.c	4	4	4	4	3	4	2		3.57
Non-Native, Invasive & Problem Species Average Score										3.96

Plan Review Item	Reference #	Anonymous Team Members								Avg.
		1	2	3	4	5	6	7	8	
Hydrologic/Geologic function, Hydro-Alteration (III.E.1)										
Roads/culverts	III.F.1.a	3	4	4	4	4	4	4		3.86
Ditches	III.F.1.b	3	4	4	4	4	4	4		3.86
Hydro-period Alteration	III.F.1.c	3	4	4	4	4	4	4		3.86
Water Level Alteration	III.F.1.d	3	4	4	4	4	4	4		3.86
Wave Erosion	III.F.1.f	3	4	3	4	4	4	4		3.71
Hydrologic/Geologic function, Hydro-Alteration Average Score										3.83
Surface Water Monitoring (III.E.3)										
Surface water quality	III.F.3.a	4	4	4	4	4	4	5		4.14
Surface water quantity	III.F.3.b	4	4	5	4	4	4	5		4.29
Surface Water Monitoring Average Score										4.21
Resource Protection (III.F)										
Boundary survey	III.G.1	3	3	3	4	4	4	3		3.43
Gates & fencing	III.G.2	3	3	4	4	4	4	3		3.57
Signage	III.G.3	3	3	3	4	4	4	3		3.43
Law enforcement presence	III.G.4	3	3	5	4	4	4	3		3.71
Resource Protection Average Score										3.54
Adjacent Property Concerns (III.G)										
Land Use										
Expanding development	III.H.1.a	3	3	4	4	4	4	3		3.57
Fresh Water Allocation	III.H.1.b	3	3	4	3	4	4	3		3.43
Inholdings/additions	III.H.2	3	3	4	3	4	4	3		3.43
Discussion of Potential Surplus Land Determination	III.H.3	2	2	3	2	2	3	2		2.29
Surplus Lands Identified?	III.H.4	4	4	2	4	4	4	5		3.86
Public Access & Education (IV.1, IV.2, IV.3, IV.4, IV.5)										
Public Access										
Roads	IV.1.a	4	4	5	4	4	4	4		4.14
Parking	IV.1.b	4	4	4	4	4	4	4		4.00
Boat Access	IV.1.c	4	4	4	4	5	4	4		4.14
Environmental Education & Outreach										
Wildlife	IV.2.a	4	4	5	4	5	4	5		4.43
Invasive Species	IV.2.b	4	4	5	4	5	4	4		4.29
Habitat Management Activities	IV.2.c	4	4	5	4	5	4	4		4.29
Interpretive facilities and signs	IV.3	4	4	5	4	5	4	5		4.43
Recreational Opportunities	IV.4	4	4	5	4	5	4	5		4.43
Management of Visitor Impacts	IV.5	4	4	5	4	5	4	4		4.29
Public Access & Education Average Score										4.27

Plan Review Item	Reference #	Anonymous Team Members								Avg.
		1	2	3	4	5	6	7	8	
Managed Area Uses (VI.A, VI.B)										
Existing Uses										
Trails	VI.A.1	4	5	4	5	5	4	4		4.43
Nature Study	VI.A.2	4	5	4	5	5	5	4		4.57
Boating	VI.A.3	3	4	4	3	4	4	5		3.86
Fishing	VI.A.4	3	4	4	2	4	4	5		3.71
Overnight Anchorage	VI.A.5	2	2	3	1	4	3	4		2.71
Birding	VI.A.6	4	5	4	5	5	5	5		4.71
Environmental Education	VI.A.7	4	5	5	5	5	5	5		4.86
Research	VI.A.8	5	5	5	5	5	5	5		5.00
Color Code:		Excellent		Above Average		Below Average		Poor		See Appendix A for details
				Missing Vote		Insufficient Information				

Scoring System Detail

Explanation of Consensus Commendations:

Often, the exceptional condition of some of the property's attributes impress review team members. In those instances, team members are encouraged to offer positive feedback to the managing agency in the form of a commendation. The teams develop commendations generally by standard consensus processes or by majority vote if they cannot obtain a true consensus.

Explanation of Consensus Recommendations:

Subsection 259.036(2), F.S., specifically states that the managing entity shall consider the findings and recommendations of the land management review. We ask team members to provide general recommendations for improving the management or public access and use of the property. The teams discuss these recommendations and develop consensus recommendations as described above. We provide these recommendations to the managing agency to consider when finalizing the required ten-year management plan update. We encourage the manager to respond directly to these recommendations and include their responses in the final report when received in a timely manner.

Explanation of Field Review Checklist and Scores, and Management Plan Review Checklist and Scores:

We provide team members with a checklist to fill out during the evaluation workshop phase of the Land Management Review. The checklist is the uniform tool used to evaluate both the management actions and condition of the managed area, and the sufficiency of the management plan elements. During the evaluation workshop, team members individually provide scores on each issue on the checklist, from their individual perspective. Team members also base their evaluations on information provided by the managing agency staff as well as other team member discussions. Staff averages these scores to evaluate the overall conditions on the ground, and how the management plan addresses the issues. Team members must score each management issue 1 to 5: 1 being the management practices are clearly insufficient, and 5 being that the management practices are excellent. Members may choose to abstain if they have inadequate expertise or information to make a cardinal numeric choice, as indicated by an "X" on the checklist scores, or they may not provide a vote for other unknown reasons, as indicated by a blank. If a majority of members failed to vote on any issue, that issue is determined to be irrelevant to management of that property or it was inadequately reviewed by the team to make an intelligent choice. In either case staff eliminated the issue from the report to the manager.

