DRAFT

REPORT

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River *of* Grass Greenway

FEASIBILITY STUDY *and* MASTER PLAN

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Part 01
INTRODUCTION

1.1 Project Origination

The idea for the proposed River of Grass Greenway (ROGG) was born out of a notion to provide public access to one of the most unique and well-studied landscapes in the world. Building on the allure of a long-distance hiking and biking experience for a variety of users, the ROGG is envisioned to bring awareness to the Greater Everglades ecosystem, including the ongoing ecological restoration in the region. The concept of the ROGG comes at a time when there are growing concerns about the environmental impacts of providing vehicle-only access to our National Parks. Multi-use trails and alternative transportation access have proven to be effective means at reducing natural resource impacts, while still encouraging access to sensitive natural areas. Well-planned, multi-use trails such as the ROGG allow access to natural areas, provide pathways for alternative modes of transportation and enhance opportunities for improved fitness.

Drawing upon the historical corridor of the Tamiami Trail, designated as U.S. 41 /Tamiami Trail/S.R. 90 (hereafter U.S. 41), the proposed ROGG links seven national and state parks, preserves, forests, and wildlife refuges. Many of these natural areas have received intensive focus in recent decades as part of the Comprehensive Everglades Restoration Plan (CERP), the largest ecological restoration project in the world. Through these alternate transportation connections, the ROGG will provide an opportunity for millions of residents and tens of millions of visitors of South Florida to experience the Everglades landscape and culture in a sustainable manner. Connecting Naples and Miami, the ROGG is envisioned as pathway roughly parallel to U.S. 41 that is suitable for a wide range of non-motorized transportation and recreation activities such as walking, bicycling, bird watching, photography, fishing and general enjoyment and education of the Everglades ecosystem.

The concept of the ROGG was originally conceived by the Naples Pathways Coalition (NPC) in 2006 and envisioned as a hard-surfaced trail separate from Tamiami Trail. Between 2006 and 2009, the NPC presented the concept of the ROGG across the South Florida region and worked to obtain letters of support from municipalities, local regulatory agencies, and private interests. In 2009, the National Park Service (NPS) Rivers, Trails & Conservation Assistance (RTCA) program in collaboration with the NPC submitted proposal to the U.S. Department of Transportation (USDOT) Federal Transit Administration (FTA) to fund a feasibility study and master plan for ROGG through the Paul S. Sarbanes Transit in Parks Program (TRIP). The grant for this work was funded by the FTA through an interagency agreement with the NPS RTCA. The NPS RTCA contracted with the Miami-Dade County Parks, Recreation, and Open Spaces Department (MDPROS) to serve as the project manager for the study. In 2012, MDPROS contracted with AECOM Technical Services, Inc. (AECOM) to provide planning, public outreach, documentation, and vision development services to assist in the preparation of the Feasibility Study and Master Plan.

The objectives for the ROGG feasibility study and master plan identified by the FTA agreement with the NPS RTCA include:

- Identification and mapping of pre-existing work related to the corridor
- Identification of potential alignments, routes, links, and connections
- Determination of alignment of intersections and access points
- Identification and analysis of necessary considerations for the proposed corridor area
- Determination of legal feasibility and compatibility with surrounding land parcels
- Identification of environmental constraints and needed mitigation
- Promotion of public participation
- Analysis of the demand, use, and benefits of the ROGG
- Assessments and other necessary tasks to determine the feasibility of the ROGG and an efficient and ecologically sensitive design to meet the viable goals of communities, multiple agencies, jurisdictions, and various organizations

1.2 Feasibility Study and Master Plan Approach

The approach for the Feasibility Study and Master Plan includes a variety of assessment, public outreach, and documentation tasks accomplished over an estimated 18 month schedule. The Project Team consists of MDPROS and a team of consultants led by AECOM, including Alta/Greenways that is a trails planning firm with extensive international experience and transportation planning firm Nelson Nygaard, in coordination with the NPS RTCA and the ROGG Executive Committee from the NPC. Collectively, these tasks included pre-planning, existing conditions analysis, conceptual corridor vision development, development of an implementation plan, and compilation of the Feasibility Study and Master Plan Report. The following provides a brief overview of these tasks:

- **Pre-Planning** – This step consisted of the identification of stakeholder groups, development of the process for engaging the public, and initial evaluations of the corridor and comparable projects. MDPROS, in association with the NPS RTCA, established a project Steering Committee comprised of approximately 16 representatives from a variety of land management agencies, regulatory agencies, tribes, and other key groups found within the general ROGG Study Area. A Public Involvement Plan (PIP) was developed to provide a schedule and plan for engaging public interaction using a variety of different techniques ranging from public meetings to a project website for public comment for the duration of the project.

  A kick-off workshop and corridor tour was conducted with the Steering Committee and Project Team in September 2012 to develop a common understanding of existing conditions; and to discuss general opportunities and constraints, and management within the corridor. The Steering Committee tour consisted of ten selected locations throughout the corridor Study Area to allow committee members to get an overall understanding of the breadth and diversity of the proposed ROGG. In November 2012, the Steering Committee met with the Project Team to review best practices and lessons learned from comparable existing greenway corridors from around the country and the world.

- **Existing Conditions Analysis** – This task consisted of the compilation, review, and assessment of existing data, reports, and site physical conditions relative to the ROGG. Geographic information system (GIS) maps and data were compiled and distilled into base maps for initial site evaluations. Technical reports such as regional environmental studies, regulatory documents, traffic studies, and recreation plans were assessed for potential relevance to the ROGG planning process.

  In November 2012, the Project Team conducted site evaluations over the entire corridor to assess the base maps and technical documentation in the field. A summary of this site review was presented to the Steering Committee in January 2013. At this meeting, the Project Team also reviewed other potential projects occurring within the Study Area that have the potential to affect the planning of ROGG. The results of the Existing Conditions Analysis are included in Chapter 2 – Research and Analysis of this report.

- **Conceptual Corridor Vision Development** – This task consisted of the development of concepts and alternatives to be collated into a conceptual master plan and considered for feasibility. It also includes an assessment of the costs and benefits provided by the ROGG. This task was initiated with a series of public workshops held in various portions of the corridor to provide extended opportunities for public comment and input to the feasibility study and plan. Workshops were held in Naples (January 29 – February 2, 2013), Everglades City (February 26 – March 2, 2013), and Miami-Dade County (March 12 – March 16, 2013). Regional associations, clubs, and organizations with special interests along the ROGG corridor were specifically invited to participate in the workshops. Individuals that attended were interviewed to document ideas and concerns. Participants were invited to provide input on potential routing alternatives, trailhead and gateway opportunities, and ways to connect to existing destinations along the corridor. .

  The feasibility of concepts that emerged from these workshops were refined based on criteria developed during the workshops that included resource impacts and benefits, expected costs, and economic benefits. These criteria were used to improve the conceptual master plan for the corridor. The conceptual master

plan and associated assessments were reviewed with the Steering Committee and the public through a variety of presentations. The results of the Conceptual Corridor Vision Development task are documented in Chapter 3 – Corridor Feasibility and Vision.

- **Implementation Plan Development** – This task consisted of assessing potential funding sources, partners and sponsors, short- and long-term maintenance and upkeep, and cost benefit analyses. These assessments were reviewed with the Steering Committee to identify actions for short-term, mid-term, and long-term implementation of the ROGG. The results of the Implementation Plan Development task are documented in Chapter 4 – Implementation of this report.

- **Feasibility Study and Master Plan Report** – The Project Team prepared a preliminary Feasibility Study and Master Plan report for review by the Steering Committee. Comments from the Steering Committee were incorporated into a Final Feasibility Study and Master Plan Report along with summary materials. Non-profit and environmental groups, interested individuals, and elected officials were educated and informed about the ROGG Feasibility Study and Master Plan through presentations in various public forums.

These tasks have been completed and documented as part of the report in four chapters (see **Diagram 1**). The first chapter identifies the project origin and approach. The second chapter provides an overview of the existing conditions, literature and comparables relevance to the feasibility of ROGG. The third chapter establishes a feasibility criteria and tests each option for trail routing developed during extensive public involvement. The fourth chapter contains a project management plan complete with funding opportunities and cost benefits. Additional information may be found in the appendix of the document.

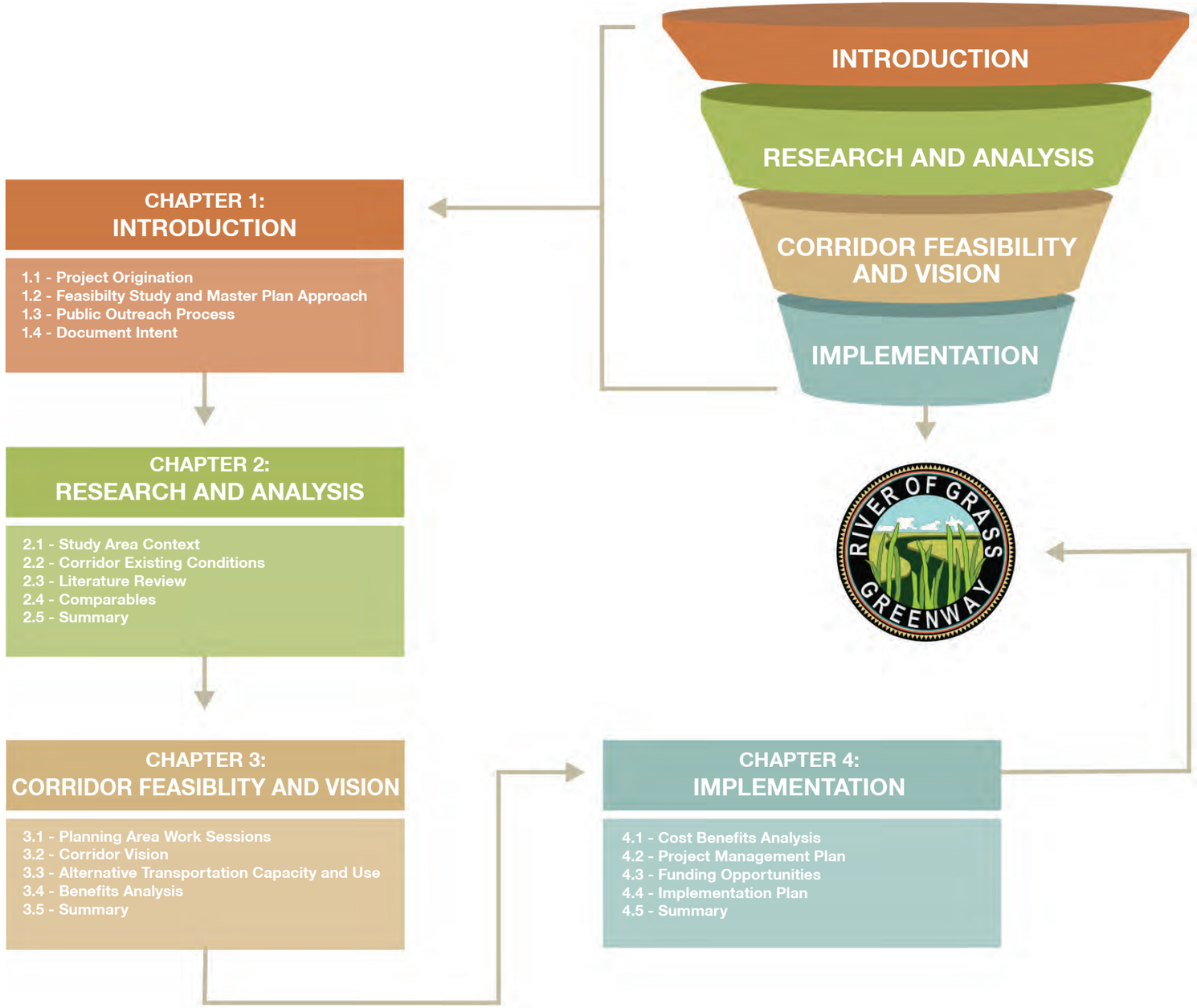


Diagram 1- ROGG Feasibilty Study and Master Plan Format

1.3 Public Outreach Process

A PIP was developed to guide effective outreach and timely distribution of information to participants that engaged in the ROGG Feasibility Study and Master Plan. The following diagram illustrates the techniques identified in the PIP and used as part of the Study as well as the flow of input and feedback for the groups identified in the plan.

1.3.1 Goals

The ROGG planning process included a variety of communication channels to help residents and stakeholders understand the scope, issues, impacts, and benefits of work completed (see **Diagram 2**). The planning process solicited input and feedback from stakeholders as to their specific needs, issues, concerns, and recommendations.

1.3.2 Techniques and Objectives

The ROGG Feasibility Study and Master Plan relied on public participation through outreach, information exchange, feedback, and consensus to inform the feasibility and master planning of ROGG. In an effort to ensure broad public participation, the planning process included the following formats:

a. Steering Committee
b. Advisory Groups
c. Primary Agency Presentation and Review Meeting
d. Community Meetings/
e. Community Workshops/Planning Area Work Sessions
f. Stakeholder Interviews
g. Project Website (Miami-Dade County)
h. Public Engagement Site (MindMixer)
i. Public Presentations
j. Press Releases
k. Handout Materials

1.4 Document Intent

The ROGG Feasibility Study and Master Plan document was developed with the intent of providing information needed by all parties associated with the planning and design of the pathway. This document has considered the technical aspects, recreation objectives, and public priorities identified in previous studies completed throughout the Greater Everglades region. Its four chapters include:

- Chapter 1 – Introduction
- Chapter 2 – Research and Analysis
- Chapter 3 – Corridor Feasibility and Vision
- Chapter 4 – Implementation

Supplemental information is included in the Appendix.

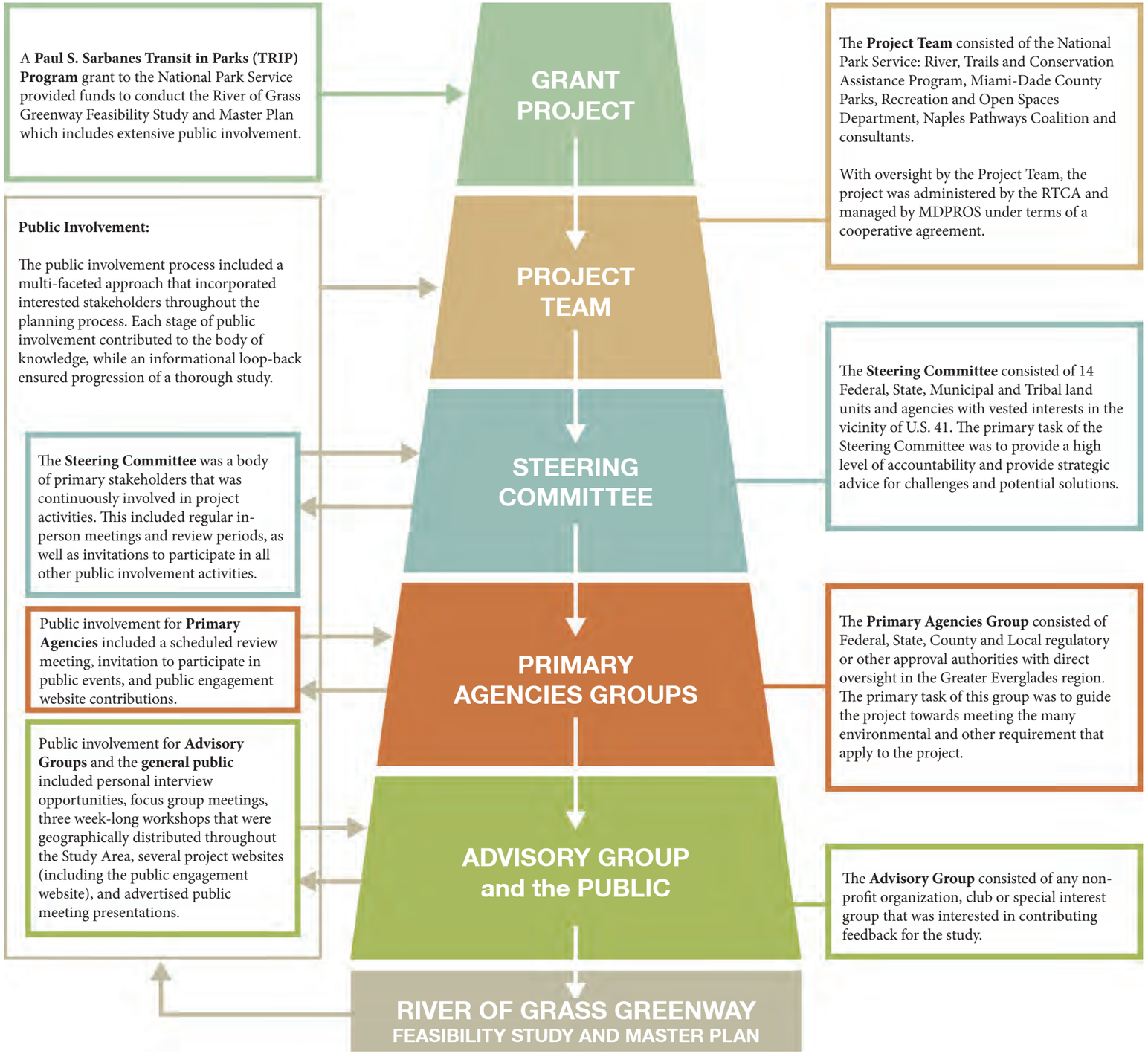


Diagram 2- Public Involvement Process

Cyclist riding along the Skark Valley Tram Road in Everglades National Park

Part 02
RESEARCH AND ANALYSIS

The miracle of light pours over the green and brown expanse of saw grass [sic] and water, shining and slowly moving, the grass and water that is the meaning and the central fact of the Everglades. It is a river of grass.

– Marjory Stoneman Douglas

Introduction

The ROGG occurs within a complex environmental, social and cultural region that has a long history of human use and occupation, but has undergone dramatic changes in land use, hydrology, and population over the last 50 to 100 years. Opportunities to experience and engage in this environment provide both the impetus for establishing a regional greenway as well as conditions and context that affect its feasibility and implementation.

The context provided by the regional setting, coupled with specific conditions within the corridor, represents the fundamental baseline that needs to be addressed by the feasibility study and master plan. This review of context and conditions does not occur in isolation from the extensive array of previous studies or the history of successful greenway and trail development across the world. The regional studies expand the knowledge base for issues, opportunities, and constraints posed by the context and conditions of the corridor, while comparable greenway projects provide technical and social examples of solutions to opportunities and constraints for the ROGG.

To that end, the purpose of this chapter is to provide summary documentation of context, existing conditions, relevant aspects of published studies and records, and comparable projects along with the implications of those elements for the feasibility study and master plan. To accomplish this, the chapter is divided into five sections, including the following:

1. Corridor Context – This section documents seven elements, including a) history, b) climate, c) geography, geology, and soils, d) hydrology and hydrogeology, e) ecology, f) public and tribal ownership, and g) transportation components of the lands in and adjacent to the ROGG Study Area. Descriptions of each element are provided , which are then followed by an assessment of the implications each element has for the feasibility study and master plan for ROGG.

2. Existing Conditions – This section documents the typical conditions and key nodes for potential alignment alternatives, points of interest, and relevant findings for the ROGG Study Area. For documentation purposes, the ROGG Study Area was divided into three segments to allow for more detailed focus on the conditions in specific areas of the corridor. While these segments provide convenience in documenting and presenting information for portions of the corridor, the feasibility study and master plan for the entire ROGG corridor addressed the findings from these segments as a whole for the entire corridor.

3. Literature Review – This section provides a comprehensive list of influencing documents that have been prepared for, or govern the lands within or adjacent to, the ROGG Study Area. It also summarizes a subset of these documents with particular relevance to the feasibility study and master plan. These summaries include a brief overview of each document and an assessment of issues relevant to ROGG that were identified in these documents.

4. Comparables – This section documents greenway and trail projects from state, national, and international locations that exhibit successful implementation of design, construction, and/or operational aspects relevant to the ROGG. It provides descriptions of seven categories of greenway and trail projects, documentation of best practices, and lessons learned from those projects.

5. Summary – This section provides a summary of the overall conditions and context, literature review, and comparable projects and it provides planning implications for those elements related to ROGG.

For the purpose of this approach and study, the following are defined terms utilized for a number of situations and descriptions:

- The use of the term Tamiami Trail refers to the concept and original configuration of the roadway built to provide a connection between Miami and Tampa, while the use of the term U.S. 41 refers to the current pavement types and widths and shoulder configuration of the existing roadway.
- The use of the term Old Tamiami Trail refers to the portions of the original roadway that were removed from vehicular use by improvements and construction of U.S. 41.
- The use of "maintained U.S. 41 right-of-way (ROW)" refers to the portion of U.S. 41 ROW that consists of the paved roadway and grassed shoulder (in general, this ranges from 34 - 125 feet), while "U.S. 41 ROW" refers to the entire width of the established right-of-way for the U.S. 41 corridor (in some cases this is 200 feet wide).
- Words such as trailheads that can be written as one or two words will be referred to in the text as one word, except for re-printing of titles of published reports in which the word was spelled as two words for consistency with the original report.

Approximate extent of Florida's shoreline during the Paleoindian period, with sea levels 130 to 165 feet below those of today.From: Milanich, J.T. 1995. Florida Indians and the Invasion from Europe.

Graphical depiction of megafauna hunting activities by prehistoric humans; Photo Credit: State Archives of Florida, Florida Memory, http://floridamemory.com/items/show/35557

2.1. Corridor Context

The purpose of this section is to document the physical, cultural, and ecological setting for the ROGG and planning implications for the feasibility study and master plan stemming from this contextual setting through a review of the following seven elements:

- **History** - This element summarizes the rich historical and cultural heritage of the corridor and notes the uses and features resulting from historical and current land uses within the corridor.
- **Climate** – This element summarizes weather and climatic conditions for south Florida.
- **Geography, Geology, and Soils** – This element provides an overview of the physiography, geology, soils, and significant geographic features of the region around the Study Area.
- **Hydrology and Hydrogeology** – This element summarizes the hydrological and hydrogeological setting for the Study Area.
- **Ecology** – This element provides an overview of the natural systems and related natural processes that support flora and fauna occurring within the corridor.
- **Public and Tribal Ownership** – This element reviews the ownership patterns for public and tribal entities within the Study Area.
- **Transportation** – This element summarizes traffic characteristics for U.S. 41, including the effects of visitation patterns for the parks on traffic patterns within the Study Area.

Each element begins with a summary of applicable data available and ends with an assessment of potential implications for planning efforts. A bibliography of documents from which information was compiled to prepare the summaries is included in **Appendix 1**.

2.1.1. History

In addition to its well-documented natural resources, the Everglades region has a rich and complex human history. The Everglades region has had a human presence for more than 12,000 years, even prior to the earliest formation of the Everglades system. This human presence has shaped and altered the natural systems of the region through that time, ranging from shell midden formation to fire patterns to regional drainage features. The population of the region rapidly expanded beginning in the early 1900s, which was coupled with construction of physical features such as the Tamiami Trail, levee and canal system, and expansion of residential and commercial uses on the eastern and western margins of the Everglades system. The following provides an overview of the historical and cultural context in which the proposed ROGG occurs. For purposes of this document, this context was broken down into three separate general categories for ease of reference, consisting of: Native Americans, 20th Century Development and Hydrology Alterations, and Conservation.

Native Americans

Like other parts of North America, Florida has been occupied by humans for more than 12,000 years. For south Florida and the Everglades, Lodge (2005) notes that four distinct cultural periods define the interaction of Native Americans with the Everglades system, including the Paleo-Indian Period, Archaic Period, Formative Period, and Seminole/Miccosukee Period. Paleo-Indians were early hunter/gatherers that hunted large animals, or megafauna, throughout the state. The Archaic Period began with the extinction of the megafauna and included the transition of subsistence from hunting to shellfish as well as the beginning occupation of the newly forming Everglades systems. Over subsequent centuries during the Formative Period, complex cultures developed in south Florida that cultivated agriculture and fired clay pottery, traded with groups throughout the southeastern United States, and developed temple mounds and village complexes. At the time of first European contact, two primary Native American groups controlled the south Florida region: the Calusa and Tequesta. After the decimation of these two people groups by disease and slave raids, few Native Americans inhabited the region until members of Maskókî tribes, referred to as the Creek Nation by white settlers, migrated into Florida and became known as the Seminole and Miccosukee tribes. The following provides a brief overview of the Native American use of the region consistent with the periods outlined in Lodge (2005).