Average scores are interpreted as follows:

Scores 4.0 to 5.0 are Excellent

Scores 3.0 to 3.99 are Above Average

Scores 2.0 to 2.99 are Below Average

Scores 1.0 to 1.99 are considered Poor

E.7/ 2019 Timber Management Analysis

Special Management Considerations

Timber Management Analysis

Chapters 253 and 259, Florida Statutes, require an assessment of the feasibility of managing timber in land management plans for parcels greater than 1,000 acres if the lead agency determines that timber management is not in conflict with the primary management objectives of the land. The feasibility of harvesting timber at Rookery Bay National Estuarine Research Reserve (Rookery Bay) during the period covered by the subject Management Plan was considered in the context of statutory responsibilities and an analysis of the research reserve's resource needs and values.

Rookery Bay is designated as a single-use property for conservation and preservation. As such, timber management is only permitted as a method of natural community restoration and maintenance rather than as an ongoing extractive activity. The long-term management goal for forest communities in the reserve system is to maintain or re-establish old-growth characteristics to the degree practicable, except for those communities specifically managed as early successional. Natural community-specific reference site characteristics developed by the Florida Natural Areas Inventory (FNAI) will serve as a benchmark. In the case of imperiled species, the management of certain natural communities may differ from standard treatments to provide optimum habitat conditions within the reserve.

Most natural communities evaluated at Rookery Bay had pine and non-pine overstory stocking levels within the range identified for corresponding FNAI Reference Sites. The Timber Management Analysis found in Addendum ____ provides additional details. Overstory thinning is a management tool that may be utilized in areas which have overstocked conditions. However, specific management goals and objectives for each natural community are detailed in the body of this Management Plan.

Addendum _____ **Timber Management Analysis**

1. *Management Context and Best Management Practices*

Timber management at Rookery Bay National Estuarine Research Reserve (Rookery Bay) is based on the desired future condition (DFC) of a management zone or natural community (NatCom) as determined by the Management Plan, along with guidelines developed by the Florida Natural Areas Inventory (FNAI). In most cases, the DFC will be closely related to the historic NatCom. However, it is important to note, that in areas where the historic community has been severely altered by past land-use practices, the DFC may not always be the same as the historic NatCom. All timber management activities undertaken will adhere to or exceed the current Florida Silvicultural Best Management Practices (BMPs) and Florida Forestry Wildlife BMPs for State Imperiled Species. Rookery Bay staff shall take all measures necessary to protect water quality and wildlife species of concern while conducting timber management activities. The Florida Department of Environmental Protection has contracted with F4 Tech (a private professional forest management firm) to complete this timber assessment.

2. *Purpose of Timber Management Activities*

Timber management activities may be conducted to help improve or maintain current conditions per the associated DFC. Timber management will primarily be conducted in upland NatCom types such as mesic flatwoods, wet flatwoods, sandhill, upland pine, upland mixed woodland, scrubby flatwoods, scrub, and altered landcover types (successional hardwood forest and pine plantations). There will likely be no scheduled timber management activities in historically hardwood-dominated or wetland NatCom types, e.g., upland hardwood forest, hydric hammock, and slope forest. In some circumstances, timber management may include the harvesting and removal of overstory invasive/exotic trees. Descriptions of NatCom types are detailed in the body of the Management Plan.

3. *Potential Silvicultural Treatments*

Several silvicultural treatments may be considered and utilized over the next ten years. The various types of timber harvests may include pine thinning, targeted hardwood overstory removal, and clearcutting. Silvicultural treatments will be selectively implemented to minimize potential impacts to water and soil resources, non-target vegetation, and wildlife (see BMPs). Depending upon the condition and marketability of the timber being manipulated, it is possible to generate revenue from the harvest. It is also possible the timber removal could be a cost. In all decisions, the mission of preserving and restoring natural communities will be the guiding factor.

Thinning is conducted to reduce the basal area (BA) or density of trees/stems in a stand to improve forest health and growth conditions for residual trees. Allowing trees more room to grow has the potential to increase tree and forest vigor, which helps mitigate the potential for damaging insect and disease outbreaks. Most tree harvesting/removals also increase sunlight reaching the forest floor and fine fuels that facilitate consistent fire return intervals and responses, which can benefit groundcover vegetation abundance, species richness, and overall ecological diversity. The disruption of natural fire regimes and fire return intervals can often result in the need to remove undesirable or overstocked hardwood stems that currently occupy growing space in the canopy and sub-canopy. Clearcutting may be used to support restoration goals by removing off-site pine or hardwood species and is a precursor to establishing site-appropriate species. It can also be used to control insect infestations that are damaging or threatening forest resources and ecosystem conditions.

On occasion, salvage cuts may be needed to remove small volumes of wood damaged by fire, wind storms, insects, or other natural causes. The decision whether to harvest the affected timber will depend on the threat to the surrounding stands, risk of collateral ecological damage on- and/or off-site, and the volume/value of the trees involved. For example, small pockets of trees killed by lightning or Black Turpentine Beetles (*Dendroctonus terebrans*) are a natural part of a healthy ecosystem that would normally be left untouched. However, if an insect infestation spread beyond an identified tolerance level, then the affected trees and a corresponding buffer zone might have to be harvested/removed to prevent significant or widespread damage.

4. Inventory Data and Potential Actions per Area of Interest

Rookery Bay comprises approximately 110,000 acres in Collier County. Approximately 912 acres are associated with three (3) upland NatCom types that are potential candidates for timber management: mesic flatwoods (387 acres), scrubby flatwoods (147 acres) and wet flatwoods (378 acres). In April 2019, a forest stand/NatCom inspection based on field plots was conducted across and within a large percentage of these areas.

The information contained herein describes the methods F4 Tech used to collect on-site data and generate summaries and analyses to support the timber assessment. F4 Tech generated field maps and identified NatCom polygons to potentially sample. Three NatCom types were inspected by field crews: mesic flatwoods, scrubby flatwoods, and wet flatwoods. All potential polygons were uniquely identified and numbered. Islands, land-locked, and inaccessible polygons were excluded from field sampling. Likewise, isolated polygons <5 AC were excluded (some smaller polygons were combined with others on a case by case basis). As a result, 443 acres in 26 NatCom polygons were identified as being candidates for a field inspection (Table 1) and eight (8) NatCom polygons were visited and inventoried via 24 plots (readily accessed and proximal to roads, trails, and/or utility corridors). Field data collections focused on overstory conditions, e.g., pine basal area (BA), tree diameters, and general site conditions, while midstory, understory/tree regeneration, and groundcover layers were described qualitatively.

This timber assessment was based on NatCom boundary GIS data (Pinelands CERP layer) provided by Rookery Bay staff in January 2019. Stakeholders and research reserve staff are encouraged to view this timber assessment and inventory data as supplemental information for future consideration, i.e., it is not intended to be prescriptive. Given the dynamic nature of property ownership and land management activities at Rookery Bay, together with the timeframe required to create or update a management plan, it is possible that some tabular data may be dated. Therefore, NatCom acreages and recent treatments that occurred after January 2019 may not be reflected in the following tables.

Table 1. NatCom types and polygons to potentially sample.

FNAI NatCom Type	Unique NatCom Polygon ID	Comprehensive Everglades Restoration Community Code	Acres
Wet flatwoods	RB123	WSpS	13.0
Wet flatwoods	RB131	WSpS	20.5
Wet flatwoods	RB167	WSpS	11.3
Wet flatwoods	RB172	WSpS	7.5
Wet flatwoods	RB177	WSpS	12.6
Wet flatwoods**	RB190	WSpS	43.6
Wet flatwoods	RB201	WSpS	16.9
Wet flatwoods**	RB208	WSpS	31.4
Wet flatwoods	RB229	WSpS	18.1
Wet flatwoods	RB287	WSpS	9.1
Wet flatwoods**	RB292	WSpS	7.5
Subtotal			191.6
Scrubby flatwoods**	RB327	WUCp	13.0
Scrubby flatwoods**	RB328	WUCp	17.2
Scrubby flatwoods	RB337	WUCp	7.8
Scrubby flatwoods	RB350	WUCp	8.1
Subtotal			46.1
Mesic flatwoods	RB402	WUpSs	20.1
Mesic flatwoods**	RB407	WUpSs	33.3
Mesic flatwoods	RB424	WUpSs	7.5
Mesic flatwoods	RB435	WUpSs	8.2
Mesic flatwoods	RB445	WUpSs	17.0
Mesic flatwoods**	RB449	WUpSs	21.3
Mesic flatwoods	RB452	WUpSs	10.0
Mesic flatwoods	RB481	WUpSs	9.7
Mesic flatwoods**	RB491	WUpSs	32.6
Mesic flatwoods	RB510	WUpSs	37.4
Mesic flatwoods	RB558	WUpSs	8.1
Subtotal			205.0
Total			442.6

*NatCom polygon unique identifiers created by F4 Tech.

** Visited/inventoried NatCom Types and polygons.

Mesic Flatwoods (386.8 acres)

South Florida slash pine (*Pinus elliotii* var. *densa*) is the preferred overstory pine species in the region. The FNAI Reference Site in this region for mesic flatwoods contains south Florida slash pine at a BA of 10 to 50 square feet per acre with non-pine at a density of 0 trees per acre (TPA). Table 2 summarizes the overstory conditions for this natural community at Rookery Bay and target overstory condition for mesic flatwoods in this region. Plot level pine BA ranged from 10 to 30 square feet per acre. On average, overstory pine trees were 32 years old (30–42 years old based

on three age trees). None-pine overstory was absent. Midstory species included south Florida slash pine, wax myrtle (*Myrica cerifera*), saw palmetto (*Serenoa repens*), and gallberry/fetterbush (*Ilex glabra* and *I. coriacea*/*Lyonia lucida*). Pine regeneration was recorded in and around some of the plots. Wiregrass and bracken fern were recorded in some plots. A gopher tortoise (*Gopherus polyphemus*) burrow was also observed in one plot. Invasive species in and around plots included melaleuca (*Melaleuca quinquenervia*), earleaf acacia (*Acacia auriculiformis*), and old world climbing fern (*Lygodium microphyllum*).

Scrubby Flatwoods (147 acres)

South Florida slash pine is the preferred overstory pine species in the region. The FNAI Reference Site in this region for scrubby flatwoods contains south Florida slash pine at a BA of 10 to 60 square feet per acre with non-pine at a density between 0 and 26 TPA. At Rookery Bay, scrubby flatwoods are managed to enhance habitat conditions for the federally threatened Florida Scrub Jay (*Aphelocoma coerulescens*). As such, overstory pine BA may not meet the target overstory conditions found at the FNAI Reference Site for scrubby flatwoods. Table 2 summarizes the overstory condition for this natural community at Rookery Bay and target overstory condition for scrubby flatwoods in this region. Plot level pine BA ranged from 0 to 10 square feet per acre and overstory pine trees were approximately 30 years-old (one age tree). None-pine overstory was absent. The midstory included species such as saw palmetto, scrub oak species, e.g., *Quercus geminata* and *Q. myrtifolia*, gallberry/fetterbush, and wax myrtle.

Wet Flatwoods (377.5 acres)

South Florida slash pine is the preferred overstory pine species in the region. The FNAI reference site in this region for wet flatwoods contains south Florida slash pine at a BA of 10 to 50 square feet per acre with non-pine at a density of 0 TPA. Table 2 summarizes the overstory condition for this natural community at Rookery Bay and target overstory conditions for wet flatwoods in this region. Plot level pine BA ranged from 20 to 80 square feet per acre. On average, overstory pine trees were 34 years old (25-40 years old based on four age trees). Cabbage palm (*Sabal palmetto*) was the only non-pine overstory species. Midstory species included wax myrtle, gallberry/fetterbush, saw palmetto, and various hollies (*Ilex* spp.). There was some pine regeneration observed in and around inventory plots. Bracken fern (*Pteridium aquilinum*) was recorded in one plot and several plots had old world climbing fern, earleaf acacia, and melaleuca.

Table 2. Overstory summary statistics for subject NatCom types at Rookery Bay.