Paleo-Indian Period

The Paleo-Indian period began with the advent of humans to Florida at least 12,000 years ago and extended until approximately 9,000 years ago. Archaeological research conducted at two sites in south Florida, Little Salt Springs near Charlotte Harbor (southwest) and the Cutler Fossil Site within the Deering Estate at Cutler (southeast), found evidence of Paleo-Indian occupation dated to approximately 12,000-13,000 years ago and 10,000 years ago, respectively. Large, now extinct, megafaunal species such as giant land tortoises, camels, and sloths occurred in the state. The semi-nomadic Paleo-Indians hunted these megafaunal species, but also supplemented their diets with smaller game and plant products. Although data is limited, human occupation of the region around the ROGG was likely sparse during the Paleo-Indian period.

During this time, the land area of the Florida peninsula was wider than current conditions due to lower sea levels and the climate was cooler and drier. The climatic conditions limited human habitation primarily to areas around coastal areas, rivers, and other large water sources. Moreover, the systems of the Everglades had not yet developed and the dry conditions on the interior of the state likely limited the occupation of the interior portions of the Everglades and Big Cypress regions. However, the coast line continually changed during this period as sea levels rose approximately six-feet per century, which also resulted in wetter climate conditions and more water sources for Paleo-Indians to use.

Archaic Period

The transition to the Archaic period began approximately 9,000 years ago with the extinction of the megafauna and extended until approximately 3,500 years ago when fired clay pottery began to be used and settlements began to be occupied. In the early part of the Archaic period, the extinction of the megafauna required modifications to hunting and food gathering, which included transitions to the use of shellfish and the use of different tools for food gathering. Coupled with the still rapid sea level rises characteristic of the end of the Paleo-Indian period, the early Archaic period exhibited drier conditions than the late Paleo-Indian period decreased available water resources, which made living conditions difficult in south Florida. However, conditions began to moderate 7,000 years ago through slower sea level rise, which allowed for more stable coastal resources such as shellfish availability, and increased moisture that allowed the formation of mesic habitats now common to south Florida, including the area that later became the Everglades.

As rainfall continued to increase and as Lake Okeechobee formed in the late Archaic, the modern ecological system of the Everglades completed its transformation into its current ecological system. People in the late Archaic period spread throughout the Everglades, using tree

islands, hammocks, and other higher elevation areas within the marshes for habitation. The close proximity of extensive freshwater resources such as turtles and snails and productive coastal resources such as shellfish provided rich resources for continuous occupation of desirable locations, eventually leading to the establishment of villages and other settlements and the establishment of middens that may have contributed to the formation and longevity of some tree islands.

Formative Period

Following the beginning of the use of fired clay pottery tempered with fibers from Spanish moss or palmetto fibers, the Formative Period contained the gradual transition from the late Archaic cultures to the increasingly complex social organizations associated with Glades cultures, including the Calusa and Tequesta peoples encountered by the early Spanish contacts in Florida. Populations increasingly drew upon the very productive estuaries in the region as well as the freshwater and upland habitats of the region, leaving behind middens in a widespread area of the Everglades including on tree islands. Associated with the population increase, increasing social organization included the development of social strata ranging from ruling classes to labor classes, an organization that allowed for the construction of large mounds used for burials and other social purposes and canals for drainage and transportation. These cultures also used fire as a management tool, potentially for the propagation and management of natural plant communities used for food supplies.

Within the vicinity of the proposed ROGG Study Area, this increasing social organization culminated in the chieftain social orders associated with the Calusa and Tequesta peoples, which were the two people groups dominant in south Florida when the Spanish first arrived in the state. The Calusa controlled the southwest portion of Florida centered around Charlotte Harbor and the Caloosahatchee River, while the Tequesta controlled the southeast portion of Florida around the Miami River. However, the Tequesta were required to show allegiance to the Calusa chief by the time of Spanish contact. The Calusa traveled extensively around the coastal systems and rivers of south Florida and were capable of using sea going canoes to travel to Cuba, while the Tequesta also canoed through the coastal systems rivers and seasonally used tree islands within the Everglades for habitation.

Led by Pedro Menendez des Aviles, the Spanish formally visited with the Calusa in their main settlement at the mouth of the Caloosahatchee River in 1566. In the following years, the Spanish introduced new foods and goods to the Calusa, while the Calusa worked to use the military skills and equipment of the Spanish to maintain influence in the region. However, the fatal diseases transmitted from the Spanish to the Native Americans, coupled with slave raids from other European powers ultimately resulted in the destruction of the Calusa and Tequesta societies. In 1763, a group of 300 Calusa and Tequesta peoples left Florida for Cuba, thereby effectively ending these cultures in Florida.

Seminole/Miccosukee Period

The Seminole/Miccosukee period includes the renewed habitation of the Everglades region by members of the Seminole and Miccosukee tribes beginning approximately in 1825 and extending to the present day. In the early 1700s, members of the Creek Nation began to move into Spanish-held Florida to occupy lands left essentially unoccupied by the effects of European diseases and slaving raids and/or to move away from encroaching European settlers. The Creeks that moved to Florida included speakers of the related, but separate, Mikasuki and Muskogee languages, but came to be collectively known as “Seminoles” by European settlers. In the early 1800s, a number of factors led to a series of conflicts called the Seminole Wars. These resulted from friction between the Seminoles and settlers in Georgia and Alabama resulting from the incorporation of escaped slaves into the Seminole population in Florida, raids by Seminoles into Georgia that were encouraged by the British during the American Revolutionary War, and forced relocations of Native Americans from the eastern United States after Florida became a state in 1821.

The Seminole Wars ranged throughout Florida, including the battle of Turner River during the Third Seminole War, with the Seminoles gradually being forced to withdraw into south Florida. These conflicts, coupled with forced relocations of Seminoles to lands west of the Mississippi River reduced the Seminole population significantly, with estimates of less than 500 Seminoles and 100 Miccosukee remaining. Moreover, these conflicts left the Seminoles living in lands around Lake Okeechobee, Big Cypress Swamp, and the eastern edge of the Everglades. Miccosukees were relegated to living deep in the wilderness of the Everglades, isolated from the majority of the other residents of Florida.

The late 19th century and first half of the 20th century brought changes in the use of the Everglades system for many of the Seminoles and Miccosukees. Following the cessation of the Seminole Wars, the remaining Seminoles and Miccosukees adapted to life within the Everglades In the late nineteenth century, living in small, temporary camps on “tree islands” and sustaining themselves through hunting, trapping, fishing, and trading with settlers at remote frontier outposts. Similar to the earlier Tequesta, they began to occupy trees islands for agriculture, hunting camps, and burial purposes.

The completion of the Tamiami Trail in 1928 blocked traditional north/south canoe travel, added east/west travel routes on the Tamiami Canal, and established tourist trade in formerly isolated portions of the lands used by the tribal members. Tribal members, especially from the Miccosukees, also began to leave the tree islands and settle along the Tamiami Trail. However, some continued to live traditionally within the Everglades system and requested to be left alone from assistance or interference from governmental agencies. This perspective was communicated to state and local officials at a meeting with tribal members and on the Tamiami Trail in 1936. The meeting is now commemorated with a historical marker on Tamiami Trail. Tribal access to lands south of Tamiami Trail was curtailed following the establishment of Everglades National Park (ENP).

The Miccosukee and Seminole Tribes of Florida maintain a significant presence within the ROGG corridor. The United States officially recognized the Seminole Tribe in 1957 and the Miccosukee Tribe in 1962 as sovereign governments, although a few individuals maintained a status as independent Seminoles separate from the tribes. Reservation lands were placed in trust for the tribes, including lands at the eastern terminus of the ROGG at Krome Avenue and the Miccosukee Indian Village. Both tribes established federal corporations to guide the economic development and independence of the tribes. Although the primary economic enterprise for the tribes is gaming such as the Miccosukee Resort and Gaming facility on the trust lands at Krome Avenue, the tribes also engage in agricultural activities associated with citrus and cattle; tobacco sales; educational, tourism, and cultural activities; and a variety of other enterprises. Tribal members own and/or live within single family residences on individual parcels or in small communities, some of which have been repatriated from federal land holdings within Federal parks. Significant cultural sites, including those used for the Corn Dance ceremonies occur near Tamiami Trail in or near portions of the proposed ROGG corridor.

Graphical depiction of a Spanish explorer in Florida; Photo Credit: State Archives of Florida, Florida Memory, http://floridamemory.com/items/show/2803

Drawing of Indian Mound near Fort Taylor, Monroe County, Florida. Photo Credit: State Archives of Florida, Florida Memory, http://floridamemory.com/items/show/3274

Seminoles canoeing through the Everglades - 1910s Photo Credit: State Archives of Florida, Florida Memory, http://floridamemory.com/items/show/35068

Military Map of the peninsula of Florida south of Tampa Bay, 1856 (Lieut. J. C. Ives under the general direction of Capt. A. A. Humphreys by the order of the Hon. Jefferson Davis, NY: Leve & Alden Printing Co., 1856, downloaded from Maps ETC, at http://ect.usf.edu/maps #f3793

Monument for the 1936 Seminole Conference

Native Americans - Relevance to ROGG: The Native American cultural use of the ROGG corridor affected feasibility assessments, potential alignment selection, construction requirements, and material selection for the ROGG feasibility study and master plan efforts. Specific influences on analysis for the feasibility study included:

- **Archaeological Resources** – Archaeological resources reflecting the long use of the areas by Native Americans could be distributed throughout the ROGG corridor and have been noted in the vicinity of the Study Area as part of surveys completed for the Big Cypress National Preserve General Management Plan (GMP). However, specific surveys within the entire Study Area have not been done as part of the ROGG feasibility study. Surveys for archaeological and/or cultural resources will be required prior to construction activities consistent with laws and regulations such as the Antiquities Act of 1906 and National Historic Preservation Act.

  Sites determined to be significant during later studies will need to be addressed as the master plan is finalized. The final alignment of the ROGG should avoid or cause no impact to mounds, middens, burial grounds, or other archaeologically significant features determined through the surveys or through review of documented records. For those sites located in or adjacent to the ROGG Study Area, measures will be required to protect archaeological sites from looting and vandalism. Archaeological resources found during surveys, construction or operation of the ROGG will need to be placed into public museums, although Native American human remains, funerary objects, sacred objects or objects of cultural patrimony require coordination with Native American tribes for dispossession, including repatriation. The ROGG provides opportunities to interpret the archaeological resources in the region and along the proposed trail.

- **Tribal Lands** – Tribal lands consisting of reservation trust lands, repatriated home sites, or lands owned fee simple by tribes or tribal members occurs throughout the Study Area, although this ownership does not extend into the U.S. 41 ROW. Depending on the trust lands involved, the Miccosukee and/or Seminole Tribes of Florida would control the potential feasibility of any trail alignment options through reservation trust lands. Routing alignments extending on and through privately held, fee simple ownership land would not be considered feasible unless requested by the subject property owner(s).

- **Battle of Turner River Battlefield** - The battlefield for the Battle of Turner River occurs generally between Birdon Road and Burns Lake Road within the Turner River floodplain and related prairies, although the boundaries are indistinct. Additional studies on the complete extent of the battlefield would shed light on the boundaries of the battlefield. During the battle, multiple individuals from both sides of the conflict perished within the battlefield, with many bodies left unburied where they fell following the conflict. Due to the loss of life within the battlefield and lack of distinguished grave sites, concerns were expressed during public workshops about potential impacts to unknown grave sites that would result from construction activities for the ROGG. Placing the trail on existing infrastructure such as U.S. 41 through the battlefield would likely not preclude feasibility of routing the ROGG through this portion of the corridor. Specific route locations that occur outside of existing infrastructure and disturbed lands within the battlefield were subject to additional public comment during the feasibility review.

- **Meeting Monuments** – The location of the 1936 meeting between state and tribal leaders has been commemorated with two separate monuments at the entry road into the Monument Lake Campground. One monument comprised of low stone walls in a square shape occurs on the south side of U.S. 41, while a stone historical sign marks the location on the north side of U.S. 41. Routing alignments that avoid the monuments would not preclude feasibility of the ROGG in this portion of the Study Area. Construction activities will need to be coordinated to avoid the monuments or other associated features identified during surveys for design and permitting. Review of activities in and around these monuments may require additional public review during permitting efforts.

- **Ceremonial Sites** – The Big Cypress National Preserve GMP notes the presence of two ceremonial sites important for the cultural practices of the Miccosukee and Seminole tribes that occur within the vicinity of U.S. 41 and the ROGG Study Area. The specific locations of the sites have been reviewed and addressed as part of the feasibility study and master plan process for ROGG, but are not documented here out of sensitivity to the significance of the sites. The Superintendent's Compendium 2012 documents buffers and closures to public use for those two sites within the Preserve. The feasibility for ROGG in this segment depends on routing locations that accommodate land use and construction requirements in the vicinity of these sites, including any restrictions on construction activities and public use associated with lands on which the ROGG would occur. The planning for specific routing alignments will need to address the buffers and associated restrictions, which may include limiting route locations to existing infrastructure associated with the U.S. 41 ROW. The master plan needs to accommodate access for tribal members as well as access controls to limit unwanted intrusions into the sites from non-tribal members.

Native American Summary

Florida has been occupied by humans for more than 12,000 years, starting with the Paleo-Indian period when the land area of the Florida peninsula was wider than current conditions and the climate was cooler and drier. The Archaic period (9,000 – 3,500 years ago) included the advent of clay pottery and permanent settlements, and it was the period in which the modern ecological system of the Everglades formed. The Formative Period included the establishment of increasingly complex social organizations associated with Glades cultures, including the Calusa and Tequesta peoples encountered by the early Spanish contacts in Florida. The Calusa controlled the southwest portion of Florida, while the Tequesta controlled the southeast portion of Florida. The Spanish formally visited with the Calusa in their main settlement at the mouth of the Caloosahatchee River in 1566. Over the next 200 years, factors such as fatal diseases and slave raids resulted in the destruction of the Calusa and Tequesta societies. Archaeological resources from these centuries of human habitation occur within the corridor and provide potential constraints and interpretation options for the feasibility study and master plan for ROGG.

The Seminole/Miccosukee period includes the renewed habitation of the Everglades region by members of the Seminole and Miccosukee tribes. In the early 1700s, Mikasuki and Muskogee speaking members of the Creek Nation began to move into Spanish-held Florida, collectively becoming known as "Seminoles" by European settlers. Following the conflicts called the Seminole Wars, the remaining Seminoles and Miccosukees adapted to life within the Everglades. With the completion of the Tamiami Trail in 1928, some members of the Miccosukee tribe began to settle along the roadway, while others continued to live traditionally within the Everglades system. The ROGG Study Area includes reservation trust lands for the Miccosukee Tribe and several significant cultural sites, including those used for the Corn Dance ceremonies. Relevant elements of the Seminole and Miccosukee historical period considered in the feasibility assessment include considerations for tribal trust lands, the Battle of Turner River battlefield from the Seminole Wars, historical monuments from tribal and government interactions, and avoidance of significant ceremonial sites for the tribe.

20th Century Development and Hydrology Alterations

Florida's Everglades were one of the final frontiers for European settlers in the United States. Although Europeans explored Florida as early as the 1500s, much of interior portions of South Florida remained essentially unoccupied by European-Americans for centuries. Some settlers began to arrive in the region as a result of the Armed Occupation Act of 1842, which granted 160 acres to anyone who would help settle the frontier. But for the most part, the subtropical climate, hydrology, landscape, and conflicts with indigenous populations of the region limited the settlement of the region by Europeans until the late in the 19th century. These early settlers were generally self-sufficient and valued personal independence and a restraint-free life over material possessions, characteristics associated with the "Florida Cracker" culture.

Over time, these residents adapted their lifestyles and subsistence patterns to include fishing and reliance on the diverse resources of the wetlands and tree islands of the Everglades and Big Cypress systems, giving rise to a regional variant of the Florida Cracker culture called "the Gladesmen Swamp/Folk Culture". The Gladesmen relied on the steady supply of fish and game provided by the Everglades ecosystem for sustenance and hides, pelts, and bird plumes for trading at outposts, all of which was similar in many respects to the subsistence and lifestyles of Native Americans within this area at the time. Although the homesteads of early Gladesmen tended to be in isolated locations, a number of informal fishing and hunting camps evolved over time into social gathering places. Practices that focused on access and use, both for subsistence and recreation, became significant features of members of this cultural group. Modern day Gladesmen retain many of the same independent, self-sufficient outdoorsmen characteristics of the early Gladesmen, but now rely on the natural resources of the Everglades more for cultural and recreational experiences than for subsistence, which arises from their respect of and traditional use of the natural areas. These Gladesmen actively participate in public forums to advocate for conservation of natural systems and access for their traditional uses.

Beginning with Hamilton Disston in the 1880s, large-scale drainage projects were implemented to lower natural water levels and drain the vast Central and South Florida wetlands, which created more arable land and provided land to supply development booms spurred by railroads along the coasts of south Florida constructed by Henry Flagler and Henry Plant. Although state policy for drainage of the Everglades and smaller scale drainage activities began prior to 1903, the

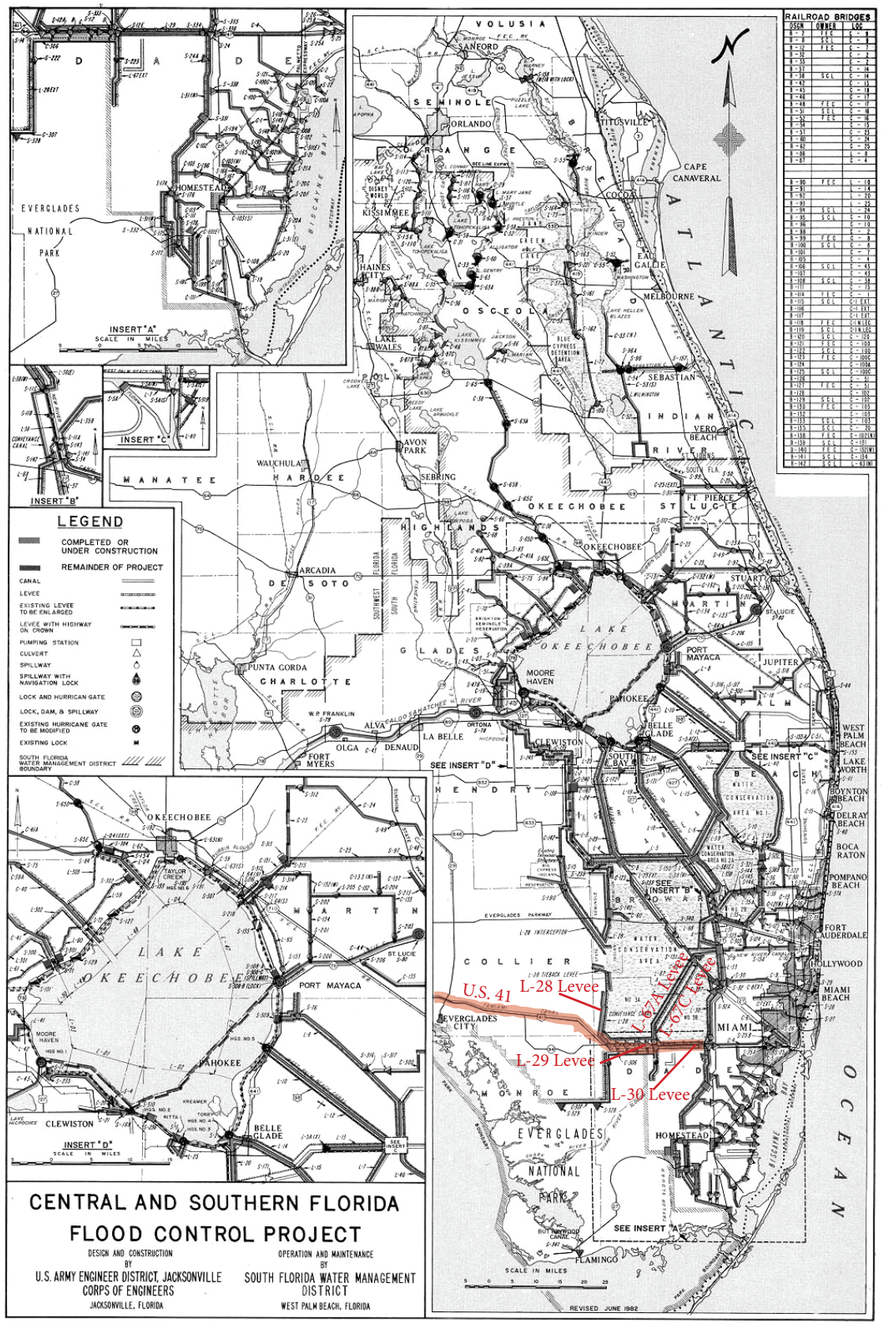
Tamiami Trail

As early as the 1910s, a regional goal emerged to connect the growing population centers of Miami and Tampa through the Everglades and Big Cypress Swamp by the Tamiami Trail, a direct link between Miami and Tampa via the town of Naples. Counties connected by this roadway were responsible for funding segments of the roadway, although many of the counties through the proposed Tamiami Trail corridor lacked the funds to construct the roadway. As a result, private developers stepped in to complete the project. Beginning in 1921, the Chevelier Corporation constructed a southern route of the Tamiami Trail through Monroe County, a segment now known as the Loop Road. A few years later, the Florida State Road Department changed the route of Tamiami Trail back to a Collier County route. Barron Collier, a New York advertising mogul who owned almost one million acres in Lee County including areas now part of Everglades City, agreed to fund construction of the Collier County route of Tamiami Trail.

Completed in 1928, the Tamiami Trail stretched across the marshes and wet prairies of the Everglades. The paved road was originally 20-feet wide and stretched 30 feet when measured shoulder to shoulder with the borrow canal occurring on the north side of the road. Six roadside service stations were established along the road to provide gas, food, overnight facilities, and police patrols along the trail. Over time, bridges and culverts were added to the road to allow for water to pass from north to south and the width of the pavement and shoulder were expanded, especially in the Miami-Dade section of the road, to the current configuration of U.S. 41. As part of improvements to the current configuration, portions of Tamiami Trail east of the Miami-Dade County line were constructed to the north of the original roadway. The original roadway was detached from the main traffic flow and exists as a separate facility called the Old Tamiami Trail. Near Fakahatchee Strand Preserve State Park, small segments of the roadway were similarly detached from traffic use when a curve in the road was straightened. Although considered an engineering feat when constructed due to the harsh conditions of the Everglades through which it had been constructed, the roadway was a significant obstruction to the historical water flow patterns from north to south throughout the corridor, resulting in significant hydrological alterations in the region.

Relevance to ROGG: The Tamiami Trail/U.S. 41 corridor is the southernmost crossing of the Everglades and the primary infrastructure component within the ROGG Study Area. General aspects associated with the assessment of ROGG based on historical conditions are provided here, while other specific information and relevant aspects of the U.S. 41 corridor are provided in the Existing Conditions section of this chapter. The historical elements of Tamiami Trail relevant to ROGG consisted of assessments of feasibility for portions of the corridor, alignment routing options and infrastructure available for incorporation into a future ROGG, future construction requirements, and long-term operations, including:

- **Way Stations** –The way stations within the corridor provide opportunities for rest stations, trailheads, and other amenities and infrastructure for the ROGG. One of these stations, Monroe Station, is listed on the National Register of Historic Places (NRHP). The other way stations are more than 50 years old as well and may be evaluated as historical resources during future permitting or implementation efforts within the corridor.
- **Scenic Byway De-Designation** – Due to the historical significance and scenic nature of the roadway, the Tamiami Trail was designated as a National Scenic Byway in 2000. However, the roadway was de-designated in 2008 at the request of the sponsor organization. Requirements for a scenic byway will not apply to ROGG within the U.S. 41 corridor.
- **Historical Status** – Although the Tamiami Trail and associated Tamiami Canal on the north side of the road are more than 50 years old, non-historic alterations to these features for improvements and other work have rendered these features ineligible for listing on the NRHP.
- **Loop Road** – Consistent with an Environmental Assessment (EA) published in 2010, Loop Road has been enhanced to repair pavement in previously paved portions of the roadway and to enhance the gravel roadbed and drainage under the road in the remaining portions. The current gravel surface accommodates vehicular traffic, but is a rough surface for cyclists. Loop Road provides a potential alignment alternative to U.S. 41 that was evaluated as part of the ROGG feasibility study and master plan. The NPS has also identified ORV trailhead improvements along Loop Road for future implementation. Potential improvements for trailheads or other amenities for ROGG separate from NPS initiatives would require extensive permitting and public coordination, especially with in-holders and other traditional users of Loop Road. Paving the remainder of Loop Road to accommodate the ROGG was not considered feasible based on previous NPS coordination for work on Loop Road.
- **Old Tamiami Trail** – Two primary segments of the Old Tamiami Trail occur within the ROGG Study Area, one consisting of approximately 9.5 miles stretching from the L-67 levee through the Miccosukee Indian Village to Loop Road and the other consisting of two segments near the Fakahatchee Strand Preserve State Park boardwalk. Portions of the Old Tamiami Trail in the first segment have been removed and/or degraded to provide for additional water flow to the south. Another portion occurs within the trust lands of the Miccosukee Tribe of Florida. The Old Tamiami Trail segments were evaluated for potential alignments for ROGG. The original roadbed is generally extant, although the portions of the Old Tamiami Trail occurring east of the Miccosukee Indian Village have been targeted for removal as part of the regional restoration efforts. Dense and tall shrubs have grown on the banks on the side of the road, providing both shade for potential users as well as visual blocks to views of the adjacent marshes. In addition, exotic plant species comprise a significant portion of the shrubs.
- **Tamiami Trail Next Steps** – The NPS prepared the Tamiami Trail Next Steps Environmental Impact Study (EIS) to evaluate alternatives to address hydrologic alterations caused by U.S. 41 in the eastern portion of ROGG north of ENP. The EIS approved the construction of bridges and alterations to the existing road base for U.S. 41, one of which was completed in 2013. The proposed modifications to U.S. 41 approved in this EIS are noted in Section 3 – Literature Reviewed of this chapter.



C&SF Project Map, 1962

Horse drawn carriage crossing of Everglades. 1906. Photo Credit: State Archives of Florida, Florida Memory, http://floridamemory.com/items/show/28871

Construction of Tamiami Trail. Before 1928. Photo Credit: State Archives of Florida, Florida Memory, http://floridamemory.com/items/show/25989

Constructing Tamiami Trail. 1924. Photo Credit: State Archives of Florida, Florida Memory,

ceding of more than 20 million acres of land from the U.S. federal government to Florida coupled with the establishment of the Everglades Drainage District in 1907 increased the rate and pace of drainage of south Florida. The populations of Miami and other existing south Florida cities rapidly increased as did tourism, including nature-based tourism. As populations increased on both coasts, the concept of and need for a roadway connecting the coasts through the Everglades became a regional goal, which was realized in 1928 with the construction of the Tamiami Trail.

Hydrological alterations to accommodate development activities and agriculture were initiated directly through drainage and flood control projects or indirectly through construction activities such as the Tamiami Trail. While an engineering feat, the Tamiami Trail had the effect of damming the flow of water into the Everglades and Florida Bay. Following catastrophic hurricanes in 1926 and 1928, flood control and navigation improvements began to be implemented within the Everglades system, including a dike around Lake Okeechobee that significantly altered water flows from the lake into the Everglades. After several years of drought that caused salt intrusions into regional water supplies, the southeast coast of Florida was inundated with more than 100 inches of rain followed by two additional hurricanes in 1947, resulting in extensive flooding. Congress authorized the Central and Southern Florida (C&SF) Project for Flood Control and Other Purposes in 1948 to prepare and implement a massive flood control plumbing system. The C&SF Project was comprised of four main components, including a perimeter levee on the eastern side of the Everglades for flood control, the designation of an agricultural area south of Lake Okeechobee, the establishment of Water Conservation Areas as water impoundments, and enlargement of the overall canal system for the region. The State of Florida created the Central and South Florida Flood Control District in 1949 to be the state manager of the C&SF Project, which was the predecessor agency to the South Florida Water Management District (SFWMD). Over the next two decades, the C&SF Project was implemented, resulting in flood control and drainage as well as significant alterations to the timing of water delivery, water quality and quantity, and freshwater available for water supply.

Beginning in the 1970s, several initiatives began to address the deterioration of the south Florida ecosystem caused by implementation and operation of the C&SF Project. The restoration of the Kissimmee River, an important source of water to Lake Okeechobee, began in the mid-1980s with the filling of a segment of the canal that had straightened the river. As part of the 1989 federal Everglades Expansion Act, activities were identified as part of the Modified Water Deliveries, or “Mod Waters”, project to modify the C&SF Project to improve water deliveries to the Everglades National

Park. In 1994, the State of Florida enacted the Everglades Forever Act, which set criteria for phosphorus levels to address water quality issues in the Everglades. In 1992, Congress authorized the Water Resources Development Act, which gave federal approval to the Kissimmee Restoration Project and authorized the U.S. Army Corps of Engineers (USACE) to re-evaluate the C&SF Project performance and provide recommended improvements and modifications to restore south Florida ecosystems and provide other water resource needs. Over the next seven years, the USACE prepared the Central and Southern Florida Project Comprehensive Review Study, or Restudy, which was submitted to Congress in 1999 and became the Comprehensive Everglades Restoration Plan (CERP) upon approval in the Water Resources Development Act of 2000. Other efforts, such as the Tamiami Trails Next Steps EIS prepared by the NPS, were also initiated by state and federal agencies to identify projects to restore the Everglades and Big Cypress systems.

Projects to restore and enhance hydrology and ecology of the region have begun to be implemented within the ROGG Study Area. A one-mile long bridge raising U.S. 41 to allow for improved hydrological conveyance was completed in 2013. The portion of the Turner Road canal south of U.S. 41 was backfilled to route water back to Turner River. More than seven miles of canal have been backfilled and 65 miles of roadway removed within the Picayune Strand State Forest, which was coupled with the installation of a series of culverts under U.S. 41 to enhance sheetflow. In addition, the USACE and SFWMD are scheduled to complete the Project Implementation Report for the Central Everglades Planning Project (CEPP) in 2013. The CEPP report will be submitted to Congress upon finalization for funding approval for a number of projects designed to enhance the hydrology of the central Everglades.

Comprehensive Everglades Restoration Plan (CERP)

The CERP is a guide and framework for the restoration of the south Florida ecosystem, which includes the Everglades. CERP was approved under the Water Resources Development Act of 2000 based on plans identified in the C&SF Project Comprehensive Review Study, or Restudy. The Restudy reviewed the status of the existing C&SF Project and made recommendations on how the C&SF Project could be modified to restore south Florida ecosystems and meet the flood abatement and water supply needs for south Floridians. Described as one of the world's largest ecosystem restoration projects, CERP provides a framework and guide for restoring, protecting, and preserving water resources over a 16 county/18,000 square mile area that centers on the infrastructure for the C&SF Project, which includes 1,000 miles of canals, 720 miles of levees, and several hundred water control structures. The USACE and SFWMD lead the implementation efforts, although a variety of federal, state, tribal, and local agencies were involved with the development and implementation of components of the plan.

The approved plan for CERP called for a series of more than 60 ecological and water system improvements across southern Florida ranging from construction projects to operational schedule changes. Construction projects were identified for nine regions that occur in or near the ROGG Study Area, including projects such as restoration of the Picayune Strand, modifications to the L-28 levee system on the east side of Big Cypress Swamp, modifications to the WCAs, and seepage management along the L-31 levee on the east side of the Everglades. The original Restudy identified many of these projects at a conceptual level and noted that additional details would be determined as implementation proceeded. Since the initial authorization for CERP only included certain projects, the implementation plan for CERP spelled out a process for additional studies to support project development and future Congressional authorizations, which included the Project Implementation Reports process. As noted on the CERP website, major benefits anticipated to result from CERP include:

- Restoring natural flows of water, water quality and hydroperiods;
- Improving the health of more than 2.4 million acres of the south Florida ecosystem, including the Everglades and Biscayne National Parks; and improving habitat for native flora and fauna, including threatened and endangered species;
- Ensuring a reliable, adequate supply of fresh water for use by all – the environment, urban residents and visitors, and agriculture;
- Maintaining flood protection set in place by the C&SF Project; and
- Creating wide-ranging economic benefits, not only for Florida, but the entire nation.

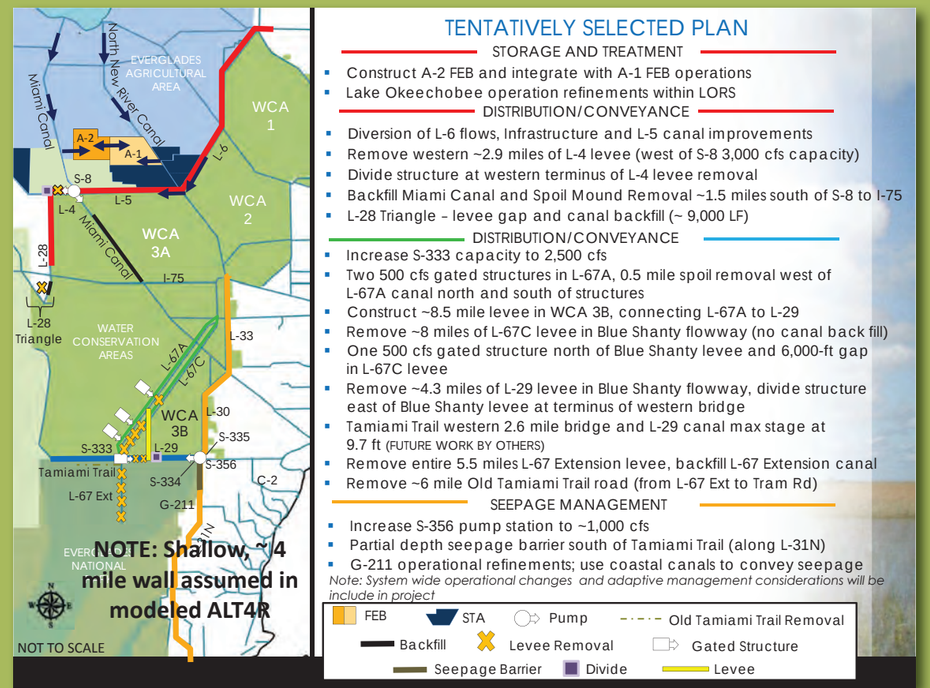
Additional details about ongoing projects that are part of the implementation for CERP can be found on the official website of the CERP at http://www.evergladesplan.org.

20th Century Development and Hydrology Alterations - Relevance to ROGG: The legacy of development and hydrological alterations affected feasibility assessments for: alignment selection and public access, connections to existing infrastructure, drainage to address hydrology, and temporal phasing considerations. Specific influences on analysis for the ROGG study included:

- **Gladesmen** – The region around the ROGG Study Area is extensively used by members of the Gladesmen culture for hunting, fishing, and backcountry access

Central Everglades Planning Project (CEPP)

The CEPP is designed to advance restoration efforts in the central portions of the Everglades by identifying and planning projects on land already in public ownership to allow for more water to be directed south to the central Everglades, ENP, and Florida Bay. Since 2011, a team lead by the USACE in partnership with the SFWMD has been preparing a Project Implementation Report with the goal to deliver the report in late 2013. Project components to be developed as part of CEPP include increasing storage, treatment, and conveyance of water south of Lake Okeechobee; removing and/or plugging canals and levees within the central Everglades; and retaining water within ENP to protect urban and agricultural areas to the east from flooding. The tentatively selected plan as of July 2013 shown below included 19 projects requiring construction or operational changes including: removal of a portion of the L-29 levee, removal of portions of the Old Tamiami Trail, and levee modifications in the southwest corner of WCA 3B. Recreation elements have been evaluated as part of the plan and will be identified for construction in the final Project Implementation Report. A draft Project Implementation Report was issued in August 2013, which identified the preferred plan and implementation plan. Based on this report, although the projects identified in the CEPP are anticipated to take multiple years to implement subject to available funding. Generally, the current draft phasing plan identifies projects in the northern portion of CEPP needing to be completed, along with the construction of bridges authorized for the Tamiami Trail Next Steps project, prior to removal of the L-29 levee.



Man guiding boat in the Everglades 1913. Photo Credit: State Archives of Florida, Florida Memory, http://floridamemory.com/items/show/2778


Dedication for Everglades National Park. 1947. Photo Credit: State Archives of Florida, Florida Memory, http://floridamemory.com/items/show/67965

Collier-Seminole State Park entrrance

for recreation and property use. Consistent with access control requirements for national and state land holdings, this access generally ranges from pedestrian to Off Road Vehicles (ORV) access. Restrictions on use, pedestrian access and parking, speed limit changes, and parking for ORVs on U.S. 41 have faced significant opposition from members of the Gladesmen cultural group. Considerations of the traditional uses of the Gladesmen for ROGG included alignment alternatives that limit encroachments onto access and parking for traditional uses, designs that accommodate ORV access, and evaluations of potential trailheads on parking access. An ethnographic study of the Gladesmen culture conducted in 2011 identified two sites, including the Airboat Association of Florida in the eastern portion of the ROGG Study Area, as Traditional Cultural Properties (TCP) eligible for listing in the National Register of Historic Places. Routing options for the ROGG that avoided known TCPs were not precluded from being considered feasible by the presence of the TCPs.

- **C&SF Project**– Infrastructure from the C&SF Project, including levees (L-28, L-29, and L-31), canals, and structures, occur within the ROGG Study Area and were evaluated for feasibility as alternative routes for the ROGG. However, much or all of several of these levees have been identified for removal as part of the regional hydrological restoration efforts for CERP. Due to operational concerns, canals pose a constraint on ROGG routing options by limiting crossing locations to existing or proposed control structures and/or limited locations for bridges. Trail crossings of structures are currently maintained by the SFWMD and are not precluded from feasibility for the ROGG. These crossings require routing protocol that will not impact operation and water flow in case of an accidental fall from the trail.

- **Regional Restoration** – Regional restoration efforts for CERP, Tamiami Trail Next Steps, and other projects will change the infrastructure available for ROGG routing alternatives, especially in the eastern portion of the corridor. CEPP has designated a 4.3 mile long segment roughly from the Blue Shanty flow way to the L-67 for removal, although implementation of other elements such as construction of additional bridges would likely need to be constructed prior to the levee removal to accommodate water flows. A temporary route for ROGG on the levee while it still remains was evaluated for feasibility. Public comment from a consortium of environmental groups indicated that the establishment of a trail on the levee, even if designed to be temporary, would set an expectation of use as a trail that could undermine public approval for the long-term removal of the levee. The design for the bridges identified in the approved plan for the Tamiami Trail Next Steps project did not include a trail facility separated from traffic use, but did include wide shoulders for vehicle recovery.

20th Century Development and Hydrology Summary

Florida's Everglades were one of the final frontiers for European settlers in the United States as the subtropical climate, hydrology, and conflicts with indigenous populations limited extensive settlement until late in the 19th century. Over time, the early settlers adapted to the diverse resources of the wetlands and tree islands of the Everglades and Big Cypress systems, giving rise to a regional variant of the Florida Cracker culture called "the Gladesmen Swamp/Folk Culture". The early Gladesmen relied on the steady supply of fish and game provided by the Everglades ecosystem for sustenance and for trade items. Modern day Gladesmen retain many of the same independent, self-sufficient outdoorsmen characteristics of the early Gladesmen, but now rely on the natural resources of the region more for cultural and recreational experiences than for subsistence. They also actively participate in public forums to advocate for conservation of natural systems and access for their traditional uses. Considerations for the traditional uses of the Gladesmen including access and parking requirements and ORV access are elements relevant to the planning, design, and operation for ROGG.

Beginning in the 1880s, large-scale drainage projects were implemented to lower natural water levels and drain the vast Central and South Florida wetlands. The populations of Miami and other existing south Florida cities rapidly increased as did nature-based tourism. As populations increased on both coasts, the concept of and need for a roadway connecting the coasts through the Everglades became a regional goal. This was realized in 1928 with the construction of the Tamiami Trail. While an engineering feat, the Tamiami Trail had the effect of damming the flow of water into the Everglades and Florida Bay despite later additions of bridges and culverts to assist in movement of hydrological flow. Elements of Tamiami Trail relevant to the feasibility assessment of ROGG consisted of the existing infrastructure for the road and way stations available for future ROGG trails, the historical status of facilities, existing improvements and permits for Loop Road, Old Tamiami Trail segments, and the Tamiami Trail Next Steps improvements program.

Congress authorized the C&SF Project for in 1948, which included four main components: a perimeter levee on the eastern side of the Everglades for flood control, designation of an agricultural area south of Lake Okeechobee, establishment of Water Conservation Areas as water impoundments, and enlargement of the overall canal system for the region. Over the next two decades, the C&SF Project was implemented, resulting in flood control and drainage as well as significant alterations to the timing of water delivery, water quality and quantity, and freshwater available for water supply. Elements of the C&SF Project relevant to ROGG include existing infrastructure such as levees and canals that could be available for ROGG routing alternatives consistent with the regional hydrological restoration efforts, and trail crossing requirements for structures.

Beginning in the 1970s, several initiatives began to address the deterioration of the south Florida ecosystem caused by the C&SF Project. As part of the 1989 federal Everglades Expansion Act, the Mod Waters project was identified to modify the C&SF Project to improve water deliveries to the ENP. In 1992, Congress authorized the Water Resources Development Act that included approval to re-evaluate the C&SF Project performance, provide improvements to restore south Florida ecosystems and provide other water resource needs. This re-evaluation resulted in the CERP upon approval in the Water Resources Development Act of 2000. In 1994, the State of Florida enacted the Everglades Forever Act to address water quality issues. Projects to restore and enhance hydrology and ecology of the region have begun to be implemented within the ROGG Study Area, including a one mile long bridge to allow for improved hydrological conveyance under U.S. 41, backfilling of portions of the Turner Road canal, and restoration efforts in the Picayune Strand State Forest. In addition, the Project Implementation Report for the CEPP is scheduled for 2013. Elements of the restoration efforts relevant to the feasibility assessment of ROGG include the removal and/or modification of existing infrastructure that would not be available for future trail options, the necessity for ROGG to be consistent with regional restoration efforts, and opportunities to incorporate ROGG elements on future bridges.

Conservation

In the midst of the drainage and development activities of the early 1900s, concerns about their effects on natural resources began to be expressed in public forums, and proposals to protect and conserve the natural systems of the Everglades began to appear. Initial efforts by local citizens groups resulted in the State of Florida establishing Royal Palm State Park in 1916 to set aside a unique hammock in the glades, which grew to a 4,000 acre state park through acquisition and donation by 1921. Between 1925 and 1934, Ernest Coe advocated for the creation of the "Tropical Everglades National Park" to protect the nationally unique resources of the Everglades. Congress eventually authorized the establishment of ENP in 1934, but the ENP was not dedicated until 1947 due to lack of funding and the need for land acquisition. Beginning at 460,000 acres, the ENP expanded to 1.4 million acres in 1958. In 1989, Congress passed the Everglades National Park Protection and Expansion Act that added 109,506 acres to the ENP, including lands adjacent to U.S. 41. At approximately 1.5 million acres, the ENP is the largest designated wilderness east of the Rocky Mountains and protects a large portion of the original "River of Grass" noted in the book by Marjory Stoneman Douglas published in the same year the ENP was dedicated called The Everglades: River of Grass. The approval and implementation of CERP has provided a focus on continued efforts to protect and enhance the hydrology and natural resources of the ENP.

In 1944, land conservation efforts within the Big Cypress basin began with the acquisition of the Collier-Seminole State Park. The State of Florida acquired title to the initial area of Collier-Seminole State Park through a donation from the Lee County Land Company. Over subsequent years, the park was expanded through the acquisition of additional parcels through perpetual leases and fee simple title. One of the significant reasons for creation of the park was the high quality rockland hammock vegetation near the current park facilities. The entire extent of the park is listed on the NRHP based on the presence of high quality natural systems representative of south Florida and the presence of cultural features, including the last walking dredge used in the construction of the Tamiami Trail. The hydrology of the park has been altered by regional drainage and canals within the park. Efforts associated with the Picayune Strand Restoration project will route additional water through the park to assist in enhancing hydrology.

The C&SF Project established three Water Conservation Areas (WCA) to provide detention reservoirs for excess water from agricultural areas, flood protection, recharge for the Biscayne Aquifer, and to assist in limiting salt water intrusion. The only WCA adjacent to the ROGG Study Area is WCA 3, which is the largest of the three WCAs in the original C&SF Project plan. In 1962, the WCA 3 was divided into two separate facilities called WCA 3A and WCA 3B through the construction of two interior levees called the L-67A and L-67C. In the vicinity of the ROGG Study Area, three levees forming part of the boundary for WCA 3A and WCA 3B include the L-28 and L-31 levees on the west and east, respectively, and the L-29 along U.S. 41. The ownership of WCA 3 is comprised of a mixture of interests, including the State of Florida, SFWMD, and private ownership. The Florida Fish and Wildlife Conservation Commission (FFWCC) manages the WCA 3 as part of the Francis S. Taylor Wildlife Management Area.

Initial plans for a large project known as the Everglades Jetport elicited substantial public debate and development of a coalition of interests that resulted in the formation of the Big Cypress National Preserve. In 1969, the initial runway at the Everglades Jetport, now known as the Dade-Collier County Transition and Training Airport, was constructed and put in operation on a portion of an approximately 23,500 acre parcel on the eastern edge of the Big Cypress Swamp just west of the Collier/Miami-Dade County line. Following substantial public debate and comment concerning the environmental impact of the proposed facility, the U.S. federal government, state of Florida, and Miami-Dade and Collier Counties entered into a pact to not enlarge the Jetport and to find a suitable alternative location for an airport. Based on plans developed in 1971 arising from work done to support the pact, the U.S. Congress authorized the formation of the Big Cypress National Preserve in 1974. Although included in the authorized boundary for the Big Cypress National Preserve, the Jetport remained a non-federal holding at the time of the ROGG study. Based upon substantial input by a coalition of interests including local conservationists, Gladesmen, Seminoles and Miccosukee Tribes of Florida, the establishing legislation for the Big Cypress National Preserve did not include the property within the Everglades National Park with its accompanying restrictions. Instead, provisions such as maintenance of traditional uses by the Miccosukee and Seminole tribes, ORV access, and hunting were maintained for the lands within the Big Cypress National Preserve. The reservation of oil exploration and extraction was also maintained as a use within the preserve.

In 1974, the State of Florida acquired property that later formed the Fakahatchee Strand Preserve State Park, an approximately 75,000 acre conservation parcel centered around the Fakahatchee Strand. Nicknamed "the Amazon of North America," the Strand is the largest linear cypress strand within the Big Cypress system, extending approximately twenty miles in length. Although much of the canopy of large cypress trees was harvested from the area between 1944 and 1954, the cypress canopy is recovering within the strand. Known for its plant diversity, the strand provides habitat for at least 11 species of plants found nowhere else in North America as well as the Florida panther and a variety of other listed and non-listed wildlife species. Access from U.S. 41 includes a boardwalk near a gift shop. The park is currently designing and permitting the construction of a visitor center building, which is anticipated to be built on a segment of Old Tamiami Trail on the north side of U.S. 41.

Primarily comprised of two major tracts of land, the approximately 79,000 acre Picayune Strand State Forest is located in west central Collier County within the Big Cypress basin. In the 1960s, a large subdivision called the Golden Gate Estates was planned for the western side of the Big Cypress watershed near Naples. Roadways and canals supporting this future development were constructed over a broad area significantly altering the hydrology of the area. However, the developer eventually entered bankruptcy and the development was not completed. In 1985, the State of Florida embarked on a large undertaking to acquire lands from more than 17,000 landowners within the South Golden Gate Estates using Conservation and Recreation Lands funds supplemented by money provided by the federal government. The restoration of the Picayune Strand was identified as one of the restoration projects in CERP. This restoration is anticipated to include plugging miles of canals, removal and degrading of roadways, exotic species removal, and other flood control and hydrological operation elements.