NatCom Type	Current Average Overstory Conditions*							Target Overstory Conditions	
	Pine BA (ft ² /ac)	Pine TPA	Pine Volume (tons/ac)	Non Pine BA (ft ² /ac)	Non Pine TPA	Non Pine Volume (tons/ac)	Total Pine and Non Pine Volume (tons/ac)	FNAI Reference Condition Pine BA Range (ft ² /ac)	FNAI Reference Condition Non Pine TPA Range
Mesic Flatwoods	25.5	92.0	14.2	0.0	0.0	0.0	14.2	10 - 50	0 - 0
Scrubby Flatwoods	3.3	3.0	2.0	0.0	0.0	0.0	2.0	10 - 60	0 - 26
Wet Flatwoods	46.7	150	27.9	21.1	28	0.0	27.9	10 - 50	0 - 0

*Summary statistics based on 24 plots inventoried in eight distinct NatCom polygons.

**Rookery Bay
National Estuarine Research Reserve
Management Plan**

Rookery Bay National Estuarine Research Reserve

300 Tower Road, Naples, Florida 34113
239-417-6310, Fax: 239-417-6315
info@rookerybay.org • www.RookeryBay.org



Florida Department of Environmental Protection

Coastal and Aquatic Managed Areas 3900
Commonwealth Blvd., MS #235
Tallahassee, FL 32399 • FloridaCoasts.org

E.8 / NOAA Evaluation of Rookery Bay Reserve Management, 2011–2019

(This document begins on the following page.)



U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
Office for Coastal Management
Silver Spring Metro Center, Building 4
1305 East-West Highway
Silver Spring, Maryland 20910

March 13, 2020

Noah Valenstein, Secretary
Florida Department of Environmental Protection
3900 Commonwealth Boulevard, MS 49
Tallahassee, FL 32399

Dear Secretary Valenstein:

Enclosed are the final evaluation findings for the Rookery Bay National Estuarine Research Reserve for the period February 2011 to September 2019.

The fundamental conclusion of this evaluation finds that the Florida Department of Environmental Protection is adhering to the programmatic requirements of the Coastal Zone Management Act in implementing the Rookery Bay National Estuarine Research Reserve. These evaluation findings document six recommendations and one necessary action.

Thank you for your cooperation and assistance, and that of your staff, in conducting this evaluation. If you have any questions about the findings, please contact Ralph Cantral, the lead evaluator, at (843) 740-1143 or via email at Ralph.Cantral@noaa.gov.

Sincerely,

Keelin S. Kuipers
Deputy Director

Enclosure

cc: Florida Department of Environmental Protection
Alex Reed, Director, Office of Resilience and Coastal Protection
Keith Laakkonen, Manager, Rookery Bay NERR

NOAA Office for Coastal Management
Ralph Cantral, Senior Advisor and Lead Evaluator
Matt Chasse, Site Liaison
Erica Seiden, Ecosystems Program Manager
Heidi Stiller, South Regional Director

Draft Evaluation Findings

Rookery Bay National Estuarine Research Reserve

February 2011 to September 2019

Published February 2020



Office for Coastal Management
National Ocean Service
National Oceanic and Atmospheric Administration
United States Department of Commerce

Table of Contents

Summary of Key Findings.....	1
Program Review Procedures.....	3
Evaluation Findings	4
Target Area 1: Reserve Administration	4
Key Findings.....	4
Target Area 2: Research.....	7
Key Findings.....	7
Target Area 3: Communications, Outreach, and Training.....	9
Examples of Key Efforts.....	9
Implementation of General Requirements	11
Evaluation Metrics	12
Metric 1: Community Awareness.....	12
Metric 2: Monitoring Hydrologic Restoration.....	13
Metric 3: Maintain and Restore Habitat	13
Conclusion.....	15
Appendix A: Response to Written Comments.....	16

Summary of Key Findings

The Coastal Zone Management Act requires the National Oceanic and Atmospheric Administration (NOAA) to conduct periodic evaluations of the performance of states and territories with federally approved coastal management programs. This evaluation conducted by the Office for Coastal Management examined the operation and management of the Rookery Bay National Estuarine Research Reserve for the period from February 2011 to September 2019. The evaluation focused on three target areas: administration, research, and communication, outreach, and training. The four sectors addressed by all of the national estuarine research reserves are research, training, education, and stewardship.

The findings in this evaluation document will be considered by the NOAA Office for Coastal Management in making future financial award decisions concerning the coastal program. The evaluation came to these conclusions:

Accomplishment: The Rookery Bay Research Reserve and Florida International University have smoothly transitioned to a new partnership with minimal disruption to reserve programs and staffing.

Accomplishment: The Rookery Bay Research Reserve has collaborated successfully with entities across Southwest Florida to implement positive protection and enhancement strategies for estuarine areas and adjacent uplands.

Accomplishment: Rookery Bay Research Reserve has been actively sharing lessons learned from disaster preparation and recovery with partners across the state of Florida.

Accomplishment: The Rookery Bay Research Reserve continues to expand opportunities for research within the reserve by collaborating with major universities in South Florida.

Accomplishment: The Rookery Bay Research Reserve's close partnership with the Florida Fish and Wildlife Conservation Commission has improved protection of key habitat areas within the reserve boundaries.

Accomplishment: The NOAA Office for Coastal Management commends the Rookery Bay Research Reserve for its outstanding efforts to provide robust training opportunities for local decision makers and to support and manage a diverse cadre of volunteers.

Accomplishment: Rookery Bay Research Reserve is commended for investing in the development of a new program to maintain the interest of students in estuarine and marine science during their middle school years and maximize the value of high school programs to individual classes.

Recommendation: The Department of Environmental Protection is encouraged to continue its strong support of the Friends of Rookery Bay to further the programmatic and management goals of the reserve and the department at no costs to the overall state budget while enhancing local economic impacts provided by the reserve.

Recommendation: The Department of Environmental Protection should consider conducting a workforce analysis to balance staff compensation between the different offices within the department and within different regions of the state.