Conservation efforts of the Big Cypress basin continued through the 1980s and 1990s with the acquisition and establishment of the Florida Panther National Wildlife Refuge (NWR) and the Ten Thousand Islands NWR. Consistent with the final recovery plan for the Florida panther, the Florida Panther NWR was established in June of 1989 under the Endangered Species Act to protect Florida panthers. The U.S. Fish and Wildlife Service (USFWS) acquired 24,300 acres in 1989 and 26,400 acres in 1996 from the Collier family through fee title acquisitions. The primary purpose of the Florida Panther NWR is the protection of the Florida panther and habitat for the panther and its prey. Under the provisions of the Arizona-Florida Land Exchange Act of 1988, the Department of the Interior was authorized to exchange 108,000 acres of land in Collier County owned by Collier family interests for 68 acres of land in Phoenix, Arizona. In 1996, the Ten Thousand Islands NWR was established through the conveyance of approximately 35,000 acres acquired as part of this exchange to the USFWS. The remaining 73,000 acres were conveyed to the Big Cypress National Preserve and the Florida Panther NWR as part of the 1996 acquisition. The Ten Thousand Islands NWR protects estuarine and freshwater marshes, shell midden islands, and other habitats for a variety of listed and non-listed wildlife species.

Large cypress trees in Florida; . Photo Credit: State Archives of Florida, Florida

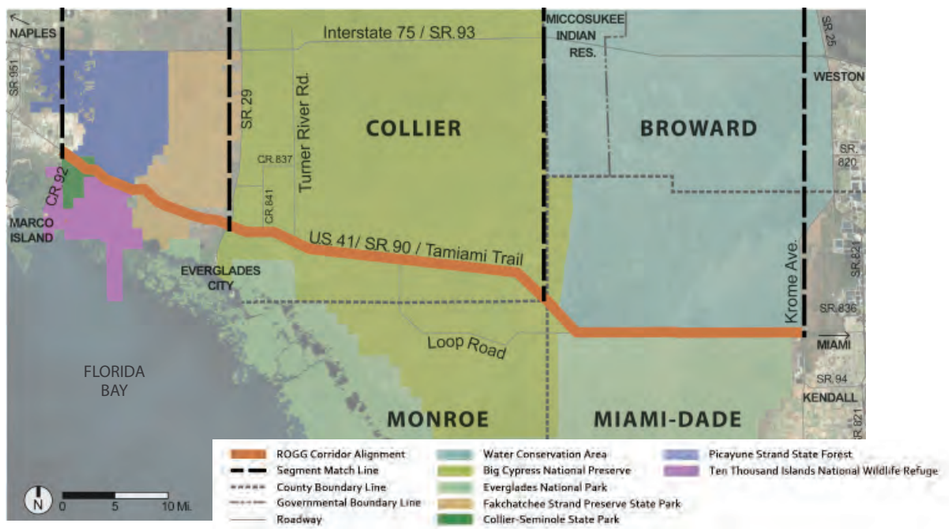
Oil well derrick for Sunniland Well #2, Collier County. 1944. Photo Credit: State Archives of Florida, Florida Memory, http://floridamemory.com/items/show/125520

Steam shovel in cypress area constructing Tamiami Trail. 1924. Photo Credit: State Archives of Florida, Florida Memory, http://floridamemory.com/items/show/27040

Conservation - Relevance to ROGG: The substantial public conservation lands within the ROGG Study Area affected feasibility assessments for potential alignment selection, considerations for public and regulatory coordination, the identification of destinations and amenities that could be co-located, connections to existing infrastructure, and post-construction operation options. Specific influences on analysis for the ROGG study included:

- **Everglades National Park** – The Shark Valley Entrance provides a potential destination for connection from ROGG, but parking is limited within and near the facility. Options that allow ROGG users to access the Shark Valley Entrance without requiring parking, including transit options and parking in the vicinity, were evaluated. Use of the Old Tamiami Trail at the park entrance was considered as a potential route alternative.
- **Collier-Seminole State Park** – The Park provides a destination for ROGG trail users. Connections to the main park facilities were evaluated as part of the master plan development. Existing tram roads within the park provide opportunities for routing alternatives separated from U.S. 41. Hydrological improvements in the park that would result from the upstream Picayune Strand Restoration project would affect the design, configuration, and maintenance requirements for ROGG alignments using these tram roads. The main entry for the Park adjacent to U.S. 41 provides open lawn and shade trees for a shelter for ROGG.
- **Water Conservation Area 3** – The levees around and through WCA3 provide potential routing alternatives for ROGG separated from the U.S. 41 ROW, although these may be only available for the short term until the regional restoration plans are completed. The feasibility of short term use of the levees considered the perspective that even short-term use of the levees for the ROGG sets public expectation about trail use that may limit or affect the anticipated removal of the levees. The CEPP-proposed Blue Shanty levee and L-67 levee would provide a spur trail loop option for connection to the ROGG. The L-31 levee is anticipated to remain for seepage control and was evaluated for use as connections to other trail networks. The recreation plan for CEPP identifies parking facilities and boating access points on portions of the levee near the S-333 structure at the L-67 levee that provide trailhead connection opportunities for ROGG.
- **Big Cypress National Preserve** – The Preserve provides multiple opportunities for ROGG to connect to destinations and/or provide trailhead facilities, including the Big Cypress Swamp Welcome Center, the Turner River canoe launch, H.P. Williams Park, Burns Lake Campground, Monument Lake Campground, Oasis Visitor Center, and Midway Campground. These facilities occur on both sides of U.S. 41, which requires feasible portions of the ROGG to have design features for safe crossings of the roadway. Roads and scenic drive loops like Loop Road within the Preserve were evaluated for potential connections to ROGG. Options, including transit and parking in the vicinity, that allow ROGG users to access facilities such as the Turner River canoe launch without requiring parking were prioritized. Route alternatives outside of the U.S. 41 ROW would require NPS review and approval as well as extensive regulatory coordination. The NPS recently completed an EA for the construction of ORV trailheads in portions of the Preserve, including locations along U.S. 41 and Loop Road. When constructed, these trailheads would provide facilities that would be compatible or support ROGG uses.
- **Fakahatchee Strand Preserve State Park** – The current boardwalk and proposed visitor center occur on the north side of the road, which requires design elements to accommodate pedestrian road crossings if trail alignments for the rest of the corridor occur on the south side of U.S. 41. The proposed visitor center is a destination within the corridor and has parking and restroom facilities that would provide trailhead facilities for the ROGG. Options to use the Old Tamiami Trail segments in this vicinity were evaluated with respect to currently proposed mitigation activities and potential conflicts with extending the ROGG through a parking lot.
- **Picayune Strand State Forest** – The Picayune Strand State Forest occurs outside of the ROGG Study Area, but restoration activities within the Picayune Strand will result in hydrological restoration along U.S. 41 and within conservation lands within the Study Area. Accommodations of hydrological flows consistent with the restoration project were incorporated into design elements for ROGG.
- **Ten Thousand Islands NWR** – The Marsh Trail facility provides a destination and potential trailhead options for ROGG. Trail alignment options outside of the U.S. 41 ROW would require review and approval from the USFWS, extensive regulatory coordination, and potential impacts to salt marsh and/or mangrove systems.

Public lands within the U.S. 41 / Tamiami Trail area



Conservation Summary

In the midst of the drainage and development activities, protection and conservation of the natural systems of the Everglades and Big Cypress also occurred. The State of Florida established Royal Palm State Park in 1916. Congress authorized the establishment of ENP in 1934, but the ENP was not dedicated until 1947 due to lack of funding and the need for land acquisition. At approximately 1.5 million acres, the ENP is the largest designated wilderness east of the Rocky Mountains and protects a large portion of the original "River of Grass." In 1944, land conservation efforts within the Big Cypress basin began with the acquisition of the Collier-Seminole State Park. The C&SF Project established three WCAs (including WCA3 - the only WCA in the ROGG Study Area) to provide detention reservoirs for excess water from agricultural areas, flood protection, recharge for the Biscayne Aquifer, and to assist in limiting salt water intrusion.

Conservation within the western portion of the Study Area began after the ENP conservation activities, but has grown into a significant aggregation of conservation lands owned by a variety of agencies. Following the construction of an initial runway for the Everglades Jetport in 1969, substantial public debate resulted in the formation of the Big Cypress National Preserve. Based upon substantial input by a coalition of interests including local conservationists, Gladesmen, Seminole and Miccosukee Tribes of Florida, the establishing legislation for the Big Cypress National Preserve did excluded the property from the ENP to allow for continued maintenance of traditional uses by the Miccosukee and Seminole tribes, ORV access, and hunting. In 1974, the State of Florida acquired property that later formed the Fakahatchee Strand Preserve State Park, an approximately 75,000 acre conservation parcel centered around the Fakahatchee Strand. Conservation efforts of the Big Cypress basin continued through the 1980s and 1990s with the acquisition and establishment of the Florida Panther National Wildlife Refuge (NWR), Picayune Strand State Forest, and the Ten Thousand Islands NWR.

The substantial public conservation lands within the ROGG Study Area affected feasibility assessments for potential alignment selection, considerations for public and regulatory coordination, the identification of destinations and amenities that could be co-located, connections to existing infrastructure, and post-construction operation options.

2.1.2. Climate

The Everglades region occurs at the southern end of the State of Florida at the interface between subtropical and temperate climate conditions, due in part to the warm waters of the Gulf of Mexico and Atlantic Ocean. Because the average monthly temperature for all months is above 64°F (18°C) and the area exhibits a pronounced wet and dry seasons, classification systems such as the Köppen classification defines the region south of Lake Okeechobee as "Tropical Savannah," which is a climate classification normally characterized by grasslands with scattered trees. Climate in the area is moderated both by extensive rainfall and occasional cold events from continental systems. As a consequence, an abundance of tropical species is generally limited to the coastal portions of the Everglades region.

The region exhibits two distinct seasons based on rainfall and temperatures. Temperatures in the winter/spring dry season (November through April) are generally mild and pleasant, though rare cold fronts may create near freezing conditions. The average temperatures in the winter/spring dry season generally range between a high of 77°F (25°C) and a low of 53°F (12°C). The summer wet season (May through October) is hot and humid, with temperatures exceeding 90°F (32°C) and humidity over 90%. Afternoon thunderstorms in the summer wet season form quickly and frequently are accompanied by heavy rainfall and frequent lightning strikes. Average rainfall is approximately 53-inches per year, and more than 60% of this total falls during four months of the wet season from June to September. Water levels in the Everglades typically rise rapidly during the wet season, reaching maximum levels late in the season, while the area slowly dries out during the dry season.

Daily weather conditions are similar during the summer wet season and more variable during the winter/spring dry season. During the wet season, trade winds bring a near continuous supply of wet air from the Gulf of Mexico and Atlantic Ocean. As this warm, wet air passes over land areas, it heats up and frequently causes heavy afternoon thunderstorms often characterized by a high frequency of lightning. The Atlantic hurricane season is June through November. During this period, tropical storms or hurricanes result in significant weather disturbances in the area. Continental frontal systems periodically pulse cold fronts through the area, which are preceded by limited rainfall events during the dry season. Following the passage of a front, the area exhibits lower temperatures and humidity levels for a few days until temperatures moderate.

Climate - Relevance to ROGG: The climate and weather conditions of the region primarily affect material selection and shelter requirements for the ROGG feasibility and planning efforts. These include:

- **Afternoon Thunderstorms** – Heavy rainfall and lightning from frequent thunderstorms in the summer wet season pose both a safety and design issue. Shelters providing protection from rain and lightning located periodically along the corridor will be required to provide trail users refuge from quick-forming storms. Trail stormwater systems will need to treat and disperse water from heavy rainfall events sufficient to not flood adjacent roadways or users, while maintaining usable trail surfaces.
- **Tropical Storms** – Periodic tropical storms and hurricanes can provide extreme rainfall and wind conditions. Structures on the trail will need to be sufficient to withstand wind loads caused by these tropical storms. The trail itself will likely be located within areas exposed to occasional storm surges, and its design will need to be resilient to these periodic, extreme events.
- **Sunlight and Temperature** – The intense sunlight and variable temperatures in the region will affect material selection and shelter requirements. Materials used in trail construction should be resistant to fading and degradation from exposure to sunlight. Similarly, materials used for trail surfacing and furnishings will need to accommodate long periods of warm temperatures and short term exposure to near-freezing temperatures. Shelters providing shade and potable water will need to be located periodically along the corridor to provide refuge from sunlight and respite from the heat.

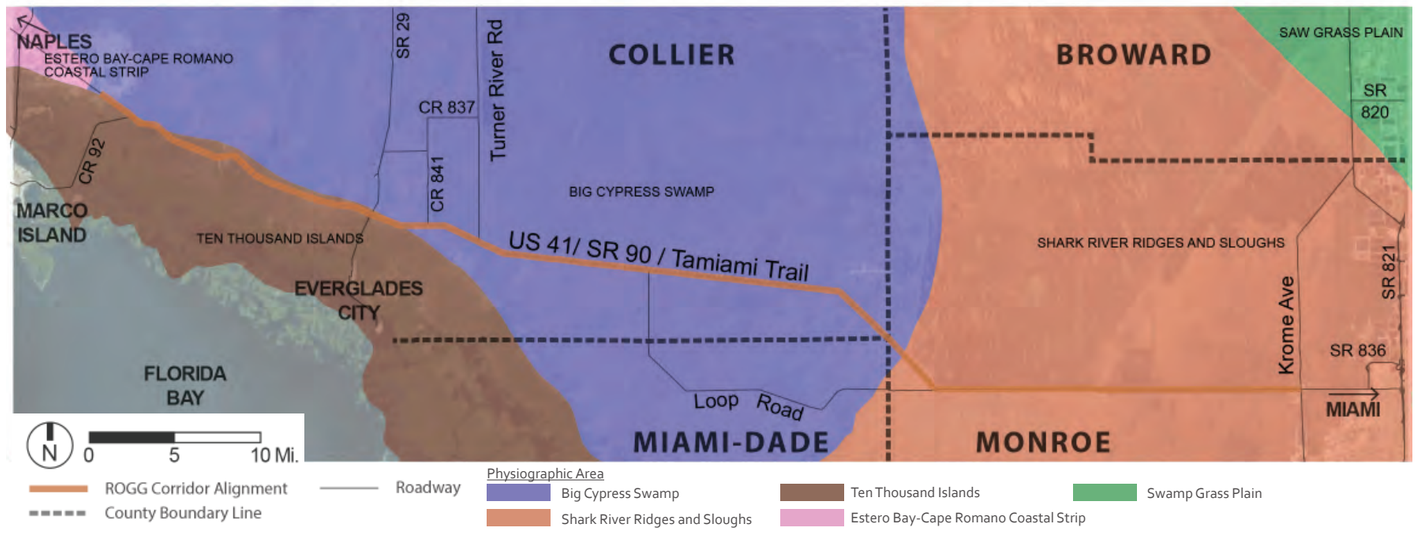
Thunderstorm over U.S. 41 (photo by Robert Heff)

Climate Summary

The ROGG Study Area occurs in south Florida at the interface between subtropical and temperate climate conditions within the climate classification of Tropical Savannah. The region exhibits two distinct seasons based on rainfall and temperatures. Temperatures in the winter/spring dry season (November through April) are generally mild and pleasant, though rare cold fronts may create near freezing conditions. The summer wet season (May through October) is hot and humid with frequent afternoon thunderstorms accompanied by heavy rainfall and frequent lightening. During the Atlantic hurricane season from June through November, tropical storms or hurricanes result in significant weather disturbances in the area.

Significant elements of climate relevant to the design and operations for ROGG considered for the feasibility assessment include rapidly developed afternoon thunderstorms, tropical storms, and intense sunlight and high summer temperatures. These climate specific impacts necessitate a need for periodical and accessibility shelter for ROGG users which can withstand high winds and intense sunlight and temperatures.

Physiographic Map of U.S. 41 / Tamiami Trail area



2.1.3. Geography, Geology and Soils

South Florida lies within the Atlantic Coastal Plain physiographic region. This region is divided into several provinces that span the ROGG Study Area, which includes the Atlantic Coastal Ridge, Big Cypress Swamp, Everglades (comprised of the Saw Grass Plains and Shark River Ridges and Sloughs subprovinces), and Mangroves and Coastal Glades (including the Ten Thousand Islands subprovince). The Atlantic Coastal Ridge is a narrow belt along the east coast of Florida that ranges from 10 to 50 feet in altitude. The Everglades is slightly lower than the Atlantic Coastal Ridge and the Flatwoods, and gently slopes to the south at a rate of less than two inches per mile. This expansive, gentle slope leads to shallow inundation and slow drainage to the south during the rainy season. The Big Cypress Swamp is west and slightly higher than the Everglades and is comparatively flat with numerous strands and sloughs that drain water south and southwest. The Mangroves and Coastal Glades province is a relatively flat band around the southern tip of Florida that lies at or near sea level and is comprised of swamps and marshes.

The Florida Peninsula rests on a deep backbone of ancient (>650 million years old) igneous and metamorphic rock covered by thick layers of sedimentary rocks of younger vintage (1.5 to 140 million years old). These sedimentary layers are comprised of a variety of materials ranging from sands and silts to marls and shellbeds. During inter-glacial periods, sea levels rose and inundated the region with shallow seas resulting in surficial geological layers comprised primarily of limestone. Wind, waves, and currents moved sediments around and influenced the formation of the shallow ridge and slough systems found in the region. Over time, limestone formed from compressed layers of carbonaceous materials, sand, and shells deposited during these inundation periods.

Surface soils are generally comprised of limestone, marls, peats, and sand. The underlying limestone stone is exposed in various areas throughout the Study Area. This limestone typically exhibits karst characteristics where exposed due to acidic water drainage through the carbonate rock. Typically found in short-hydroperiod wetland areas, marls are mixtures of calcareous clays and calcite particles, sand, and/or shell fragments, often resulting from oxidation of periphyton (algal mats). Peats and the associated muck soils are derived from partially decayed plant materials that form in anaerobic conditions associated with long periods of inundation. Sand deposits are infrequent in natural settings in the corridor and likely derived from old shorelines.

Several natural and man-made geographic features within the Study Area, deserve mention for their relevance to ROGG due to physical conditions, recreational connection opportunities, or uniqueness in the landscape. Occurring approximately eight miles from the western boundary of the Study Area, the Fakha Union Canal provides boating connections between the Port of the Islands community to Fakahatchee Bay. The Fakahatchee Strand is a linear swamp system and drainage feature in the western portion of the Study Area that was incorporated into the Fakahatchee Strand Preserve State Park. Approximately 2.5 miles east of Ochopee, the Turner River meanders through forested floodplain forests, marshes, and mangroves to Chokoloskee Bay. Approximately 21 miles west of Krome Avenue, the L-28 levee extends north from U.S. 41 where it forms the western edge to the WCA-3A. The L-29 levee and canal runs along the north edge of U.S. 41 in the eastern portion of the Study Area. The Shark Valley Slough is the primary source of water for Everglades National Park and occurs south of U.S. 41 in the eastern portion of the Study Area.

Geography, Geology and Soils - Relevance to ROGG: The geology and geography of the region affect potential alignment selection, construction requirements, and material selection for the ROGG feasibility and planning efforts. These include:

- **Soils** –Soils in the vicinity of the project would serve as either the base on which the trail is constructed or as the source for fill material. Limestone provides a firm base for pilings or fill, although solution holes or subsurface caverns will need to be evaluated during final construction. Significant peat or muck aggregations increase the costs and complexity of construction, so alignment alternatives through sloughs and marshes with the potential for muck required careful consideration. Although limestone can be a fill material, sources of fill material within the Study Area will be limited due to the protected status of lands in the area. To the extent that importation of fill was considered feasible, these costs were addressed as part of the implementation assessment.
- **Drainage** – The flat character of the Study Area influences the location, sizes, and configurations of drainage systems serving future facilities. Positive drainage from trail features will require elevating the features either through pilings or fill so that drainage outfalls can accommodate discharge during dry and wet conditions. Because of the perviousness of the underlying limestone, and the prevalence of surface-water and groundwater throughout much of the year, opportunities to excavate stormwater treatment facilities are limited. Consideration of drainage requirements were a part of the assessment of the feasibility of installing potential trail features.
- **Geographic Features** – Features within the Study Area provide opportunities for connections to recreation opportunities, such as blueways or other experiences as well as potential constraints for alignment selection or construction requirements for crossing or connecting to the feature. Crossings for canals or channels like the Fakha Union Canal and the Turner River will require new or expanded bridges, and the alignment location and/or feasibility for the crossing was evaluated based on effects on species using the channel (i.e. manatees) or the need to maintain boat access. Landscape features such as the Fakahatchee Strand provide opportunities for environmental interpretation and destinations for trail users, although the feasibility for access necessitates safe trail connections that minimize potential impacts to function of the natural systems. Regional drainage structures like the L-28 and L-29 levees provide existing infrastructure that were evaluated for trail use, although the long-term use of these features for the ROGG will continue to be guided by regional restoration efforts.
- **Mineral Resources** – Active oil and gas production occurs in the vicinity of the central portion of the ROGG Study Area, although all production fields are located outside of the Study Area. Operations for the production fields required accommodation for continued access. Similarly, the design of the ROGG included consideration for separation of pedestrians from truck traffic on U.S. 41. The operator of the production fields began an EA during the ROGG feasibility study to extend electric lines to production facilities, which would assist in reducing the truck traffic required for operations. Opportunities to co-locate ROGG facilities with infrastructure identified in the alternatives evaluated in the EA were evaluated as part of the ROGG Feasibility Study and Master Plan.

Geography, Geology and Soils Summary

The ROGG Study Area lies within the Atlantic Coastal Plain physiographic region, which consists of several provinces including the Atlantic Coastal Ridge, Big Cypress Swamp, Everglades, and Mangroves and Coastal Glades. Geologically, the Florida peninsula rests on a deep backbone of ancient igneous and metamorphic rock covered by thick layers of sedimentary rocks of more recent origin. The sedimentary layers are comprised of a variety of materials ranging from sands and silts to marls and shellbeds that were deposited during higher sea levels associated with inter-glacial periods and compressed over time to form limestone. Surface soils are generally comprised of limestone, marls, peats, and sand. Significant elements of geology and soils relevant to the design and operations for ROGG considered for the feasibility assessment include the structural capacity of local soils and use of soils for fill material, drainage conditions that result in marl soils, and accommodation for mineral extraction.

Several natural and man-made geographic features occur within the ROGG Study Area. Large canals, including the Fakha Union Canal and L-29 canal, and natural streams such as the Turner River provide fishing and/or boating opportunities. The L-28 and L-29 levees occur in the eastern portion of the ROGG Study Area and provide existing infrastructure available for potential ROGG use, although this use cannot affect the long-term regional hydrological restoration efforts. Landscape features including the linear Fakahatchee Strand and wider Shark Valley Slough serve as natural drainage features and sources of freshwater for downstream areas. Geographic features provide opportunities for connections to recreation, design considerations for new water crossings, environmental interpretation, and/or infrastructure that could be used consistent with regional hydrological restoration goals.

2.1.4. Hydrology and Hydrogeology

The ROGG Study Area occurs within a complicated hydrological setting associated with the Everglades and Big Cypress Swamp watersheds, both of which have been subjected to extensive hydrological alterations that changed flow conditions, direction of flow, water quantity and quality in the region. The Everglades watershed originates in central Florida in lakes draining into the Kissimmee River and then flows south through Lake Okeechobee into the Everglades and south into Florida Bay. The Big Cypress Swamp headwaters originate in the northern sandy flatlands south of the Caloosahatchee River drainage area. Water from the northwest portion of this watershed drains west into Estero Bay, while several large slough and strand systems drain the remainder of the watershed west and south. Significant strands in the Big Cypress watershed include Devil's Garden, Corkscrew Swamp, Okaloacoochee Slough, and Fakahatchee Strand. The surface hydrology interacts with and is influenced by the hydrogeology of the relatively permeable geological strata underlying the peninsula. Due to the significance of hydrology to the ecology of the ROGG Study Area, understanding historic and current conditions coupled with the hydrological improvements anticipated from the regional restoration projects that are proposed or underway was a critical aspect of the feasibility study.

Hydrogeology and Aquifers

There are three aquifers within the marine carbonate sediments: the Floridan aquifer system, the intermediate aquifer system, and the surficial aquifer system. The Floridan aquifer is the lowest of the strata. It starts roughly 500 feet below sea level on the west coast and slopes to about 750 feet below sea level on the east coast. The intermediate aquifer system is located above the Floridan aquifer. Its domed shape peaks in Big Cypress Swamp and the Everglades at sea level and slopes off towards both coasts. The surficial aquifer system is composed of two triangular-shaped features located between the peak of the intermediate aquifer and each coast. The eastern triangle is called the Biscayne aquifer, and the western is called the shallow aquifer. The Biscayne aquifer is a significant water source for the east coast population. Freshwater in the WCA3 limits saltwater intrusion into the Biscayne aquifer. Restoration activities within the region are anticipated to maintain hydrological inputs into the aquifers.

Pre-Drainage Conditions

The hydrological system in which the ROGG Study Area occurs is dominated by the watersheds of the Everglades and Big Cypress, both of which were historically interconnected with uplands, coastal areas, and marine systems. The vast wetlands associated with these watersheds dominated the pre-drainage landscape of south Florida. Throughout their extent, the majority of these basins are characterized by extremely flat topography that slopes generally north/northwest to south/southwest with a very low gradient, typically ranging from one to two inches per mile. The soils and upper geological strata are highly permeable limestone, which provide connections to surficial aquifers and allow groundwater seepage into creeks, rivers and other surface waters.

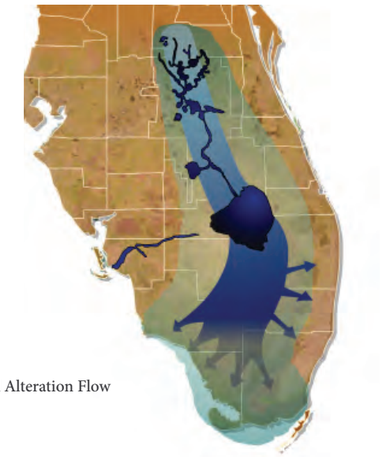
The pre-drainage wetland systems exhibited three essential characteristics: dynamic storage and sheet flow, large spatial scales of drainage, and heterogeneity in habitat. The large expanse of wetlands spread rainfall and upstream drainage into shallow sheetflows over a wide area, the depth of which significantly influenced vegetation heterogeneity and the formation of peat substrates. Drastic seasonal variations in rainfall interacted with this hydrological action to create dynamic water conditions within the system. This broad flow of freshwater strongly influenced the upstream extent of salt marshes and other brackish systems as well as the salinity levels within downstream estuaries. The slow rate of flow through the topographically flat system resulted in a discharge of freshwater into estuaries well into the dry season.

Water flowing through both the Everglades and Big Cypress systems was generally low in nutrients. Nutrients transmitted through the water column were rapidly removed by vegetation and periphyton communities, all of which were adapted to low-nutrient environments. Although conditions in both the Everglades and Big Cypress watersheds were generally oligotrophic for phosphorus and nitrogen compounds, Big Cypress surface waters typically would have exhibited higher total phosphorus and nitrogen levels than those in the central Everglades marshes due to different soil conditions.

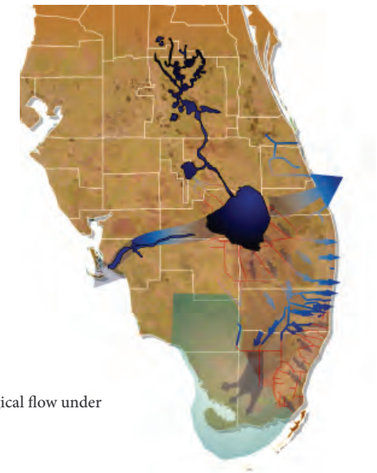
Post-Drainage Conditions

Drainage and development projects such as C&SF Project and Tamiami Trail altered the hydrological elements that were characteristic to the Everglades and Big Cypress watersheds and resulted in significant ecological changes. Roadways served as dams, which effectively blocked or rerouted the broad sheet flow characteristic of the systems into narrow channels that could pass through culverts or narrow bridges. Canals captured and channelized sheetflow as well as intercepted groundwater that was then conveyed towards the coast, often in a direction that contrasted with historical flow patterns. Canals modified the period of inundation and provided avenues for saltwater or brackish water to extend into interior portions of south Florida. Levees were constructed as part of the C&SF Project to retain floodwaters and control flow discharge. The effects of these activities on hydrology were most pronounced in the eastern half of south Florida with the significant civil work projects in the Everglades, but the Tamiami Canal and Tamiami Trail also impacted a large drainage area, and interrupted the historic overland sheet flow through the Big Cypress. These alterations reduced the depth and duration of inundation, introduced tidal influences into interior freshwater systems, and modified surface discharges to occur too often, too little, or at the wrong times of the year. As described in Section 2.5 – Ecology, the changes to hydrology resulted in ecological changes to the plant and wildlife populations of south Florida.

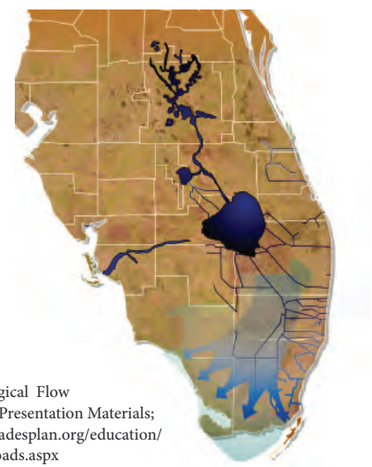
In addition to water flow and quantity issues, the water quality of the region has also changed, although water quality inputs for the Big Cypress have generally been affected less than those of the Everglades. The Everglades occurs at the end of a hydrological gradient beginning near Orlando, a gradient that includes extensive agricultural lands. Water from cattle operations occurring upstream of Lake Okeechobee along the Kissimmee River contain phosphorous and nitrogen at higher levels than historic background levels. Between Lake Okeechobee and the remaining Everglades lies the 700,000 acre Everglades Agricultural Area (EAA). Sugarcane, the predominant crop in the EAA, is chemically intensive to grow on a sustained basis. In south Dade County, farming operations use heavy tilling to break up sea shells and coral (limestone) covering the area in order to cultivate vegetables. This farming method requires extensive use of fertilizer and pesticides, some of which drains into the Everglades watershed. Moreover, altered water levels within the region result in the oxidation of the underlying organic soils. This oxidation releases organically bound nitrogen that combines with other elements to form nitrates at higher levels than the historical levels, including both in surface waters and the aquifer. In addition, regional hydrological alterations reduced seepage into the aquifer, allowing salt water to intrude into portions of the aquifer



Pre Hydrological Alteration Flow



Current hydrological flow under the C&SF Project



Restored Hydrological Flow
CERP Everglades Presentation Materials; http://www.evergladesplan.org/education/requested_downloads.aspx

Turner River canoe launch

View northwest of WCA3 near Gator Park

View east of the L-29 canal from the S-334 structure

and to extend farther upstream into historically freshwater wetland systems. The Big Cypress watershed is less affected by altered nutrient loads as upstream drainage into the watershed is limited, but salt water intrusion through canals has modified conditions in upstream freshwater wetlands.

The waters of Big Cypress National Preserve, ENP, Florida Panther NWR, Collier-Seminole State Park, and Fakahatchee Strand Preserve State Park are currently designated as Outstanding Florida Waters. This is a state designation overseen by the Florida Department of Environmental Protection (FDEP) and codified in Rule 62-302.700 Florida Administrative Code (F.A.C). It is intended to protect existing, high-quality waters. For the most part, these wetland systems are located at the down-gradient end of an altered watershed, and they are subject to the effects of upstream water management practices.

Hydrological Features

The ROGG Study Area includes a number of hydrological features and/or structural components of water control efforts, including levees and canals, natural creeks, and sloughs in additional to extensive wetland systems. The following provides an overview of these different features.

Natural Water Features

Natural water features ranging from sloughs to creeks and rivers occur within the ROGG Study Area, with the Shark Valley Slough dominating the eastern portion of the study area and a variety of rivers and lakes occurring in the western portion of the study area. The Fakahatchee Strand occurs west of S.R. 29 and is a five mile wide, 20 mile long swamp forest that ultimately drains south of U.S. 41 into the Fakahatchee and East Rivers and related estuarine tidal systems. Several other tidal creeks, including the Whitney and Blackwater Rivers, occur south of U.S. 41 in the western portion of the ROGG Study Area. Extending to Chokoloskee Bay, the Turner River intersects U.S. 41 east of Ochopee. Restoration efforts, including plugging of the Turner River Canal, have increased flows within the river, which has increased the accessibility of this river for canoeists and kayakers. Historically approximately 20 miles wide at U.S. 41, the Shark River Slough occurs in the eastern portion of the study area and is the primary source of water for the ENP. It consists of extensive wet prairies and slough vegetation until it discharges into the Shark River.

Water Conservation Areas

As part of the CS&F Project, three WCAs were established in the mid-1940s to provide flood protection, water supply storage, and environmental resource protection for the lands lying south and east of Lake Okeechobee. The southernmost element of this system, WCA3, occurs north of and adjacent to U.S. 41 in the ROGG Study Area and is the largest of the three WCAs covering more than 921 square miles. The L-67A and L-67C levees subdivide WCA3 into two portions, which are known as WCA3A west of the levees and WCA3B east of the levees. Other levees, including the L-28 and L-29 levees, form the exterior boundary for WCA3, except for a seven mile long gap on the west side that allows for free water exchange with the Big Cypress. WCA-3A receives water from Lake Okeechobee, WCA-2 and the EAA via the North New River and Miami Canals, and from several other canals and pump stations and delivers water to ENP and Miami-Dade County. The majority of WCA3 consists of sawgrass marsh and tree islands, although the inundation depths and durations differ from the natural free-flowing sheetflow that historically occurred within the Everglades. The direction of flow has also been modified by the canals and levee system, with the L-67A and L-67C levees directing flows in a more southwesterly direction than historically occurred. WCA3B is a significant recharge area to the Biscayne aquifer and helps control saltwater intrusion in municipal wells in populated areas along the coast. It receives most of its water from rainfall and occasionally from WCA3A via the Miami and L-67 Canals. Water is discharged from WCA3B via the Miami Canal although plans are underway to enable discharges to the Northeast Shark River Slough along the northeast boundary of ENP from WCA3B.

Big Cypress Canals

Water within the Big Cypress watershed generally flows southwest under U.S. 41 and other roads through several culverts and bridges before discharging through tidal marshes and mangroves into the Gulf of Mexico, although the eastern portion of the watershed is connected hydrologically to the eastern Everglades. U.S. 41 and other roads such as Birdon Road, Loop Road, and Turner River Road and their accompanying parallel canals obstruct sheet flow in the region and channel water to narrow culverts or bridges. The sheetflow and channelization elements from the canals along the road significantly altered the Turner River watershed so that the river became shallow, slow-moving, and clogged with vegetation, thereby affecting the ecology of the river and estuarine areas at the outflow in Chokoloskee Bay. A system of plugs was placed into the canal and culverts were placed under Turner River road to slow and redirect water flow back to the river in the 1980s, resulting in increased flows for Turner River and a series of small connected ponds in the remainder of the Turner River Road Canal. Flows in some sections of U.S. 41 were improved in the mid-1990s by the construction of several new culverts or bridges under the road, although many of these were still widely separated in the landscape. An additional 16 culverts were installed under U.S. 41 between 2003 and 2006 as part of the Western Tamiami Trail Culverts Critical Project to further enhance water movement under U.S. 41. Recently, the NPS completed improvements to Loop Road to stabilize the road and install additional culverts to improve hydrological connections.

Several other large canals were constructed in the western portion of the ROGG Study Area to provide drainage for development tracts planned for the area. The Halfway Canal provides drainage for lands now used for the Big Cypress National Preserve headquarters and Visitor's Center, while the canal along S.R. 29/C.R. 29 provides drainage for the road serving Everglades City. The Faka Union Canal was constructed as the primary drainage feature for the Port of the Islands development, but also served as an outlet for the Golden Gate Estates planned development. A number of roads and canals were constructed in the planned southern portion of the Golden Gate Estates, which modified water movement within the western portion of the ROGG Study Area. These roads and canals are now part of the Picayune Strand State Forest and restoration activities are ongoing to remove roads and modify these canals as part of the Picayune Strand restoration efforts. All three of these canals channelized sheetflow and provided an avenue for brackish water to extend further inland.

Brackish Marsh Considerations

The extent and salinity of tidally influenced wetlands in the western portion of the ROGG Study Area were altered by the installation of U.S. 41 and the Tamiami Canal, particularly near the intersection of S.R. 29/C.R. 29. The canals in this area provide an avenue for brackish water to extend into freshwater wetland systems, while the Tamiami Canal spreads this brackish water east/west through the landscape. U.S. 41 blocks the movement of freshwater from the north and tidal, brackish water from the south except through a limited number of bridges and culverts. This results in differences in salinity on the north and south sides of U.S. 41. Planning and implementation of projects to restore tidal exchange to these areas by increasing groundwater recharge and reducing large and

unnatural freshwater inflows are underway. The Picayune Strand Restoration Project, a sub-project of CERP, includes 55,000 acres located between Alligator Alley and U.S. 41. This project involved plugging canals, building and operating pump stations, placing culverts under U.S. 41 and removing old road beds, which were designed to restore freshwater flows south of U.S. 41 and improve the tidal exchange.

Future Restoration Considerations

Hydrological restoration activities have begun to be implemented in the vicinity of the ROGG Study Area. Several projects associated with the Mod Waters project have been completed in recent years, including improvements to the 8.5 Square Mile area to protect private lands from increased flows in the ENP, conveyance and seepage control features such as raising the elevation of Tigertail Camp, and the completion of construction of a one mile bridge for U.S. 41 to facilitate flow into Shark River Slough. Several CERP projects have had elements that were completed, including the construction of Stormwater Treatment Areas (STA) and the Picayune Strand Restoration Project. To improve water quality flowing in to the WCAs through the removal of phosphorus, the SFWMD has constructed several STAs between the EAA and the WCAs providing an effective treatment area of more than 57,000 acres as of late 2012. In the western portion of the ROGG Study Area, the Picayune Strand Restoration Project has included removal of more than 160 miles of roadways, installation of plugs for more than 20 miles of canals, and installation of pump stations to assist with water control.

Additional projects are anticipated to be implemented in the next 10+ years to continue to improve the hydrology of the Everglades, primarily through the implementation of projects identified for CEPP. Projects identified for CEPP include elements in the vicinity of the ROGG Study Area include the removal of portions of the L-29 levee and six miles of the Old Tamiami Trail, installation of a new levee adjacent to the Blue Shanty flow-way, and modifications to water control structures. Projects occurring north of the ROGG Study Area include construction of additional storage and detention basins, backfill of the Miami Canal, levee removal, and other canal improvements to route more water into WCA3. The CEPP plan identifies project details that will guide phasing of projects identified for CEPP. Generally, the projects north of the ROGG Study Area will need to be completed prior to constructing and completing the CEPP projects within the ROGG Study Area. In addition, the construction of the bridges associated with the Tamiami Trail Next Steps project, especially the 2.6-mile bridge between the proposed Blue Shanty flow-way and L-67 levee, is required prior to the removal of the L-29 levee and/or discharge of the increased water quantity from the northern projects. The draft Project Implementation Report for CEPP that documents the final plan elements, schedules, and other elements is scheduled for release in August 2013 with the goal to have it available for congressional review and approval as part of an upcoming Water Resources Development Act project. Additional projects within the CEPP study area that were identified as part of the Decompartmentalization of WCA3 CERP project, including the removal of the L-28 levee and the remaining portions of the L-29 levee, were not included in the CEPP plan and are not anticipated to be implemented in the next 10+ years unless other funding is secured.

Although not addressed in current CERP projects, hydrological restoration activities in the Big Cypress have also been identified for future implementation within the ROGG Study Area. Although the Western Tamiami Trail Culverts Critical Project has been partially implemented, funding has limited the implementation of the remainder of the culverts (approximately 60) under U.S. 41 and Loop Road. Hydrological restoration activities for wetlands in the Ochopee area of the Big Cypress National Preserve have been identified to enhance sheetflow and are currently being designed and permitted. These activities include scraping roadbeds used for historical agricultural activities back to existing grade, installing new culverts under Birdon Road, and installing plugs in the Birdon and Diagonal canals. These activities are anticipated to restore sheetflow to drained wetland systems and to eliminate saltwater intrusion along Birdon Road.

Hydrology - Relevance to ROGG: Regional hydrology is one of the most significant elements affecting the regional character and ecology in which ROGG would occur as well as a primary consideration for the design and implementation of ROGG. The role of hydrology at both the regional levels associated with watershed drainage and restoration activities as well as local sheetflow and water movement affects feasibility assessments for routing options, design of trail and trailhead facilities, regulatory coordination, and constructability. Specific influences on analysis for the ROGG included:

- **Regional Hydrological Restoration** – The regional hydrological restoration efforts associated with CERP and other projects are the primary drivers for the prevailing physical conditions, improvements and infrastructure that would be available for ROGG. Further, hydrologic restoration and management must be accommodated as part of design. Any aspect of ROGG that would compromise the fundamental objectives or implementation of regional hydrological restoration efforts are considered infeasible for this study. The post-restoration configurations and conditions for infrastructure, water levels, and/or flows are the baseline condition for feasibility evaluations of routing alternatives and design options for ROGG. Infrastructure with particular relevance to feasibility assessments for ROGG includes the proposed U.S. 41 bridges identified in the Tamiami Trail Next Steps EIS, levee removals associated with CEPP, Turner River and Copeland Prairie hydrological modifications, and culverts and bridges for the Picayune Strand Restoration Project. The water levels and flow requirements for post-restoration systems set the baseline for the design of trail surface elevations and stormwater treatment drainage requirements.

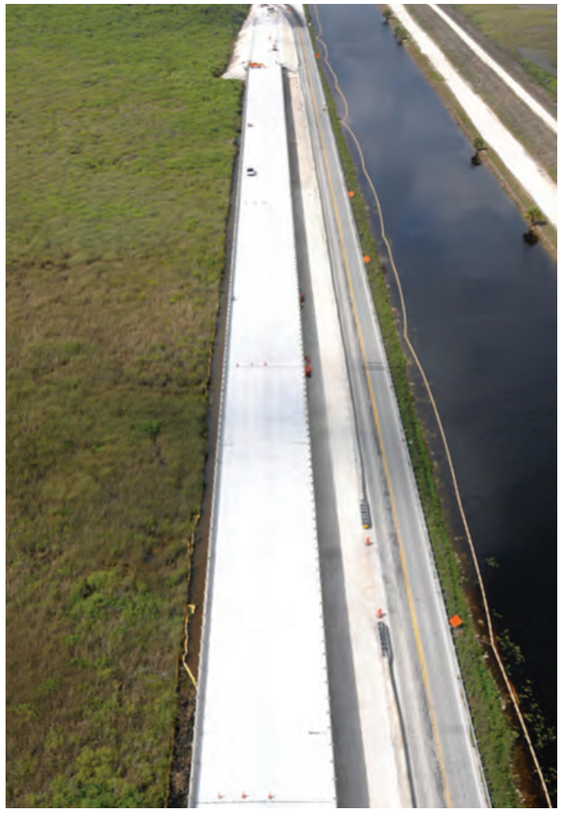
- **Sheetflow/Channelization** – U.S. 41 hinders sheetflow in much of the corridor due to the effects of channelization from the adjacent Tamiami Canal as well as the limited number of bridges and culverts that occur under the road. Installation of new culverts through projects such as the Western Tamiami Trail Culverts Critical Project or the Copeland Prairie Mitigation Plan assists in providing additional avenues for flow under U.S. 41 that will contribute to re-establishing sheetflow. The feasibility evaluation for the design and routing for ROGG segments and/or facilities considered the current and proposed future sheetflow conditions as well as proposed structural improvements to enhance sheetflow. Opportunities to design ROGG facilities to enhance sheetflow by diverting or collecting the runoff from the culvert channel under U.S. 41 and spreading it across the relatively flat landscape was also considered as part of the feasibility evaluation, especially for portions of the ROGG occurring on the south side of U.S. 41. Projects to enhance sheetflow over a broad area identified by the NPS or other public landowners such as the Copeland Prairie Mitigation Plan were considered as potential mitigation activities for the ROGG feasibility assessment.

- **Water Features/Canals** – A number of natural rivers and canals occur within the ROGG Study Area, many of which are or can be utilized for fishing or other water related recreation. ROGG facilities would be designed to accommodate existing canal crossings through the construction of bridges or culverts that accommodate future restoration efforts. The incorporation of safety features for trail crossings over water features was included in the feasibility evaluation. Fisherman and pass-through trail users pose potential conflicts for trail crossings of water features. Incorporation of methods to separate users and/or provide separate facilities to accommodate fishing was considered as part of the feasibility assessment.

- **Saltwater Intrusion** – Tidal exchange has been affected by U.S. 41, especially in the Copeland and Ochopee areas of the ROGG Study Area, resulting in salinity changes on the north and south sides of U.S. 41. In addition, canals and freshwater diversion have allowed brackish or saltwater intrusion into historically freshwater systems. The routing and design of ROGG facilities should not negatively affect tidal exchange nor limit opportunities to restore appropriate tidal dynamics. Opportunities to use ROGG to limit surface saltwater intrusions were evaluated as part of the feasibility assessment.

Faka Union Canal bridge crossing

- **Aquifer** – Aquifers are naturally replenished by rainfall and surface waters that saturate into the ground and work their way through the soil and geological substrate to the water table. ROGG facilities may include the installation of impervious surfaces that would hinder percolation into the groundwater and/or surface aquifers. However, stormwater facilities and the relative narrow profile of the ROGG relative to the thousands of acres of natural lands in the vicinity may limit or negate the potential effects on aquifer recharge from ROGG facilities. ROGG facilities would be designed to maintain existing recharge to the surficial aquifer or improve recharge in areas where existing impervious surfaces could be removed or replaced with pervious structures in the Study Area. Where ROGG facilities require water sources, the feasibility of using surficial water sources rather than other aquifers was evaluated.



Completed one-mile bridge for the Tamiami Trail Modification Project; Photo Credit: USACE Tamiami Trail Construction Update March 2013

Hydrology and Hydrogeology Summary

The ROGG Study Area occurs within the Everglades and Big Cypress Swamp watersheds, both of which have been subjected to extensive hydrological alterations. The Everglades watershed originates in central Florida in lakes draining into the Kissimmee River and then flows south through Lake Okeechobee into the Everglades and south into Florida Bay. The Big Cypress Swamp headwaters originate in the northern sandy flatlands south of the Caloosahatchee River drainage area. The surface hydrology interacts with and is influenced by the hydrogeology of the relatively permeable geological strata underlying the peninsula. There are three aquifers within the marine carbonate sediments underlying the southern peninsula: the Floridan aquifer system, the intermediate aquifer system, and the surficial aquifer system that includes the Biscayne aquifer, a significant water source for the east coast population. Restoration activities within the region are anticipated to maintain hydrological inputs into the aquifers.

Historical and Current Conditions

The hydrological system in which the ROGG Study Area occurs consisted primarily of vast wetlands associated with the Everglades and Big Cypress watersheds in the extremely flat topography of the pre-drainage landscape of south Florida. The pre-drainage wetland systems exhibited three essential characteristics: dynamic storage and sheet flow, large spatial scales of drainage, and heterogeneity in habitat. The slow rate of flow through the topographically flat system resulted in a discharge of freshwater into estuaries well into the dry season. Water flowing through both the Everglades and Big Cypress systems was generally low in nutrients. Drainage and development projects such as C&SF Project and Tamiami Trail altered the hydrological elements that were characteristic to the Everglades and Big Cypress watersheds. Roadways and canals blocked or rerouted sheet flow into narrow channels, changed the direction of historical flow patterns, and modified brackish water exchange. Levees were constructed as part of the C&SF Project to retain floodwaters and control flow discharge. These alterations reduced the depth and duration of inundation, introduced tidal influences into interior freshwater systems, and modified surface discharges to occur too often, too little, or at the wrong times of the year. In addition to water flow and quantity issues, the water quality of the region has also changed through increased nutrient levels, although water quality inputs for the Big Cypress have generally been affected less than those of the Everglades. The Everglades occurs at the end of a hydrological gradient beginning near Orlando, a gradient that includes extensive agricultural lands.