Recommendation: The Department of Environmental Protection's Office of Resilience and Coastal Protection should continue engaging with Bureau of Design and Construction staff to improve department prioritization of reserve construction projects impacted by federal funding requirements and deadlines.

Recommendation: The Rookery Bay Research Reserve should consider working with partners to explore social science opportunities concerning public perceptions and public communications with partners during the execution of the Belle Meade Estates project.

Recommendation: The Rookery Bay Research Reserve should examine available funding opportunities, including an arrangement with the Collier County School District to provide board of education funding for on-site marine educational positions, to further support and expand educational programming at the middle and high school level.

Recommendation: The Department of Environmental Protection should encourage promotion of its partnership with NOAA at the Rookery Bay Research Reserve while operating within the new "One DEP" framework.

Necessary Action: The Rookery Bay Research Reserve must work with the NOAA Office for Coastal Management to develop within 90 days of the receipt of the final evaluation report an agreed-upon timeline for the adoption of a final reserve management plan.

Conclusion: This evaluation finds that the State of Florida Department of Environmental Protection is adhering to the requirements of section 312(a) of the Coastal Zone Management Act, 16 U.S.C. § 1458(a), in the operation of the Rookery Bay National Estuarine Research Reserve.

Program Review Procedures

The NOAA Office for Coastal Management evaluated the Rookery Bay National Estuarine Research Reserve in fiscal year 2019. The evaluation team consisted of Ralph Cantral, evaluation team lead, Matt Chasse, site liaison, and Heidi Stiller, south regional director, all from the NOAA Office for Coastal Management; Janice Kerns, manager of the Old Woman Creek Research Reserve (Ohio); and Justine Lundsted, Knauss Sea Grant fellow. The support of the Rookery Bay Research Reserve staff members was crucial in conducting the evaluation, and their support is most gratefully acknowledged.

NOAA sent a notification of the scheduled evaluation to Secretary Noah Valenstein of the Florida Department of Environmental Protection on March 29, 2019, and published a notice of intent to evaluate the Rookery Bay Research Reserve in the *Federal Register* on July 23, 2019. The Rookery Bay Research Reserve posted a notice of the public meeting and opportunity to comment in the *Florida Administrative Record* on August 21, 2019.

The evaluation process included a review of relevant documents and a survey of stakeholders, which helped identify three target areas for the evaluation: administration, research, and communication, outreach, and training. A site visit was conducted from September 24 through 26, 2019, during which the evaluation team held group discussions with stakeholders and program staff members. The evaluation team also discussed the target areas with reserve staff members, who helped identify issues and workable solutions to maintain and improve the implementation of the reserve's programs. In addition, a public meeting was held on September 25, at 5:00 p.m. at Rookery Bay Environmental Learning Center, 300 Tower Road, Naples, Florida 34113, to provide an opportunity for members of the public to express their opinions about the implementation of the reserve programs.

Stakeholders and members of the public were also given the opportunity to provide written comments via email or U.S. mail through Friday, October 4, 2019. No written comments were received from the public or interested parties.

Final evaluation findings for all national estuarine research reserves highlight each reserve's accomplishments in the target areas and include recommendations that are of two types:

Necessary Actions address programmatic requirements of the implementing regulations of the Coastal Zone Management Act and of the reserve's management plan approved by NOAA. These must be carried out by the dates specified. Failure to address necessary actions may result in a future finding of non-adherence and the invoking of interim sanctions, as specified in the Coastal Zone Management Act §312(c). This evaluation contains one necessary action.

Recommendations are actions that the office believes would improve the program, but which are not mandatory. The reserve is expected to have considered the recommendations by the time of the next evaluation or by the dates specified. This evaluation contains seven recommendations.

Evaluation Findings

Target Area 1: Reserve Administration

The Rookery Bay Research Reserve is administered by the Florida Department of Environmental Protection through the Office of Resilience and Coastal Protection. Rookery Bay Research Reserve is one of three estuarine research reserves administered by the office, which also manages the Florida Coastal Management Program and a system of aquatic and buffer preserves.

Key Findings

The Rookery Bay Research Reserve is one of the largest within the National Estuarine Research Reserve System, with more than 100,000 acres within its boundaries and a staff of more than 30. Reserve management relies on a number of partnerships, and reserve staff members are employed through a number of vehicles, including the state personnel system, direct contracts, cooperative agreements with other institutions, and the reserve's not-for-profit support group, Friends of Rookery Bay.

During the review period, the research reserve has had administrative arrangements with three different educational institutions: Florida Gulf Coast University, Florida SouthWestern State College, and Florida International University. These partnerships have proven crucial to maintaining adequate staff resources to support research reserve activities.

Most recently, the reserve transitioned to a partnership with Florida International University (FIU), and a significant portion of the reserve staff is now employed through a contract with FIU. The transition appears to have gone well, and the reserve has expanded relationships with both FIU and Florida Gulf Coast University. Although the initial focus of the relationship between the reserve and FIU has been to serve as an administrative home for many of the reserve's contractual employees, the reserve is positioned to take advantage of a number of other benefits of the partnership related to research, education, and outreach, including translation of communications materials. (See target area 2: research, as well.)

Accomplishment: The Rookery Bay Research Reserve and Florida International University have smoothly transitioned to a new partnership with minimal disruption to reserve programs and staffing.

The Rookery Bay Research Reserve's not-for-profit partner organization, Friends of Rookery Bay, has continued to support the reserve in many ways, including providing funds to employ key positions such as the middle school education coordinator. The partnership is a crucial element of the reserve's success in involving the surrounding community in resource stewardship activities, including Team OCEAN (Ocean Conservation Education Action Network),

the volunteers who patrol heavily used areas of the reserve. The Friends of Rookery Bay also provide logistical assistance to support the education programs, including scheduling of guided nature tours in partnership with local experts.

Recommendation: The Department of Environmental Protection is encouraged to continue its strong support of the Friends of Rookery Bay to further the programmatic and management goals of the reserve and the department at no costs to the overall state budget while enhancing local economic impacts provided by the reserve.