Hydrological Features

The ROGG Study Area includes a number of hydrological features and/or structural components of water control efforts, including levees and canals, natural creeks, and sloughs in addition to extensive wetland systems. Natural water features ranging from sloughs to creeks and rivers occur within the ROGG Study Area, with the Shark Valley Slough dominating the eastern portion of the study area and a variety of strands and rivers occurring in the western portion of the study area. These include the Fakahatchee Strand, Whitney River, Blackwater River, and Turner River. The Turner River is the only river that passes under U.S. 41 within the ROGG Study Area. Constructed as part of the CS&F Project, WCA3 occurs north of and adjacent to U.S. 41 in the ROGG Study Area. The L-67A and L-67C levees subdivide WCA3 into two portions, while the L-28 and L-29 levees generally form the exterior boundary for WCA3. U.S. 41 and other roads, such as Birdon Road, Loop Road, and Turner River Road, and their accompanying parallel canals obstruct sheet flow in the Big Cypress watershed and channel water to narrow culverts or bridges. Several other large canals were constructed in the western portion of the ROGG Study Area to provide drainage for development tracts planned for the area, including the Halfway Canal, the canal along S.R. 29/C.R. 29, and the Faka Union Canal. All three of these canals channelized sheetflow and provided an avenue for brackish water to extend further inland, while the Tamiami Canal spreads the brackish water from these canals east and west.

Future Restoration Considerations

Hydrological restoration activities have begun to be implemented in the vicinity of the ROGG Study Area. Several projects associated with the Mod Waters project have been completed in recent years, including the completion of construction of a one-mile long bridge for U.S. 41 to facilitate flow into Shark River Slough. Several CERP projects have had elements that were completed, including the Picayune Strand Restoration Project. Additional projects are anticipated to be implemented in the next 10+ years as part of CEPP, including the removal of portions of the L-29 levee and six miles of the Old Tamiami Trail, installation of a new levee adjacent to the Blue Shanty flow-way, and modifications to water control structures. The CEPP plan identifies that projects north of the ROGG Study Area will need to be completed prior to constructing and completing the CEPP projects within the ROGG Study Area to ensure that water quality meets project objectives and to manage the amount of water flowing through the system. In addition, the construction of the bridges associated with the Tamiami Trail Next Steps project, especially the 2.6-mile long bridge between the proposed Blue Shanty flow-way and L-67 levee, is required prior to the removal of the L-29 levee and/or discharge of the increased water quantity from the northern projects. Although not addressed in current CERP projects, hydrological restoration activities in the Big Cypress have also been identified for future implementation within the ROGG Study Area, including hydrological restoration activities for wetlands in the Ochopee area of the Big Cypress National Preserve to enhance sheetflow.

Feasibility Considerations

Regional hydrology is one of the most significant elements affecting the character and ecology of the ROGG Study Area and a primary consideration for the design and implementation of ROGG. Any aspects of ROGG that would compromise the fundamental objectives or implementation of regional hydrological restoration efforts are considered infeasible for this study. The post-restoration future conditions for infrastructure, water levels, and/or flows were considered the baseline condition for feasibility evaluations of routing alternatives and design options for ROGG. Other elements with specific relevance to ROGG include maintaining or enhancing existing sheetflow, incorporating water related recreation opportunities and opportunities to restore historic patterns of tidal exchange.

2.1.5 Ecology

The ecological resources in the regional context of the ROGG Study Area provide both the impetus for establishing a regional greenway and the challenge of managing human access into such a unique and sensitive ecosystem. The suite of ecological resources found in south Florida are uniquely adapted to the region's subtropical climate, geology and soils, and the overriding influence of water at the regional scale. At the same time, this area is extremely sensitive to perturbations caused by the presence and activity of humans who live, recreate, or visit within the systems. Although many of the component species are similar across vegetation communities, the characteristics of specific community types can be distinguished due to differences in the way the species and vegetation assemblage responds to natural processes and alterations caused by human activity. While the regional ecosystem provides a uniquely recognizable setting, a full appreciation for the ecological setting for the ROGG Study Area requires a more detailed review of specific elements occurring across the ecosystem. These range from the resources of vegetation communities and wildlife to the ecological processes that interact subtly to form the diverse mosaic of the overall system.

The purpose of this portion of the report is to document these ecological conditions within the ROGG Study Area and the relevance those conditions have to the feasibility and master plan of ROGG. To accomplish this purpose, this Ecology element is divided into five elements, including:

- **Vegetation Communities** – Provides an overview of the composition, relevant ecological processes, and issues for the vegetation communities that occur within the ROGG Study Area
- **Listed Wildlife Species** – Provides an overview of the range, habitat requirements, life history, and threats to the listed wildlife species that could be affected by ROGG
- **Exotic Species** – Summarizes the types, areas affected, and issues posed by exotic and invasive species
- **Wetlands** – Provides a consolidated assessment of the jurisdictional requirements and issues associated with wetlands
- **Ecological Processes** – Provides an overview of the natural processes that affect or drive the ecological character and that pose specific constraints or opportunities for design and construction requirements

Each element begins with a description of resources or processes for the section and ends with an assessment of potential implications to feasibility assessments and master plan design. For simplified presentation, the common names of plant and animal species are used throughout the text. Scientific names are provided for reference in **Appendix B.**

Natural Resource Regulatory Context

Impacts to natural resources in the Study Area would require authorization from several agencies having jurisdiction over Waters of the United States (WOUS), including wetlands and water bodies, and protected wildlife and plant species. The review and authorization for proposed impacts would be coordinated through a variety of regulatory mechanisms, ranging from National Environmental Policy Act (NEPA) coordination to application and approval of various environmental permits. Construction of the ROGG may require coordination with the USACE, USFWS, EPA, State Historic Preservation Office (SHPO), SFWMD, FDEP, FFWCC and the Miami-Dade County Department of Regulatory and Economic Resources (MDRER), resulting in the need to obtain one or more of the following permits:

- USACE Individual Permit (IP)
- SFWMD Environmental Resource Permit (ERP) and/ or Dewatering Permit
- FDEP National Pollutant Discharge Elimination System (NPDES)
- MDRER Environmental Permit (Class I-VI) commensurate with impact details
- USFWS Biological Opinion (BO) or Bald and Golden Eagle Protection Act (BGEPA) Permit for Non-Purposeful Take of Eagles
- FFWCC Incidental Take Permits or Relocation Permits

Current regulations and permitting requirements for each regulatory agency are summarized in **Appendix C**.

National Environmental Policy Act (NEPA) Coordination:

The objectives for the National Environmental Policy Act (NEPA) must be met when federal funds are used or are contemplated to be used for any aspect of a project. Signed into law on January 1, 1970, NEPA was established to "foster and promote the general welfare, to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans." Generally speaking, NEPA requires that federal agencies consider the effects of their decision on the quality of the environment based on one of three levels of analysis: Categorical Exclusion Determination, EA/ Finding of No Significant Impact (FONSI), or Environmental Impact Statement. The analyses are accomplished through a variety of methods depending on the subject federal agency, but typically include an extensive review of the project purpose, project alternatives, data review, and public involvement. Coordination with regulatory agencies is part of the NEPA process, but construction authorization is still required subsequent to completion of the study.

Wetland Permitting:

Impacts to WOUS would be subject to USACE review under the Section 404 regulatory program in compliance with the Clean Water Act (CWA). A permit application would be submitted to the USACE for proposed activities that are regulated by that agency in conformance with Section 404 of the CWA. If construction actions involve activities in the surface waters and wetlands of Florida, an ERP would need to be obtained from SFWMD. Stormwater requirements are integrated into the state dredge and fill ERP permitting process in Florida. An ERP serves as water quality certification under Section 401 of the CWA. Issuance of an ERP is also the means of obtaining concurrence with the federal consistency provisions of the Coastal Zone Management Act. Adjacent residents and the public at-large are encouraged to participate in the wetland permitting process at both the state and federal levels.

Listed Species Permitting:

Listed plant and wildlife species are protected by the USFWS, the FFWCC, and the Convention on International Trade in Endangered Species. The USFWS, through the Endangered Species Act (ESA) and other regulatory instruments, and the FFWCC, through Chapter 68 of the F.A.C., regulate activities that may affect protected plant and wildlife species. Impacts and mitigation are determined on a species-by-species basis, and potential impacts to an individual animal or nest structure, nesting habitat, foraging habitat or all suitable habitat may require permits.

Relevance to ROGG: Although the permit process would be initiated after the ROGG feasibility study and master plan are completed, an assessment of the types and kinds of permits as well as the potential impacts to resources that would trigger the need for those permits was a critical aspect of the feasibility assessment of ROGG. The types of permit process required to address different types of impacts and mitigation informs the costs and schedule for implementation, and potential scrutiny to which permit applications or regulatory reviews would be subjected. All of these were incorporated into the feasibility assessment.

Wetlands near Kirby Storter Park

Depiction of rare and extinct animals from Florida; Photo Credit: State Archives of Florida, Florida Memory, http://floridamemory.com/items/show/17723

Everglades System Overview

Subject to some of the largest civil works projects in the world, the ecological resources of the Everglades have experienced significant changes over the last century, yet are proving resilient after implementation of restoration efforts to address the alterations. The characteristic view of the Everglades is the near monotonous expanse of wet prairies dominated by sawgrass and dotted with tree islands. Yet, the ridge and slough landscape adds subtle diversity to the system where differences in elevation of only a few inches may cause significant differences in water flow and vegetation communities. Regional drainage alterations have led to habitat changes and exotic/ invasive species encroachment, but restoration efforts targeted to restore appropriate hydrology promise possibilities of improved ecological function over time. For the ROGG Study Area, the Shark Valley Slough provides a representative landscape feature that has been significantly impacted by regional drainage projects, but is now the target for significant hydrological enhancements that include features that will directly affect the feasibility and master plan for ROGG.

Big Cypress System Overview

Comprising the western 2/3 of the ROGG Study Area, the Big Cypress watershed is driven by similar elements as the Everglades, but contrasts in ecological character and relative degree of alterations. The forested strands, sloughs, and prairies of the Big Cypress comprise one of the largest stands of interconnected cypress wetlands in Florida, and provide a home for rare and endangered species unique to North America. Hydric pine flatwoods and scattered hammocks weave through the mosaic of the Big Cypress wetlands in areas with elevations that may be only inches above the adjacent cypress. The freshwater passing through the Big Cypress gradually grades into the brackish estuarine system of the Ten Thousand Islands characterized by salt marshes and mangroves. Although alterations in the hydrology of the Big Cypress such as canal and road construction in the Picayune Strand and the construction of the Tamiami Trail and associated canal occurred, the degree and intensity of these changes across the watershed were less concentrated than the levee and canal system through the Everglades. These regional alterations have resulted in habitat changes through increased salinity and inundation changes, but restoration efforts have begun to address some of the elements. The ROGG Study Area traverses the entire range of systems within the Big Cypress and could provide a window on the ecological processes of this region.

Vegetation Communities

Typically the most visible aspect of the south Florida ecosystem, vegetation communities vary from freshwater systems of the Everglades and the Big Cypress to tidally connected estuarine systems. Locally, diversity and structure depend on soil, hydrology, and topographic variability. The vast majority of the ROGG Study Area consists of vegetation communities associated with wetland habitats such as wet prairies, freshwater sloughs, salt marshes, cypress systems, hydric pine flatwoods, and coastal mangroves. Generally, the eastern portion of the ROGG Study Area exhibits marsh and wet prairie systems, while the western portion exhibits cypress systems, hydric pine flatwoods, and tidally connected estuarine systems. Open water systems also occur throughout, including those associated with natural stream bodies like the Turner River, although the majority are associated with canals or other excavated water bodies. Naturally vegetated upland areas such as pine flatwoods and hammocks exhibit limited to no inundation during average years, but typically grade gently into the adjacent wetland areas both in vegetation composition and topographic elevation. Other upland areas occur within the corridor on filled areas associated with roads, fill pads for current or historical structures, and/or levees and often exhibit dense stands of exotic, invasive vegetation. The following provides a summary description of the dominant habitat types found within the corridor.

Freshwater Vegetation Communities

Marsh – Sawgrass marsh is the dominant vegetation community and one of the defining characteristics of the Everglades, but can also occur in smaller patches within the Big Cypress. Sawgrass overwhelmingly dominates these marsh systems ranging from dense monospecific stands with plants up to nine feet in height to low growing and patchy plants intermixed with a diversity of other marsh species depending on soil conditions, fire history, and depth and duration of inundation. A variety of grasses and forbs such as maidencane, pickerelweed, spikerush, and arrowhead occur in more open areas of the sawgrass marsh. Cattails occur throughout sawgrass marshes as a minor component of the diversity, although elevated nutrient levels can result in dense stands of cattails that replace sawgrass as the dominant species. The culms of sawgrass provide an attachment area for periphyton, or algal mats, which can form dense mats in more open areas of the marsh. Sawgrass marshes can grow and thrive in a variety of hydroperiods, but these marshes typically occur where inundation of 1.0 to 1.5 feet occurs for most of the year. Fire is an important natural process for sawgrass marshes depending on the timeframe and intensity of the fire. Fires during the wet season can renew vegetation growth and provide nutrients to the system, while fires that burn into the soil during drought conditions can destroy sawgrass roots and change the composition of the community.

Freshwater Sloughs – Freshwater sloughs are deeper channels that are one to two feet deeper than the adjacent sawgrass marsh. They remain inundated for most months out of any given year, including through typical drought conditions. These channels provide significant areas of water flow for the Everglades throughout the year. Vegetation within freshwater sloughs in the Everglades typically includes a variety of submerged vegetation such as bladderwort, water hyssop, waterlily, and spatterdock and emergent vegetation such as maidencane, but sawgrass typically exhibits little to no presence within the sloughs. Sloughs in the Big Cypress are generally dominated by herbaceous species such as waterlily, water hyssop, ludwigia, and southern wild rice, although a variety of shrubs such as pond apple and pop ash can occur on the margins of the slough. Transitions between sawgrass marsh and sloughs typically are abrupt in vegetation composition with a dense “wall” of sawgrass vegetation bordering the more open slough with lower growing vegetation. This pattern is termed as a ridge and slough landscape. Major sloughs in the ROGG Study Area include Shark River Slough, which drains to Florida Bay, and smaller sloughs in the Big Cypress National Preserve, Fakahatchee Strand Preserve State Park, and Collier-Seminole State Park.

Wet Prairies – Wet prairies are treeless features dominated by herbaceous understory species that occur throughout the Big Cypress as well as shallower areas of the Everglades. Wet prairies are characterized by diverse flora including sedges, rushes, and grasses such as muhly grass, blue maidencane, and south Florida bluestem that grow over marl or fine sand soils, although the presence of limestone near the soil surface can also provide substrate for wet prairies to grow. Sawgrass may occur, but generally is a minor component of this system. Wet prairies typically inundate for three to seven months of the year at an average depth of approximately four inches. Periphyton mats occur within many wet prairies during the wet season. Prairies will burn during periods of drought, which limits the growth of shrubs. Wet prairies can grade with cypress systems to form the cypress prairies that are characteristic of the Big Cypress National Preserve.

Forested Wetlands – Forested wetlands occur primarily in the Big Cypress watershed and exhibit several forms ranging from cypress dominated domes, strands, and prairies to mixed hardwood swamps. The underlying soils and hydrology as well as the history of fire interact to allow the growth of the three types of cypress communities. Cypress domes are characterized by a monospecific overstory of cypress, which grow tallest in the center and taper off toward the fringes, forming a dome-like feature. Domes occur where the limestone substrate has given way to circular solution holes and appear visually isolated from other canopy systems within the landscape.

Cypress strands form along major drainages and generally retain a north-south orientation, parallel with the flow of water. Very large cypress trees may occur in these strands, especially in remote areas that were relatively inaccessible to timber harvesting operations. Strands such as the Fakahatchee Strand can extend for miles and be a mile or more in width. A variety of mixed hardwood species can occur with the cypress trees in interior portions of the wide sloughs. The near constant presence of water, coupled with high humidity provides conditions favorable for large numbers of orchids, bromeliads, and other epiphytic plants to grow on canopy and shrubs within or near large strands. They exist in microcosms where soils are richer and the area is protected from fire. Cypress prairies are characterized by an open forest of stunted cypress trees, called dwarf cypress. They are distributed in low densities in poor soils, and scattered, sparse growths of understory vegetation. Fires from the adjacent marshes and prairies burn into the margins of cypress domes and strands, which limits shrub growth and can lead to smaller trees due to damage from fire and nutrient changes.

Hydric Pine Flatwoods – One of the most diverse south Florida vegetation communities, fire dependent hydric pine flatwoods, also termed as wet pinelands, are comprised of a south Florida slash pine canopy over a groundcover generally dominated by herbaceous species and scattered shrubs. The herbaceous layer is generally dominated by grasses and sedges such as muhly grass, sand cordgrass, broomsedge, and beaksedges similar to the wet prairies, but can also include scattered shrubs such as wax myrtle and saw palmetto. The shrubs can become dense in the absence of fire. The boundaries between hydric pine flatwoods and wet prairies or cypress strands can be gradual due to intergradation between the communities. These systems typically exhibit a short hydroperiod with

inundation or saturation generally lasting for two months or less. These communities are dependent on frequent fires that burn the fine fuels of the grasses and pine needle litter, thereby limiting the growth of shrubs.

Tree Islands - Tree islands consist of aggregations of canopy trees and/or shrubs that look like tear-drop shaped islands of taller vegetation amidst the surrounding marshes and prairies. The majority of the tree islands within the Everglades consist of wetland vegetation and experience some inundation during the wet season, although some tree islands do include higher elevation hardwood hammocks that do not inundate regularly, if at all. Tree islands were extensively used by Native Americans and often exhibit archaeological or historical artifacts. Although cypress domes are sometimes called tree islands, reference to tree islands in this report are targeted towards the bayhead and willowhead communities more common in the Everglades. Bayheads are typically dominated by a variety of shorter trees such as swamp bay, pop ash, sweetbay, cocoplum, pond apple, and dahoon, although cabbage palms can project through these lower growing trees. Willowheads generally occur in slightly lower elevations than the bayheads and are dominated by Carolina willow. A variety of herbaceous species often dominated by ferns can occur within the tree islands. Willowhead islands occur on peat, which is very sensitive to fire during drought conditions.

Tidally Connected Vegetation Communities

Tidal Marsh - Tidal marshes are generally dominated by herbaceous communities that exhibit a low diversity of species adapted to high salinity and tidal fluctuations. Characteristic species found in tidal marshes include saltmarsh cordgrass, needle rush, perennial glasswort, saltgrass, saltwort, seaside oxeye, and saltmeadow cordgrass. Tidal marshes often exhibit distinct zones of vegetation in which one or two species of these characteristic species occurs, depending on frequency, depth, and salinity. The uplands adjacent to tidal marshes are dominated by salt tolerant shrub species such as grounsel, marshelder, and cocoplum. Salt pans occur within the marshes in areas that only periodically inundate and exhibit much higher salinity levels than the adjacent marshes. Vegetation within these pans is limited to species that tolerate high salinity levels such as saltgrass, perennial glasswort, and saltwort. Tidal marshes are highly productive and are important in the lifecycles of a variety of commercial marine species for food and shelter. The corridor exhibits salt marshes through significant portions of the corridor west of Ochopee, Florida.

Mangroves - Mangrove wetlands are intertidal wetlands common to coastal habitats. In the ROGG Study Area they also occur on the banks of canals exposed to tidal fluctuations. These wetlands are dominated by trees that are specially adapted to the high-salinity environment found on and near the coast. Typically, mangroves forests are dominated by a mix of white, red, and black mangroves or buttonwood, a mangrove associate. The most salt tolerant is the red mangrove, which also occurs in the deepest inundation zones. As flooding becomes less frequent, black mangroves and white mangroves can be found with buttonwood occurring on the areas with least frequent flooding. These species help protect the coastline during storms and high surf and they provide nursery habitat for fish and other wildlife in the coastal systems. Inundation and salinity levels within mangrove forest stands are influenced both by tides and runoff from upstream sloughs and swamps. Fires and frosts can limit mangrove growth, while hurricanes and storm surges can result in death or removal of mangroves. Within the ROGG Study Area, mangroves are found primarily west of Ochopee to near the Collier-Seminole State Forest along tidal creeks and open water bodies such as excavated ponds and canals subject to tidal influences, including the banks of the Tamiami Canal.

Upland and Transitional Habitats

Mesic Pine Flatwoods – Similar to hydric pine flatwoods in canopy composition, mesic pine flatwoods typically occupy higher elevations and experience little, if any, inundation during normal hydrological conditions. Pinelands are dominated almost exclusively by south Florida slash pine in the canopy, although cabbage palms can also occur, especially in areas that were historically logged. In contrast to hydric pine flatwoods, mesic flatwoods generally exhibit dense shrub layers of saw palmetto with lesser amounts of herbaceous species. In drier portions of the mesic flatwoods, a variety of scrub oaks such as sand live oak and myrtle oak can occur, although this scrubby flatwoods variant is limited in distribution through the ROGG Study Area. These forests often take root in the exposed limestone substrate of south Florida. Pineland communities are adapted to frequent fires that burn through the shrubs and accumulated pine needles. Long-term exclusion of fire can result in the increase in shrub density as well as more extreme fire events when fires do occur. These can result in the loss of canopy trees. Mesic pine flatwoods occur in the western portion of the ROGG Study Area in the Collier-Seminole State Park, although smaller aggregations occur in other portions of the Big Cypress watershed.


Forested wetlands


Mesic pine flatwoods


Wet praries


Hardwood hammock lining the entry to Collier-Seminole State Park


Mangroves


Tamiami Canal near the Big Cypress National Preserve Oasis Visitor Center

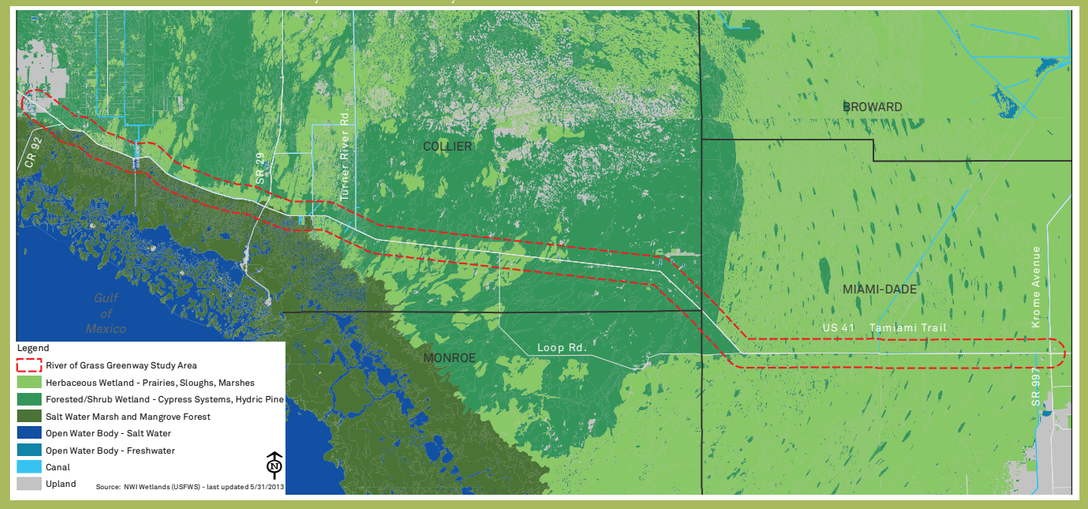
Wetland Regulatory Framework

Generally, wetlands are defined as low-lying areas in the landscape that are seasonally to permanently inundated and vegetated with plants tolerant of flooding or frequent saturation. Formal definitions of wetlands and the methods for determining the extent of wetland jurisdiction are found in the following applicable regulatory instruments: Chapter 24 of the Miami-Dade County Code of Ordinances, Chapter 62-340 of the FAC, and the Regional Supplement to the Corps of Engineers Wetland Delineation Manual (2010). Wetlands within the ROGG Study Area were mapped by the USFWS as part of the National Wetlands Inventory. The majority of the ROGG Study Area is classified as wetland with the exception of scattered hardwood hammocks, some pinelands, and artificially filled areas. Wetlands within the ROGG Study Area occur in both non-forested and forested form and included as Freshwater Vegetation Communities and Coastal Vegetation Communities vegetation community categories. All of the prairies, marshes, cypress, slough, mangrove, and some of the hardwood hammock and pineland communities are wetland.

Wetlands in the ROGG Study Area provide substantial habitat value for wildlife and are crucial for water storage and sustaining or enhancing water quality. Wetlands within ENP, Big Cypress National Preserve, Fakahatchee Strand Preserve State Park, and Picayune Strand State Forest are designated as Outstanding Florida Waters (OFWs), which is a designation intended to protect existing, high-quality waters by mandating that proposed projects within these areas to not degrade the existing water quality. If determined to be feasible, implementation of ROGG would likely require impacts to jurisdictional wetlands. As noted in Appendix 3, this requires the review and approval of a number of environmental permits from regulatory agencies. The reviews of any permits for future segments of ROGG will include functional assessments of potential impacts and mitigation to offset those impacts to ensure no net loss of wetland function resulting from ROGG.

Slough provides a representative landscape feature that has been significantly impacted by regional drainage projects, but is now the target for significant hydrological enhancements that include features that will directly affect the feasibility and master plan for ROGG.

NWI Wetland Delineation within the vicinity of the ROGG Study Area



Pine Rockland – Pine rocklands occur on outcrops of limestone that have hydrological conditions similar to hydric and/or mesic pine flatwoods depending on ground elevations. Similar to mesic and hydric pine flatwoods, the canopy of pine rocklands is dominated by south Florida slash pine. However, the herbaceous layer is typically comprised of shrubs such as saw palmetto and scattered cabbage palm. Typically, herbaceous species are more diverse in this community with a higher number of endemic species than herbaceous layers in the pine flatwoods. The limestone within pine rocklands is typically pitted with fissures. Pine rocklands depend on frequent fire to discourage the growth of shrubs. In the absence of fire, pine rocklands gradually transition to rockland hammock communities dominated by a variety of fire intolerant shrub and canopy species. Pine rocklands in the ROGG Study Area are most prominent within ENP, but do occur in scattered areas within the Big Cypress watershed. This habitat is unique to south Florida within the continental United States.

Hardwood Hammock – Hardwood hammocks occur on higher elevations that are scattered throughout the ROGG Study Area and are a habitat unique to south Florida within the continental United States, especially those that provide conditions suitable for royal palms. Many of the hammocks are located on shell mounds, while the remaining hammocks occur on natural rises within pine flatwoods, pine rocklands, or strands. Hammocks on shell mounds vary in composition depending on location with hammocks in coastal areas being dominated by tropical hardwoods such as gumbo limbo, mastic, and poisonwood and inland hammocks dominated by live oak and/or cabbage palm. Rockland hammock areas occur on broader areas of higher elevation and consist of diverse tropical hardwood forests dominated by species such as inkberry, satinleaf, Jamaica dogwood, and strangler fig. Rockland hammocks can grade into pine rocklands and can represent the successional climax community when fire is excluded. For both types of hardwood hammock forests, the herbaceous layer is generally sparse, while shrub and vine layers can be dense. Typically, hardwood hammocks in the ROGG Study Area are relatively small in size, although larger expanses of hardwood hammock can occur such as the rockland hammock in Collier-Seminole State Park. Fire in hardwood hammocks is generally an infrequent to rare occurrence, but can significantly change the composition of the hammock, especially if occurring during dry conditions.

Disturbed Lands – A variety of disturbed upland habitats occur throughout the ROGG Study Area. These uplands consist of areas that were historically cleared and/or filled for residential or commercial structures, levees, roadbeds, or other uses. Existing residential or commercial parcels include houses or other structures as well as lawns and/or parking facilities that are often landscaped with a variety of native and non-native vegetation. Vacant lots often exhibit dense stands of exotic plants, typically comprised of Brazilian pepper and melaleuca although a variety of other exotic invasive species can also occur. Levees exhibit a variety of conditions; sand or gravel serves as a driving surface on the top or bench of the levee and the slopes are comprised of ruderal vegetation subject to frequent mowing. Roadbeds range from the paved road section and grassed shoulder of U.S. 41 to narrow filled gravel/limestone roads through marshes and swamps used for historical logging operations. The banks of many of these roadways are lined with shrubs ranging from natives such as cocoplum and wax myrtle to exotic plants such as Brazilian pepper. Other lands used in historical agricultural production have been left fallow and now consist of ruderal lands.

Open Water

Waterbodies - Significant surface water features within the ROGG Study Area include rivers, canals, lakes and excavated reservoirs. Several natural riverine drainage ways occur in the vicinity of U.S. 41, including the Blackwater, Whitney, Faka Union, Fakahatchee, New, East, and Turner Rivers. The majority of these rivers are tidally influenced and occur south of U.S. 41, although Turner River extends north of U.S. 41 as a significant freshwater drainage way. One major canal feature, the Tamiami Canal was excavated to create fill for road construction and is located north of U.S. 41. Additional regional canals, including the S.R. 29, L-28, L-67A, L-67C, L-30, and Faka Union canals, intersect the Tamiami Canal within the ROGG Study Area. These features are detrimental to sheet flow in that the roads block flow, and the canals divert water from adjacent wetlands. The Faka Union is tidally influenced and provides Critical Habitat for manatees. Several small lakes and water bodies occur throughout the ROGG Study Area, some of which naturally occur in depressions or sinks in the landscape, while others were created as borrow ponds. These water bodies provide year round aquatic habitats for wildlife refuge during drought conditions.

Vegetation - Relevance to ROGG: Vegetation communities within the ROGG Study Area affected feasibility assessments for routing options, design of trail and trailhead facilities, considerations for public and regulatory coordination, and post-construction operation. Specific influences on analysis for the ROGG included:

- **Routing Alternatives** – Routing alternatives for ROGG considered both the potential presence of rare vegetation communities and options that would primarily traverse previously disturbed habitats. Several rare vegetation community types occur within the ROGG Study Area, including hardwood hammocks and pine rockland. Although these habitats typically include shade trees and upland habitat that would provide beneficial elements for ROGG, they can also be home to rare plant and animal species. The route alternatives for ROGG included an assessment of both the educational and experiential opportunities associated with access to the rare communities as well as potential impacts to the species comprising the habitats and/or management implications that would be caused by a trail through the natural community. Management implications could include reduced capacity to apply prescribed fire and/or breaks in vegetation that cause increased susceptibility for the vegetation community to damage from hurricane winds or exotic species encroachment. Routing alternatives that used previously disturbed lands were prioritized both to take advantage of conditions favorable for trail use as well as opportunities for the trail operation to remove exotic plants present in the disturbed areas.

- **Wetlands** - Vegetation communities in the vast majority of the ROGG Study Area are wetlands subject to the regulatory authority of local, state, and federal entities, which are described in more detail in **Appendix C**. Construction of a trail within wetland communities will require extensive permitting and was a significant factor for the overall feasibility of implementing all or portions of the ROGG segments. Accommodations for wetlands were included in design options evaluated for ROGG facilities, which included boardwalks to reduce fill and allow light penetration, and options to use the trail to spread out the flow of water from channelized flow-ways to closer mimic the historical sheetflow of the region.

- **Lack of Shade** – The majority of the ROGG Study Area consists of prairies, marshes, or other relatively non-forested communities. Trail sections for ROGG through these areas would have little natural canopy available to provide shade for trail users, which would require the installation of shade structures or way stations to mitigate the heat and sun in south Florida.

- **Waterbodies** – A number of excavated canals and ponds occur within the ROGG Study Area, the majority of which have steep banks and no vegetated edge. Some of these have structures that limit access to the water, such as the guardrails between the road surface of U.S. 41 and the Tamiami Canal. Likewise, trails located adjacent to, or over water will require railings to limit access. Some of these water features may be targeted for restoration, which would affect both the slopes anticipated at the water's edge as well as the experience of trail users. Water features also serve as a fishing location. Fishing provides a potential user conflict between pass-through trail users and the fisherman that want to stay near good fishing locations. The incorporation of design features such as platforms and "no fishing" locations were evaluated as part of the study.

- **Shrub Management** – Many of the natural vegetation communities in the ROGG Study Area have a sparse shrub layer due to the history of fire and inundation, which creates the characteristic vista across open prairies in the region. However, areas that have been disturbed by historical agricultural activities, hydrological alterations, and/or fill placement provide drier conditions and protection from fire that allows dense shrubs to grow, including both native and exotic invasive shrub species. Along roadways and fill pads the Old Tamiami Trail and portions of Loop Road, these shrubs can grow into an almost impenetrable thicket that limits views across the natural systems. These shrub thickets have become part of the cultural landscape along roadway corridors, which may limit the amount or intensity of management allowed to thin the shrubs and allow additional views into the surrounding natural systems. New trail facilities built on filled areas will require management during trail operations to limit the growth of undesirable shrubs. In areas where exotic invasive shrub species occur, the ROGG was identified as a potential catalyst for removal of these undesirable species.

- **Landscape Palette** – The ROGG Study Area traverses vast expanses of native vegetation communities in which a diversity of native plants that should be used for landscape designs within the region. The incorporation of native plants into the landscape palette for the trail and/or trail facilities can minimize abrupt transitions between constructed features and the adjacent natural areas. These species are adapted to the ecological setting of the region, which can limit the maintenance requirements once the species are established.

- **Tidal Communities** - Vegetation communities that rely on tides and the associated influence of salinity occur in the western portion of the ROGG Study Area. Routing alternatives and design options that would alter historical tidal fluctuations were deemed essentially infeasible. On the other hand, opportunities to use ROGG to enhance or restore historical tidal operation and salinity levels were evaluated as part of the feasibility study.

Vegetative Commmunities Summary

The vast majority of the ROGG Study Area consists of vegetation communities associated with wetland habitats. Generally, the eastern portion of the ROGG Study Area exhibits marsh and wet prairie systems, while the western portion exhibits cypress systems, hydric pine flatwoods, and tidally connected estuarine systems. Unique tear-drop shaped tree islands occur within the marshes and wet prairies of the Everglades. Forested wetlands occur primarily in the Big Cypress watershed and exhibit several forms ranging from cypress dominated domes, strands, and prairies to mixed hardwood swamps, such as the Fakahatchee Strand. Open water systems also occur throughout, including those associated with natural stream bodies like the Turner River, although the majority of these systems are associated with canals or other excavated water bodies.

Naturally vegetated upland areas such as pine flatwoods and hammocks exhibit limited to no inundation during average years, but typically grade gently into the adjacent wetland areas both in vegetation composition and topographic elevation. Small portions of the ROGG Study Area consist of pine rockland, a habitat unique to south Florida that consists of pine forests growing on limestone outcrops. Other upland areas occur within the corridor on filled areas associated with roads, fill pads for current or historical structures, and/or levees. These uplands often exhibit dense stands of exotic, invasive vegetation.

Specific influences on analysis for the ROGG from vegetation communities included routing alternatives in the vicinity of rare vegetation communities, areas requiring intensive management, and previously altered sites, the need for additional shade features due to limited available tree canopy, access to water features, design and management considerations to address shrub management and tidal communities, regulatory requirements for wetlands, and vegetation that could be incorporated into a landscape palette for the ROGG.

Primary Listed Species Regulations Summary

A number of regulations require review of activities with the potential to impact listed species and changes to project design and/or permits if the impacts would realized in the final implementation. Four of these have specific relevance to ROGG as the primary regulations affecting potential impacts to listed species in south Florida. The following provides a brief summary of each regulation.

Endangered Species Act (ESA) of 1973, as amended (PL 93-205)

The ESA was developed to protect threatened and endangered species and the ecosystems upon which they depend by prohibiting the take of a species through a variety of actions defined in the ESA. Plants and animals listed as federally threatened and endangered are protected under the ESA, which is administered and enforced by the USFWS. The ESA allows for exceptions to prohibited activities through the issuance of a permit for taking of a listed species incidental to otherwise lawful activities.

The ESA also regulates Critical Habitat, which is a defined land area containing the habitat area essential for the conservation of the species. Critical Habitat may require special management considerations or protection, but the area does not necessarily represent the total extent of suitable or occupied habitat for the species. Approximately 50% of species listed by the USFWS have Critical Habitat designations.

Migratory Bird Treaty Act (MBTA)

Most native birds within the ROGG Study Area are protected under the Migratory Bird Treaty Act (MBTA). The MBTA made it illegal for people to "take" migratory birds, their eggs, feathers or nests. "Take" is defined in the MBTA as an attempt at hunting, pursuing wounding, killing, possessing, or transporting any migratory bird, nest, egg, or part thereof by any means or in any manner. The MBTA allows for legal hunting of certain species protected under the MBTA and within the hunting regulations established by the State of Florida.

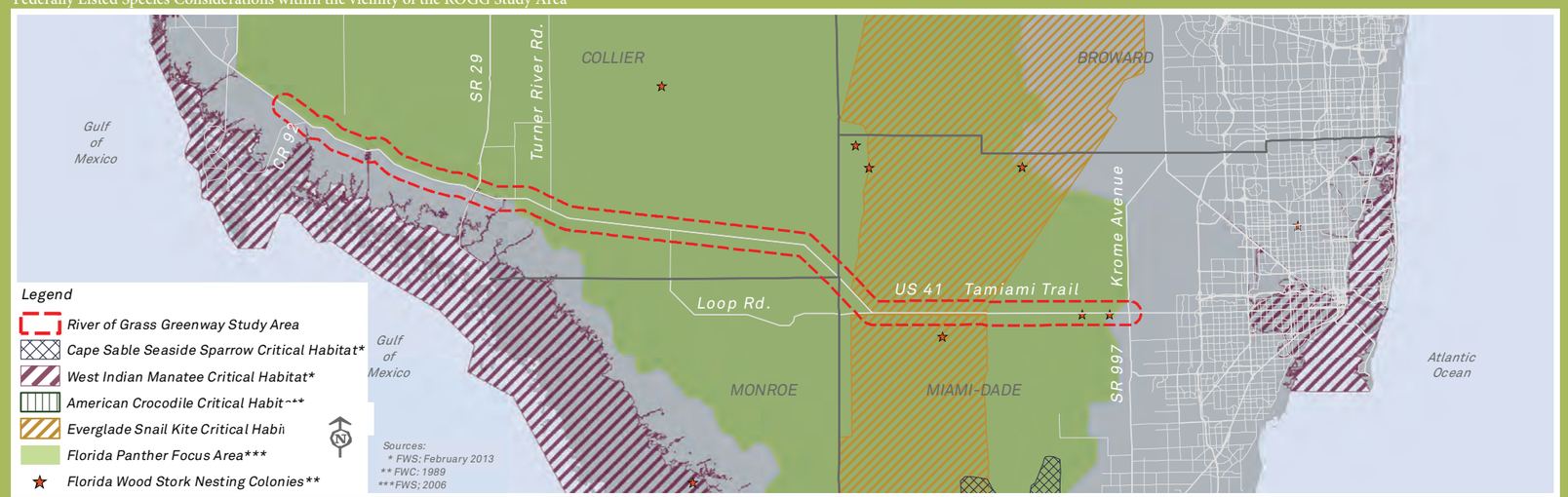
Bald and Golden Eagle Protection Act (BGEPA)

Following the removal of the bald eagle from the ESA in 2007, the USFWS implemented a permitting program under the auspices of BGEPA for potential impacts to bald eagles. BGEPA prohibits the taking of bald eagles and golden eagles, their parts, nests, or eggs within the United States without appropriate permits issued by the Secretary of the Interior. Originally issued as the Bald Eagle Protection Act of 1940, BGEPA was expanded in 1962 to address protection of the golden eagle. Under BGEPA, "take" is defined as any action that will kill, injure, molest, or disturb these species to the point where productivity or reproduction is affected. Both the FFWCC and the USFWS implement elements of the permitting program for BGEPA.

Chapter 68 of the Florida Administrative Code

Through Chapter 68 of the F.A.C., the FFWCC regulates activities that may affect listed species within the State. The purpose and intent of this chapter is to conserve or improve the status of endangered and threatened species with the understanding that lawful, nature-based recreational activities may be managed to be compatible with species protection measures. The FFWCC regularly reviews the status and listing designation for species meeting the criteria of the Code, develops and implements management plans that are designed to protect the target species throughout the state, and administers the permitting program.

Federally Listed Species Considerations within the vicinity of the ROGG Study Area



Listed Wildlife Species

The ROGG Study Area traverses expanses of publicly-owned land noted for or set aside specifically to conserve habitat suitable for occupation by rare and endangered species protected by state and/or federal government regulations (hereafter listed species). Management plans for parks and conservation lands produced by county, state, and federal agencies that manage these parcels have documented occurrences of listed species throughout the ROGG Study Area. In addition, the USFWS completed a Multi-Species Recovery Plan for 68 federally listed species that occur in south Florida to assist with project planning, management actions, and environmental compliance. Based on the species noted in these plans, the following 20 listed wildlife species have the potential to occur in or adjacent to the ROGG Study Area and/or be affected by the proposed project:

- Florida panther
- West Indian manatee
- Everglade snail kite
- American alligator/ American crocodile
- Cape Sable seaside sparrow
- Wood stork
- Eastern indigo snake
- Bald eagle
- Limpkin
- Little blue heron
- Roseate spoonbill
- Snowy egret
- Tricolored heron
- White ibis
- Southeastern American kestrel
- Osprey (Monroe County population)
- Florida sandhill crane
- Everglades mink
- Big Cypress fox squirrel
- Florida black bear

The USFWS has designated Panther Focus Areas, Critical Habitat for Cape Sable seaside sparrow, American crocodile, West Indian manatee and Everglade snail kite, and Core Foraging Areas (CFAs) for wood storks within the vicinity of the ROGG Study Area. These designations include habitat occupied or suitable for occupation, roosting, foraging, and nesting by species listed as threatened and/or endangered by the USFWS. These designations are a tool used to guide agencies in fulfilling conservation responsibilities by requiring them to consult with the USFWS if projects occur in these locations.

Listed plant species occur within or near the ROGG Study Area, including several species within the Fakahatchee Strand Preserve State Park that are found nowhere else within North America. The majority of these plant species occur within wetlands that would be subject to a variety of regulations intended to protect wetlands and wetland-dependent species. In addition, regulations addressing potential impacts

to listed wildlife species typically require consideration of potential impacts to listed plants. As such, additional detailed descriptions of listed plant species within the corridor are not included in this document.

Florida Panther

The Florida panther is a tawny-colored, medium-sized cat that historically occupied much of Florida, but has experienced significant range and population reductions due to a variety of factors, including habitat loss and road mortality. The Florida panther occupies an estimated two to three million acres in south Florida, which is less than five percent of its historic range. The population is estimated to be 100 - 120 individuals that generally prefer large, remote tracts of land with adequate prey, cover, and reduced levels of disturbance as suitable habitat. The small population size makes this species susceptible to a bottleneck caused by a lack of genetic diversity. The lack of genetic diversity can render the population more susceptible to the spread of contagious diseases, which have the potential to wipe out the remaining population if the disease is severe.

The quality of suitable panther habitat is largely driven by forage available for prey species, which include white-tailed deer, feral pig, raccoon, armadillo, and rabbit. Mature forested uplands provide relatively dry conditions with dense vegetation enabling panthers to rest and den while still providing visibility and access to large prey in bordering swamps, marshes, or pinelands. Much of the prime panther upland habitat is north of I-75, but the conservation lands within the corridor, including the Florida Panther National Wildlife Refuge, the Big Cypress National Preserve, Big Cypress Seminole Indian Reservation, ENP, Fakahatchee Strand Preserve State Park and Picayune Strand State Forest, form a large contiguous tract of panther habitat.

The home range of this solitary species varies according to gender, habitat availability, and habitat quality, although males generally have larger home ranges than females. Males are polygamous and their home ranges typically overlap with the home ranges of several females and their dependent offspring. Florida panther breeding may occur throughout the year with a peak during the period of winter and spring. The gestation period is 90 to 95 days and litter size ranges from one to four kittens. The young will disperse between 18 to 24 months after birth. The overall breeding cycle lasts two years.

Threats to this species include road mortality, habitat loss and fragmentation, disease, and inbreeding. Regional habitat loss and declines in habitat quality have decreased suitable habitat available, which has contributed to dispersal of panthers. Habitat fragmentation has separated the large blocks of habitat desired by panthers. Instead, panthers have to use corridors of unsuitable habitat to disperse (even through corridors with human activity). Corridors that cross roadways expose panthers to potential vehicular collisions, which accounted for 20% of panther deaths between 1972 and 2004. Regionally, wildlife underpasses along I-75 and S.R. 29 have decreased vehicular accidents. However, the majority of panthers using these crossing are males looking for additional habitat, while females still rarely cross major roads or use the underpasses, essentially sustaining their habitat as fragmented. Panther mortality on S.R. 29 has historically been a significant percentage of the total deaths caused by vehicles, even following the installation of wildlife fencing along the roadway. Panther mortality has also occurred on U.S. 41, especially in the vicinity of the Turner River.

The ROGG Study Area includes portions of the U.S. 41 corridor within the Big Cypress National Preserve that have been equipped by FDOT with the Roadside Animal Detection System (RADS) technology. RADS are electronic motion and/or infrared sensors that detect the movement of large animals on or near roadways. When sensors are activated, RADS triggers a warning message that signals drivers to reduce their speed and proceed with caution.

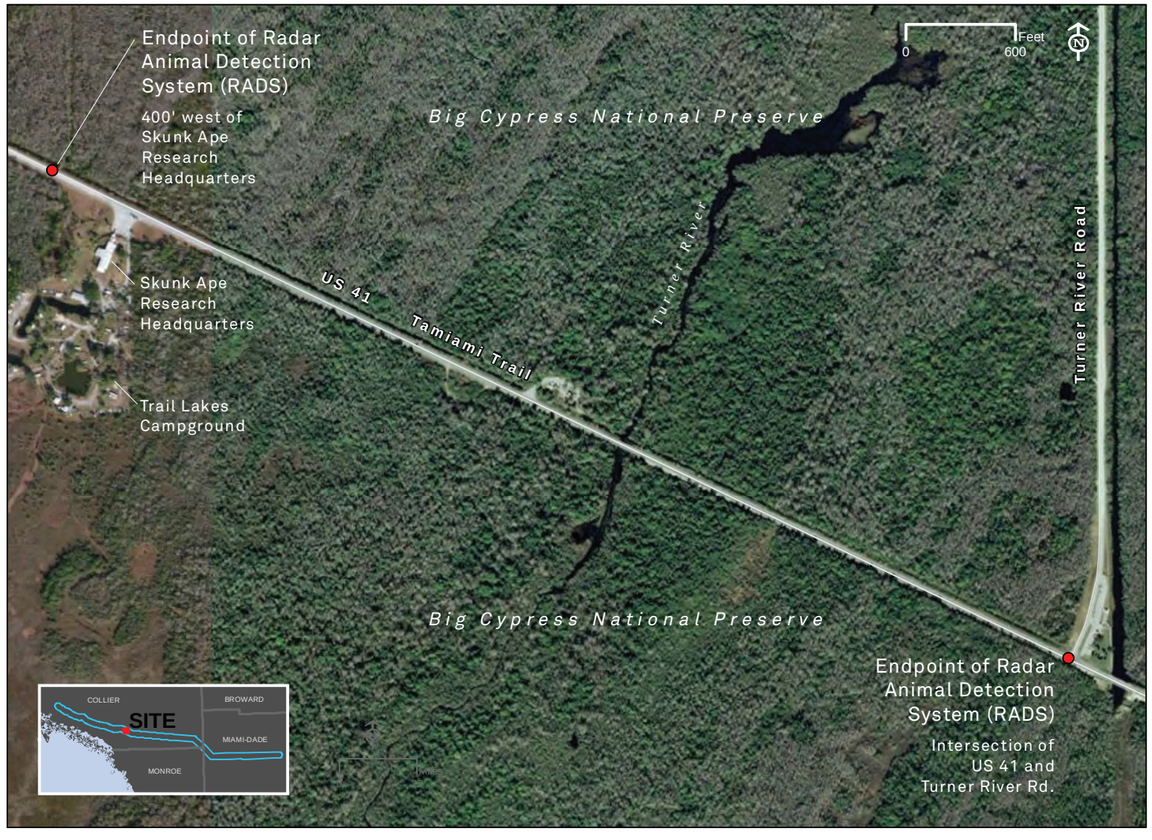
The ROGG Study Area is located within the primary zone of the Panther Focus Area. Conservation of these lands is essential for the long-term survival of this species, and any disturbance within the Focus Area has the potential to impact the species.