Prescribed fire management is another area where the reserve works collaboratively with area land managers, and where partners expressed their appreciation. Area land managers that have staff certified to participate in fire management activities, such as the National Park Service, will participate in burn days at the reserve. Other partners such as the Conservancy of Southwest Florida rely on trained reserve staff members to conduct fire management on areas they own or manage.

Another example of collaborative work is the reserve's partnership with the Ten Thousand Islands National Wildlife Refuge. The reserve's stewardship and research program staffs were instrumental in the creation of replacement refugia for West Indian manatees within Faka Union Bay, and they provide extensive environmental monitoring data from throughout the refuge to support management by the U.S. Fish and Wildlife Service. Without the support of the information provided by the research reserve, refuge staff would not be able to manage refuge resources as effectively.

Accomplishment: The Rookery Bay Research Reserve has collaborated successfully with entities across Southwest Florida to implement positive protection and enhancement strategies for estuarine areas and adjacent uplands.

Rookery Bay Research Reserve routinely is not able to match the salaries of similar positions in the Southwest Florida area. The evaluation team learned that this is a problem not only in comparison to other employers, but also to other divisions of the Department of Environmental Protection doing similar work. This has caused problems in hiring and retaining staff members because of the high cost of living in the Naples area.

Recommendation: The Department of Environmental Protection should consider implementing a workforce analysis to balance staff compensation between the different offices within the department and within different regions of the state.

The reserve has gained a great deal of knowledge related to disaster preparation, response, and recovery as a result of Hurricane Irma which made landfall in the reserve in September 2017. The reserve's preparations minimized damage during the storm, staff restored functionality of facilities after the storm, and post-disaster funding was secured to remove marine debris and repair and replace facilities. Lessons learned have already been applied (e.g., installed tie-down anchors and purchased straps for boats), making the reserve more resilient.

Staff participation as Natural Resource Advisors during marine debris removal activities after Hurricane Irma also helped minimize damage to habitats and species outside of the reserve. In addition to activities throughout Southwest Florida, reserve staff members traveled to the Florida Panhandle to help the Apalachicola Estuarine Research Reserve and the St. Joseph Bay State Buffer Preserve clean up and recover after Hurricane Michael in October 2018.

Accomplishment: Rookery Bay Research Reserve has been actively sharing lessons learned from disaster preparation and recovery with partners across the state of Florida.

The evaluation team discussed several issues with agency leadership to explore ways to reduce or remove time constraints that have caused projects to be eliminated or delayed and funding to be returned to NOAA. During the review period, the reserve was forced to return federal funds because of the inability to award contracts. Discussions indicated that the extended periods might be due, in part, to Department of Environmental Protection procedures for capital improvements. It also appears that different offices and regions may have differing priorities.

Repairing and replacing structures damaged or destroyed by Hurricane Irma has proven to be difficult. At the time of the site visit, the Goodland dormitory structure damaged during Hurricane Irma had not been replaced. Fortunately, bids had finally been received, and communication channels between the two divisions appeared to be open.

Recommendation: The Department of Environmental Protection's Office of Resilience and Coastal Protection should continue engaging with Bureau of Design and Construction staff to improve department prioritization of reserve construction projects impacted by federal funding requirements and deadlines.

Target Area 2: Research

Research, along with education, training, and resource stewardship, is one of four key elements addressed by each of the 29 national estuarine research reserves.

Key Findings

The new relationship between the Rookery Bay Research Reserve and Florida International University provides tremendous opportunities for new research within the reserve. The university recognizes that the reserve is an excellent location for research for graduate students from this Tier 1- (Research 1-) level institution, as new research initiatives can build upon the many years of continuous data collection by the reserve. This relationship can benefit FIU by helping to attract new graduate students with an interest in estuarine science, and can benefit the reserve by providing opportunities for publications by respected faculty and students.

Rookery Bay Research Reserve also continues to collaborate with Florida Gulf Coast University, which offers master's degrees. Faculty members of both Florida Gulf Coast and Florida International Universities serve on the board of the Friends of Rookery Bay and play an important role in identifying needs and opportunities for the reserve.

Accomplishment: The Rookery Bay Research Reserve continues to expand opportunities for research within the reserve by collaborating with major universities in South Florida.

In November 2018, the Rookery Bay Research Reserve convened the Mangrove Symposium that brought together a number of nationally prominent scientists who have studied the mangrove ecosystem at the research reserve over the past 40 years. The scientists shared their knowledge of past research in Southwest Florida and shared their thoughts about the future of mangrove management with local researchers and interested citizens.

Rookery Bay Research Reserve has long-standing nesting bird research and monitoring programs in partnership with National Audubon and Audubon Florida. These partnerships have provided essential information for the designation by the Florida Fish and Wildlife Conservation Commission of new critical wildlife areas within the reserve. These designations offer a much higher level of protection for significant nesting areas. In addition, shorebird monitoring and protection has led the reserve to co-locate an Audubon Florida staffer at the reserve.

Accomplishment: Rookery Bay Research Reserve's close partnership with the Florida Fish and Wildlife Conservation Commission has improved protection of key habitat areas within the reserve boundaries.

Reserve staff have worked closely with local government officials to implement the findings of the Restore the Rookery Bay Estuary Project funded through the reserve system's Science Collaborative. This project was designed by reserve staff members to provide information to

state and local water resource managers to determine the impacts of potential land use and development decisions. The resulting information was critical to the improvement of models used by state water resource managers, and has led to better land use and water management decisions in the Rookery Bay watershed. The study has been used extensively to guide the Collier County project funded under the Resources and Ecosystems Sustainability, Tourist Opportunities, and Revived Economies of the Gulf States Act (RESTORE Act) that will reestablish historic sheet flow patterns from the Belle Meade Estates area to Rookery Bay.

One aspect of this Belle Meade Estates restoration project that may not have been adequately addressed by existing studies is related to public perceptions of the project. The Rookery Bay Research Reserve could support research to help identify communications strategies that would make the project more understandable to the local community.

Recommendation: The Rookery Bay Research Reserve should consider working with partners to explore social science opportunities concerning public perceptions and public communications with partners during the execution of the Belle Meade Estates project.

The research reserve has also made significant progress in rebuilding research partnerships with NOAA's National Centers for Coastal Ocean Science and other federal agencies, including the U.S. Geological Survey, U.S. Fish and Wildlife Service, and U.S. Department of Agriculture. These interagency partnerships should provide a strong foundation for management of resources throughout Southwest Florida.

One of the key elements of research at Rookery Bay Research Reserve is long-term monitoring. The reserve has gone far beyond the requirements of the System Wide Monitoring Program by developing programs for habitat and wildlife monitoring. The habitat mapping has ranged from seagrass distribution to shoreline change in key nesting areas and mangrove forests. The reserve has also monitored the regrowth of vegetation in areas of prescribed burns to detect changes in type and abundance. Wildlife monitoring has included panthers, shorebirds, sea turtles, and gopher tortoises, in addition to numerous aquatic species.

The research reserve actively participates in system-wide and regional research priority-setting activities. This effort has produced several interesting proposals and projects, such as a joint science catalyst proposal with Jobos Bay Research Reserve in Puerto Rico to the Science Collaborative, which was successful. This project will focus on hurricane impacts and community resilience. Additional research collaborations with other research reserves have examined blue carbon, environmental DNA, estuarine modeling, and surface elevation table methods.

The partnership with Florida International University has created an excellent opportunity for the attraction of students with specific interest in estuarine research, and especially within the mangrove ecosystem. This partnership can be productive for both entities, as the reserve can develop relationships with researchers, and the university can use the partnership to attract new students with interests in the field.

Target Area 3: Communications, Outreach, and Training

Southwest Florida is one of the fastest growing regions of the United States. The Rookery Bay Research Reserve provides valuable information about natural resources and management techniques to local officials and local residents.

Examples of Key Efforts

The Rookery Bay Research Reserve has actively sought to maintain support from the community and from coastal decision makers. The reserve regularly invites local, state, and federal officials to visit the reserve to keep them updated on the benefits the reserve provides to the community and the threats to the reserve's resources. The reserve also supports decision makers by providing data and training, and by convening stakeholders to examine local issues. This approach has been quite successful in gaining support.

The reserve has also worked with the ecotourism industry to create a variety of tours that expand the reach of its educational messages to the public. The reserve's partnership with the Friends of Rookery Bay has enabled the expansion of environmental education activities with only limited staff investment. By providing fiscal and administrative assistance, the Friends have allowed reserve staff members to focus on the reserve's core mission and activities.

Convening and actively collaborating with other organizations is a strength of the Rookery Bay Research Reserve, and is appreciated by diverse partners. As mentioned in the research section (target area 3), the reserve held the Mangrove Symposium in 2019 that brought together a wide variety of partners to learn more about past research and the current status of mangrove research in Southwest Florida.

The reserve's coastal training program has brought information about numerous topics to a variety of professional audiences, ranging from landscapers to city planning board members. Training topics range from facilitation training to inundation mapping and integrated pest management. The coastal training program annually convenes area law enforcement (county, city, and Florida Fish and Wildlife Conservation Commission) to share both ecological and enforcement information.

Community volunteers at Rookery Bay are a critical resource that supports a wide range of reserve programs, including education, outreach, monitoring, research, and stewardship. Team OCEAN volunteers, in particular, have been critical to public outreach efforts, which have positive impacts for the reserve's natural resources and specifically the nesting success of colonial shorebirds.

Accomplishment: The NOAA Office for Coastal Management commends the Rookery Bay Research Reserve for its outstanding efforts to provide robust training opportunities for local decision makers and to support and manage a diverse cadre of volunteers.

The Rookery Bay Research Reserve has conducted for many years a highly successful and valued education program for the students of Collier County. The education program not only continues to coordinate with schools to bring fourth graders and high school students to the reserve, but also recently identified a need to involve middle school (grade 7) students in the program. With this new effort, all school levels are able to experience a different component of the reserve, starting on land as Estuary Explorers in fourth grade and advancing to “on the water” experiences for high school marine science students.

The inclusion of middle school students in the program has already proven to be an effective tool to pique students’ interest in pursuing marine education as part of their science program in high school. To date, staffing to support the new middle school initiative has been provided through the Friends of Rookery Bay.

Accomplishment: Rookery Bay Research Reserve is commended for investing in the development of a new program to maintain the interest of students in estuarine and marine science during their middle school years and maximize the value of high school programs to individual classes.

The Rookery Bay Research Reserve has been working to increase the utility of the education program to the local school district and especially to under-served populations within the county. To this end, the reserve is working with an outside education specialist to conduct a formal evaluation of the education program. This effort is focused on identifying the desired goals of the educators who bring students to the reserve. The primary result of the evaluation will be a guide that will allow reserve staff members to assess whether the goals of both the education program and the teachers are being met, and identify where improvements might be made. In light of this effort to support the local schools, the reserve may want to seek a more formal relationship with the Collier County School District.

Recommendation: The NOAA Office for Coastal Management encourages the Rookery Bay Research Reserve to examine available funding opportunities, including an arrangement with the Collier County School District to provide board of education funding for on-site marine educational positions, to further support and expand educational programming at the middle and high school level.

The Department of Environmental Protection recently implemented new guidelines that promote “One DEP.” This is a very positive step for the department in showing the connections between its many valued programs. The Rookery Bay Research Reserve, however, is not just a

Department of Environmental Protection venture. It is a partnership between the department and NOAA. This partnership provides opportunities to build upon the strengths and identities of both agencies, and therefore, it is in the best interest of both partners to promote this alliance.

Recommendation: The Department of Environmental Protection should encourage promotion of its partnership with NOAA at the Rookery Bay Research Reserve while operating within the new “One DEP” framework.

Implementation of General Requirements

The 2012-2017 management plan for Rookery Bay National Estuarine Research Reserve became out of date two years ago. The regulations for the National Estuarine Research Reserve System (15 CFR 921.33) require that management plans be revised at least every five years.

The reserve is currently updating its management plan and has been coordinating with the NOAA Office for Coastal Management.

Necessary Action: The Rookery Bay Research Reserve must work with the NOAA Office for Coastal Management to develop within 90 days of the receipt of the final evaluation report an agreed-upon timeline for the adoption of the final management plan.

Evaluation Metrics

Beginning in 2012, national estuarine research reserves began tracking their success in addressing three specific evaluation metrics for their programs. The evaluation metrics include a five-year target and provide a quantitative reference for each program about how well it is meeting the goals and objectives it has identified as important to the program.

In 2016, Rookery Bay Research Reserve requested to revise their performance measures. The measures were approved July 20, 2016, thus there are only two years of results available for evaluation purposes.

METRIC 1—Community Awareness

Goal: To increase the community's level of awareness, knowledge, skills and sense of value for the coastal environment that would result in positive attitudinal and behavioral change.

Objective: Conduct education, training and outreach programs for a variety of targeted audiences that incorporates the best available science and stewardship practices while emphasizing the value of coastal resources.

Strategy: Provide educational opportunities for school field trips, public visitors, and eco-tour participants. Student environmental education and outreach will be implemented through continuing implementation of K-12 Environmental Education Programs (KEEP). On-site interpretive programs and outreach programs will continue, with assistance from trained volunteers. The RBNERR boat and kayak tours will provide an on-the-water education estuarine experience for guests.

Performance Measure: The number of K-20 students, visitors to the Environmental Learning Center, attendees at RBNERR festivals and events, and the number of visitors who experience a RBNERR eco-tour.

Targets: Annually, 14,000 K-20 students, visitors to the Environmental Learning Center, attendees at RBNERR festivals and events, and the number of visitors who experience a RBNERR

First Year Results: 10,161

Second Year Results: 12,479

Cumulative Results: 81% of goal.

Discussion: Due to damage from Hurricane Irma in September 2017, the reserve was closed for an extended period, which caused a drop in total attendance figures. As of the time of the site visit, the reserve was once again highly functioning and well on its way to meeting this target.

METRIC 2 – Monitoring Hydrologic Restoration

Goal: Minimize adverse environmental impacts from land use while restoring the ecosystem services.

Objective: Support regional efforts to reestablish the hydrologic connections from the Fakahatchee watershed and Southern Golden gate Estates (Picayune Strand State Forest) the Ten Thousand Islands.

Strategy: Long-term fisheries and juvenile shark research and monitoring in the Ten Thousand Islands (TTI) is a crucial program for RBNERR to continue to assess and forecast estuarine impacts stemming from the upstream Picayune Strand hydrologic restoration, a key component of the Comprehensive Everglades Restoration Plan. Monitoring efforts are focused on the TTI back bay systems (Pumpkin Bay, Faka Union Bay, and Fakahatchee Bay). This effort includes an annual compilation, analysis, and dissemination of long-term data for RBNERR management needs and to RBNERR partners and stakeholders (e.g., USACOE, USFWS, SFWMD). This effort provides a science-based, data-driven platform for informed coastal/estuarine resource management and assessment.

Performance measure: The number of fish trawls and juvenile shark tagging trips conducted by RBNERR.

Targets: Annually, conduct 30 fish trawls & juvenile shark assessment and tagging trips.

First Year Results: 41

Second Year Results: 29

Cumulative: 35 per year average (exceeded the goal of 30)

Discussion: The reserve staff were hindered by bad weather during the second year, yet the average over the two years exceeds the annual goal.

METRIC 3 – Maintain and Restore Habitat

Goal: Improve the conservation of native biodiversity

Objective: Reduce non-native invasive plant and animal species.

Strategy: The acres of uplands and wetlands in RBNERR where the Stewardship team takes direct actions to address loss of native biodiversity due to invasive plants and animals and

suppression of natural fire regimes. Initial treatment and outlier treatment of many exotic invasive plants populations has led to maintenance levels in many areas. Additionally, where funds and staff limit extensive exotic plant control, Stewardship staff focus of rare habitats and highs with high levels of native biodiversity. Exotic plant treatment combined with prescribed fire that mimics natural fire regimes are efficient at providing additional control. RBNERR has a mature prescribed fire program leveraged by assistance from federal, state, and local partners. Several areas of the RBNERR are now in the third or fourth year of fire rotation. The addition of an Environmental Specialist will assist with additional acreage treated. Stewardship staff will follow Best Management Practices to ensure no impact to listed species or their habitats occur.

Performance Measure: Number of acres that are exposed to prescribed fire and treated for exotic invasive plants.

Target: Annually, 500 acres that are exposed to prescribed fire and treated for exotic invasive plants.

First Year Results: 942 acres

Second Year Results: 883 acres

Cumulative Results: 912 acres per year (180 percent of goal)

Discussion: The Rookery Bay Research Reserve has been very successful at meeting targets for invasive species control and controlled burns to restore habitats within the reserve.

Conclusion

For the reasons stated herein, I find that the Florida Department of Environmental Protection is adhering to the programmatic requirements of the Coastal Zone Management Act and its implementing regulations in the operation of the Rookery Bay National Estuarine Research Reserve.

These evaluation findings contain one necessary action and six recommendations. The recommendations must be considered before the next regularly scheduled program evaluation, but they are not mandatory at this time. Program recommendations that must be repeated in subsequent evaluations may be elevated to necessary actions.

This is a programmatic evaluation of the Rookery Bay National Estuarine Research Reserve that may have implications regarding the reserve's financial assistance awards. However, it does not make any judgment about or replace any financial audits.

Keelin S. Kuipers
Deputy Director
NOAA Office for Coastal Management

Date



Rookery Bay National Estuarine Research Reserve
DRAFT Management Plan
Florida Department of Environmental Protection
Office of Resilience and Coastal Protection