West Indian Manatee

The West Indian manatee is a large aquatic mammal that can be found in saltwater, brackish, and freshwater environments. Manatees can be found in shallow, slow-moving rivers, estuaries, saltwater bays, canals, and coastal areas, particularly where foraging areas for seagrass or freshwater submerged vegetation occur. Manatees are mostly herbivores, however small fish and invertebrates can be ingested when they consume a large variety of submerged, emergent, and floating plants. This migratory species travels to peninsular Florida in the winter to use warm waters, such as natural springs or power plant discharges. Reproductive rates are low for manatees with one calf being born every two to five years. Gestation lasts 11 to 14 months and mothers nurse their young for one to two years. Manatees have no natural enemies and can live 60 years or more. Historically, the major cause of natural death was likely exposure from cold weather. Most human-related manatee fatalities occur from collisions with watercraft, but other causes for human-related mortality include being crushed and/or drowned in canal locks and flood control structures; ingestion of fish hooks, litter and monofilament line; and entanglement in crab trap lines. Critical Habitat has been mapped by the USFWS for this species, which includes the Faka Union Canal and portions of the Tamiami Canal within the ROGG Study Area.

Florida panther - Photo Credit: fwsgov

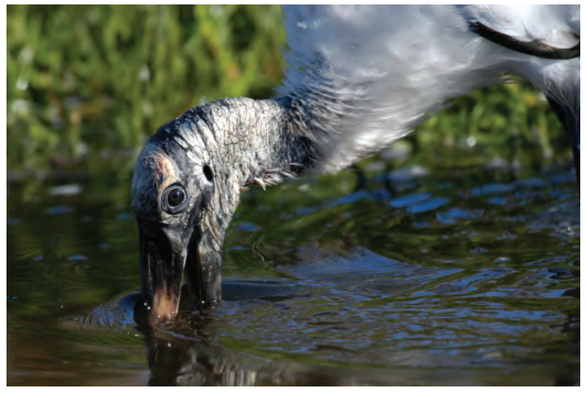
Radar Animal Detection System (RADS) on U.S. 41



Western Indian manatee - Photo Credit: fwsgov

Cape Sable seaside sparrow - Photo Credit: fwsgov

Male Everglade snail kite



Wood stork

American alligator

Eastern indigo snake

Everglade Snail Kite

The Everglade snail kite is a medium-sized raptor that forages for its primary prey, the apple snail, in open herbaceous wetlands of south Florida. This subspecies is limited to wetlands of central and south Florida. In the vicinity of the ROGG Study Area, this species regularly occurs in the expansive marshes of the WCA3 and ENP. The Everglade snail kite is highly mobile and will move from one portion of its range to another in search of food if foraging conditions decline in one area. Open herbaceous wetlands comprised of spike rushes, maidencane, and bulrushes comprise important components of habitat since they provide suitable conditions for apple snail availability. Dense vegetation is not optimal for the Everglade snail kite because it complicates the ability to forage successfully. They nest in a variety of vegetation types, including both native and exotic woody vegetation and cattails. Typically, nests occur approximately three to ten feet above the water in areas with good foraging habitat nearby. Critical Habitat has been mapped for this species, which includes much of the eastern portion of the ROGG Study Area.

American Alligator/ American Crocodile

The American alligator and American crocodile are two similar-looking reptiles found in open water bodies of south Florida. Alligators are common throughout the Coastal Plain of the southeastern United States, while crocodiles are limited to south Florida and the neotropics. Alligators are found primarily in freshwater habitats, while crocodiles typically occur in coastal estuaries. Both are opportunistic predators that will consume any prey that is easily accessible. Both reptiles are an important part of their ecosystem because they establish depressions through their nesting activities that can provide habitat for a number of other species. Along the ROGG Study Area, the American alligator is abundant and often observed thermo-regulating along the banks of canals adjacent to roadways. Critical Habitat has been mapped by the USFWS for the American crocodile, but it does not occur within the ROGG Study Area. Activities involving American alligators are regulated by the FFWCC.

Cape Sable Seaside Sparrow

The Cape Sable seaside sparrow historically occupied a range in Collier, Miami-Dade, and Monroe counties, including areas in the vicinity of the ROGG Study Area. The population has declined due to loss of habitat as a result of development, changes in vegetation, fire, natural disasters, and hydrologic alteration. The Cape Sable seaside sparrow is a relatively small bird with drab colors that uses the marshes and wet prairies of interior southern Florida that remain dry most of the year, but become seasonally flooded with fresh to slightly brackish water. These vegetative communities burn periodically and the timing of these fires are critical to the survival of the sparrow. Sparrows build nests near the ground with an average nest height of approximately 6 inches. Nesting may happen two to three times in a nesting season, which begins as early as late February and can persist into early August commensurate with rainfall. Fires that occur late in the dry season threaten eggs and newly fledged young. Ideally, fires would occur during the wet season and water levels would not be artificially elevated during the dry season to prevent disturbance to nesting sparrows. The USFWS has mapped Critical Habitat for this species and it does not occur within the ROGG Study Area. However depending upon the final location of the alignment, the ROGG may occur within the consultation area for this species.

Wood Stork

Wood storks are large wading birds that utilize shallow marshes and prairies throughout Florida. They have exhibited population declines attributed to loss of wetland habitat and regional hydrological alterations. Wood storks feed on small fish in shallowly-inundated wetlands or manmade water bodies. The ideal hydrologic regime for wood stork foraging includes periods of flooding (at which time prey items proliferate) alternated with dry periods (at which time prey items become concentrated). Periods of drought typically instigate the breeding season, and ultimately this timing results in concentrated prey for fledgling wood storks. Artificial impoundments, levees, and canals in south Florida have changed the natural hydrology of wetlands, which has impacted prey availability and foraging potential for this species.

Beginning as early as October in south Florida, wood storks produce nests in colonies that utilize large cypress trees or mangrove islands. Wood stork nesting within the ROGG Study Area is rare, but sporadic nesting has been documented since the mid-90s. In south Florida, wood stork CFA is defined as any suitable foraging habitat located within 18.6 miles of a known wood stork rookery.

The ROGG Study Area is located within the CFA of several currently active wood stork colonies. For projects occurring in a CFA, activities ranging from filling of foraging habitat to hydrological alterations that change the depth and/or

duration of inundation may be considered as adverse impacts to wood storks. Minimization of adverse impacts to the wood stork can include replacement of foraging habitat through hydrological and habitat improvements or in the purchase of wetland credits from an approved mitigation bank as long as the impacted wetlands occur within the permitted service area of the bank.

Eastern Indigo Snake

The eastern indigo snake is a large, black, non-venomous snake found in a variety of upland habitat types throughout the State, although they are not commonly found in great numbers in the wetland complexes of the ROGG Study Area. Eastern indigo snakes frequent several habitat types ranging from scrubby uplands to freshwater marsh edges to agricultural fields and typically require a mosaic of habitats to meet their complex habitat needs. In wetter habitats such as those in the vicinity of the ROGG Study Area, eastern indigo snakes may take shelter in hollowed root channels, hollow logs, or the burrows of rodents, armadillo, or land crabs. Their diet includes fish, snakes, frogs, turtles, eggs, small alligators, birds, and small mammals. Critical Habitat has not been mapped for this species by the USFWS.

Bald Eagle

The bald eagle is a large raptor found throughout most of the US that exhibited significant population declines in the 1900s, but has since substantially recovered throughout the state. This species typically nests in expanses of forested habitat located within 1.8 miles of open fresh or salt water where they forage. Bald eagles nests, or eyries, are usually built in native pines, but they have been observed in cypress, mangroves, and artificial structures. Their diet is comprised primarily of fish and waterfowl, although mammals, amphibians, and reptiles are also consumed. The bald eagle uses a variety of methods to obtain food, including eating carrion, stealing fish from other birds or hunting for its own prey. Bald eagles are no longer protected under the ESA, but it is protected under the MBTA and the BGEPA. Based on data obtained by the FFWCC in triennial surveys through the 2011-2012 nesting season, a total of nine bald eagle nests, all of which are in Collier County, (nests numbered CO-006, CO-011, CO-012, CO-013, CO-016, CO-017, CO- 037, CO-042, and CO-044) are known to occur within one mile of U.S. 41 in the ROGG Study Area.

Limpkin / Little Blue Heron / Roseate Spoonbill / Snowy Egret / Tricolored Heron / White Ibis

Six species of wading birds that occur in the ROGG Study Area are listed as Species of Special Concern by the FFWCC: limpkin, little blue heron, roseate spoonbill, snowy egret, tricolored heron, and white ibis. The population of wading bird species declined rapidly in the early 1900's due to egg and plume hunting, but the population declines have continued and been attributed to habitat degradation and loss, reduced prey availability, and disturbance at breeding and foraging sites. All six of these species range throughout Florida, where they generally forage in shallow water on a variety of fish, crustaceans, insects, and small reptiles. Estuaries and wetlands along the ROGG Study Area are prime habitat for these wading birds. All but the limpkin breed in colonies, many of which include multiple wading bird species. According to FFWCC's Florida Breeding Bird Atlas and the 2010 South Florida Wading Bird Report, a number of rookeries have been documented in and around the ROGG Study Area. The FFWCC Board of Directors recently approved the removal of the white ibis and snowy egret from Florida's endangered and threatened species list pending adoption of a management plan that is currently in process.

Florida Sandhill Crane

The Florida sandhill crane is a subspecies of sandhill crane that inhabits Florida year round where it forages and nests within a variety of open habitats. These large birds with distinguishing red crowns utilize prairies, freshwater marshes, and pasture lands for foraging and nesting, but generally avoid forests and deep marshes. Florida sandhill cranes typically nest in late winter and early spring in matted vegetation surrounded by shallow water. They are omnivorous and forage on seeds, roots, berries, insects, invertebrates, small reptiles, amphibians, and mammals. Florida sandhill cranes have large home-range requirements, so protection measures are concentrated on the acquisition and/or conservation of land that bolster existing populations. Periodic fire is important to retard invasion of woody vegetation in marshes on protected habitat.

Osprey

The osprey is large raptor that ranges throughout Florida year round and uses open water bodies such as freshwater lakes and oceans for foraging on a variety of fish species. Pesticides, shoreline development and declining water quality threaten the abundance and availability of food and nest sites for ospreys. They

Bald eagle

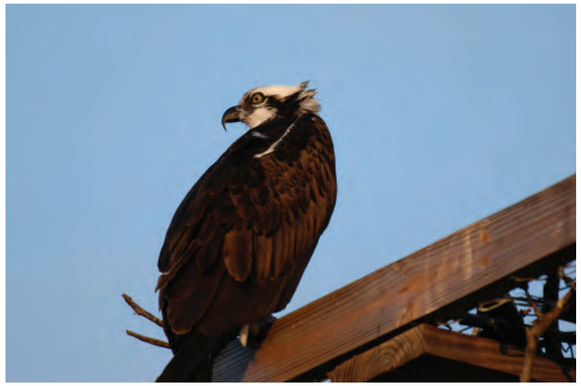
Snowy egret

White ibis

Little blue heron

Limpkin

Sandhill crane



Osprey

Fox squirrel

Florida black bear

build large stick nests on live or dead trees as well as manmade structures such as utility poles, channel markers and nest platforms. Nest initiation typically begins between December and February. There is both a resident population and a migrant population that passes through Florida each spring and fall. The osprey is protected in Monroe County only, but permits are required to remove nests located anywhere within the state and a replacement structure must be erected to mitigate the removal of the nest. Suitable habitat occurs continuously without geographic barriers to movement throughout the ROGG Study Area. Osprey are protected under the MBTA and state protected under Chapter 68A F.A.C., where they are specifically protected in Monroe County as a Species of Special Concern.

Southeastern American Kestrel

The southeastern American kestrel is the smallest North American non-migratory falcon. It uses a variety of agricultural and natural systems for foraging and nesting. Both resident and migratory kestrels occur within Florida; only the resident kestrel population is present between April and October when wintering northern kestrels have returned to their nesting ranges. Territory sizes can range up to approximately 800 acres in size. Suitable habitat includes pastures and low-intensity agriculture, open woodlots and fields within residential areas as well as fire-dependent sandhill and open pine savannah habitats. Ideal habitat provides suitable nesting and foraging habitat. In Florida, their diets are comprised primarily of grasshoppers and small lizards, but other invertebrates can also be eaten. Kestrels prefer to hunt from perches, but will hunt from the air if perches are lacking. Southeastern American kestrels breed from mid-March to early-June, typically using cavities previously excavated by woodpeckers in large dead trees and/or artificial nest boxes. A breeding pair of kestrels will defend their territory for multiple years. Mortality sources include mammalian and avian predators, but vehicle collisions also occur. An overall decline in nesting and foraging habitat as a result of development and agricultural conversion is the primary threat to this species. This species benefits from acquisition and management of suitable habitat, planting of canopy species in prairies and pastures, and prescribed fire to maintain a grassy, open understory and snags for nesting sites.

Big Cypress Fox Squirrel

The Big Cypress fox squirrel is a relatively secretive, large squirrel that uses a variety of habitats in south Florida. This species is found in Collier County, mainland northern Monroe County, and extreme western Miami-Dade County, including lands within the ROGG Study Area. Most information concerning the Big Cypress fox squirrel is based on ecological characteristics of fox squirrels in general as subspecies specific information is limited. Preferred habitat includes pine forests and cypress and mangrove swamps from which they eat fungi, nuts, seeds, and other plant material. They breed in late winter and the middle of summer, and typically the litter is comprised of two or three young. Primary threats to the Big Cypress fox squirrel include loss and fragmentation of habitat, suppression of fire that allows the growth of an undesirable dense understory, and disease.

Everglades Mink

The Everglades mink is a member of the weasel family with a limited range in the marshes and swamps of the ENP, Big Cypress National Preserve, and Fakahatchee Strand Preserve State Park. It is a semi-aquatic species with partially webbed toes specially adapted to hunting in water. This carnivorous species is an opportunistic hunter that will kill much larger aquatic and terrestrial species. They are solitary animals unless they are raising young, which typically consist of litters of three to six kits born in the spring. They den in hollow logs and stumps or under tree roots. The quality of their habitat has been degraded through development, stream channelization, and the drainage of wetlands and they are susceptible to the canine distemper virus. Other threats include the increase of invasive species into their habitat, especially the Burmese python.

Florida Black Bear

The Florida black bear is a subspecies of the American black bear that historically ranged throughout Florida and the southern portions of adjoining states, but currently occupies only a small portion of their historic range. There are five subpopulations of Florida black bear in Florida and the ROGG Study Area traverses habitat occupied by the Big Cypress subpopulation. Florida black bears are adaptable to a wide variety of habitats, including flatwoods, swamps, bayheads, and hammocks common to south Florida. The Florida black bear is the largest mammal in Florida with adult males typically weighing an average of 250 to 350 pounds and females weighing 130 to 180 pounds. Florida black bears are generally solitary by nature, with typical home ranges ranging from 50 to 120 square miles for males and 10 to 25 square miles for females. Their diet is comprised of predominantly plant material with insects with occasional consumption of meat. This species was delisted by the FFWCC in 2012 upon approval of the Black Bear Management Plan and passage of the Florida Black Bear Conservation Rule (Chapter 68A-4.009 F.A.C.). The rule continues to make it illegal to “take” a bear and also states that the FFWCC will assist landowners and regulating agencies with the objectives of the minimizing and avoiding negative human-bear interactions.

Listed Wildlife Species - Relevance to ROGG: The presence of listed species within the ROGG Study Area affected feasibility assessments for routing options, design of trail and trailhead facilities, considerations for public and regulatory coordination, and post-construction operation options. Specific influences on analysis for the ROGG included:

- **Routing Alternatives** – The ROGG Study Area occurs within the primary zone of the Panther Focus Area and includes Critical Habitat for West Indian manatee and Everglade snail kite. While the occurrence of the project within the primary zone for the Panther Focus Area does not necessarily preclude the construction of new facilities, any new facilities would require substantial public and regulatory review, especially for those that affect high quality forested systems. Routing alternatives that utilized previously disturbed habitats and/or accounted for high use areas for panthers within the corridor, including near Turner River, were evaluated as part of the study. Similarly, routing alternatives across Critical Habitat for West Indian manatees and Everglade snail kite would be subject to additional regulatory and public review.
- **Panthers and Roadways** - Vehicle collisions result in the death of numerous panthers. Anecdotal accounts during workshops for ROGG suggested that guardrails and canals for U.S. 41 complicate a panther’s ability to quickly avoid ongoing traffic. Although the RADS system is in place, the location of the RADS system close to the paved road surface limits the time between the signal being triggered and the panther crossing the roadway. Other factors, including frequent vandalism has limited the effectiveness of the system. Opportunities to support or enhance the effectiveness of the RADS were evaluated as part of ROGG.
- **Wildlife Friendly Design Elements** – The ecology and behavior of several listed species affected considerations for design features for the trail.

American alligators and American crocodiles warm themselves in the sun on canal banks and pavement to regulate their body temperature. ROGG facilities would be designed to deter use by these species, especially when located adjacent to open water bodies, and to minimize potential for reptile/human interaction. Wildlife, including Florida black bears, has been known to scavenge trash receptacles as a part of their foraging routine. Design accommodations for wildlife proof trash receptacles were evaluated for ROGG to provide users the opportunity to dispose of food appropriately so that wildlife do not further associate people with food. Several species of wildlife discussed above tolerate nest boxes and/or platforms to augment nesting opportunities. ROGG facilities would be designed to maximize the opportunity to install nest platforms suitable for use by osprey and bald eagle and artificial cavities suitable for use by southeast American kestrel.

- **Permitting** – The permit process associated with listed species and/or their habitats was considered as part of the costs and schedule for public involvement and permitting for the ROGG. Future construction activities will require authorization through permits that specify the scope of impact and species-specific compensatory mitigation to offset unavoidable impacts. Specific permitting requirements for several species of note include:

  - **Florida Panthers** – Potential impacts to Florida panther habitat, especially forested habitat, for ROGG would require an assessment of Panther Habitat Units through a functional panther habitat assessment administered by the USFWS. This assessment would determine the habitat value of the lands impacted and the mitigation requirements to compensate for the impacts. Mitigation could include purchase of Panther Habitat Units from one of the several conservation banks permitted by the USFWS to offset impacts to panther habitat. If unavoidable impacts to panther habitat are required as a part of the construction of the ROGG, mitigation requirements will be negotiated and quantified during the formal USFWS consultation process.

  - **Wood Storks** - If construction impacts result in more than five acres of impacts to CFA, the impact and mitigation areas require a functional assessment as outlined in the "Wood Stork Core Foraging Analysis Methodology". If unavoidable impacts to wood stork foraging habitat are required as a part of the construction of the ROGG, mitigation requirements will be negotiated and quantified during the formal USFWS consultation process.

  - **Eastern Indigo Snake** - The construction of the ROGG may require impact to habitat preferred by this species. Typically, impacts are minimized to this svpecies by adhering to the "Eastern Indigo Snake Programmatic Effect Determination Key and "Standard Protection Measures for the Eastern Indigo Snake".

  - **Bald Eagle** – Construction activities inside of a 660 feet zone adjacent to a bald eagle nest tree will require a permit from the FFWCC and USFWS. This permit will include requirements for monitoring and timeframes for construction within the buffer zone.

  - **Osprey** – Currently, a federal permit is required to take an active osprey nest, and state permits are required to take both active and inactive nests. Any nests observed within the project area would be avoided or removed after the appropriate permits are secured.

  - **Florida Sandhill Crane** - Impacts to this species are minimized by complying with the provisions set forth in guidelines provided by the FFWCC, which include survey requirements and management considerations for a requisite 400-foot buffer around sandhill crane nest sites to prevent disturbance or take of this species during nesting.

Listed Species Summary

The ROGG Study Area traverses expanses of publicly-owned land noted for or set aside specifically to conserve habitat for listed wildlife and plant species. Although a variety of listed species could occur within the public lands, the following 20 listed wildlife species have the potential to occur in or adjacent to the ROGG Study Area and/or be affected by the proposed project:

- Florida panther
- West Indian manatee
- Everglade snail kite
- American alligator/ American crocodile
- Cape Sable seaside sparrow
- Wood stork
- Eastern indigo snake
- Bald eagle
- Limpkin
- Little blue heron
- Roseate spoonbill
- Snowy egret
- Tricolored heron
- White ibis
- Southeastern American kestrel
- Osprey (Monroe County population)
- Florida sandhill crane
- Everglades mink
- Big Cypress fox squirrel
- Florida black bear

The USFWS has designated Panther Focus Areas; Critical Habitat for Cape Sable seaside sparrow, American crocodile, West Indian manatee and Everglade snail kite; and Core Foraging Areas for wood storks within the vicinity of the ROGG Study Area. These designations include habitat occupied or suitable for occupation, roosting, foraging, and nesting by species listed as threatened and/or endangered by the USFWS. These designations are used to guide agencies in fulfilling conservation responsibilities by requiring them to consult with the USFWS if projects occur in these locations. Listed plant species occur within or near the ROGG Study Area, including several species within the Fakahatchee Strand Preserve State Park that are found nowhere else within North America. The majority of these plant species occur within wetlands that would be subject to a variety of regulations intended to protect wetlands and wetland-dependent species. In addition, regulations addressing potential impacts to listed wildlife species typically require consideration of potential impacts to listed plants. As such, additional detailed descriptions of listed plant species within the corridor are not included in this document.

The presence of listed species influenced the analysis for the ROGG through evaluations of routing alternatives that could affect Florida panther habitat within the Panther Focus Area and Critical Habitat for other listed wildlife species, opportunities to incorporate design elements that could minimize impacts to Florida panthers such as enhancement to the Roadway Animal Detection System, accommodations to minimize wildlife use of trail facilities that would be adverse for wildlife or trail users, and permitting requirements for future ROGG facilities relative to listed species.

Exotic Invasive Species

Exotic invasive species are the cause of extensive environmental damage to natural systems throughout south Florida. Due to the lack of natural enemies and frequently robust survival rates, exotic invasive species can displace or alter the composition of natural vegetation communities, change physical or ecological processes and nutrient availability, cause the death of native plant or animal species, or change conditions for the growth and reproduction of native plant or animal species. Exotic invasive species can also reduce recreational opportunities through clogging waterways used for boating or swimming, encroaching on trails and camp facilities, or reducing the aesthetics of facilities. Hundreds of thousands of acres of land in south Florida have been affected by exotic invasive species, although management activities including the exotic invasive management efforts for national and state parks in the area provide some measure of control. While desirable for ecosystem management, management efforts can be both costly to implement and can cause unintended negative local effects on cultural resources or non-target species.

Although exotic invasive plants occur throughout the ROGG Study Area, the amount and density of exotic invasive plants varies based on disturbance and management history. Monocultures of exotic invasive plants such as melaleuca, Brazilian pepper, or cogongrass occur on some vacant parcels that were filled many years ago, along the banks of the Old Tamiami Trail, and in areas with significant hydrological alteration. These monocultures have displaced native plant communities or exclude the natural re-establishment of native vegetation due to the density of the exotic plant population. In other locations, scattered individuals of exotic invasive plants intermingle with native shrub species along linear disturbed areas such as the edge of the U.S. 41 road shoulder, but do not extend into adjacent natural vegetation communities. Exotic invasive plants such as water hyacinth and hydrilla occur in a number of waterways within the ROGG Study Area, ranging from small floating clumps of plants to dense stands that clog the surface of the water body.

Exotic invasive animals also occur within the ROGG Study Area. Some species, such as Burmese pythons, occur as solitary individuals that range through the region, and are anticipated to have a regional effect on other native wildlife populations. These solitary species are difficult to eradicate since finding individuals within the region can be problematic. Other species, such as fire ants, can occur in large groups where the species occurs. These species

Definitions

Exotic invasive species are often described with a variety of terms, such as exotic, nuisance, noxious, invasive, or non-indigenous. For the purposes of this report, the following definitions are used for exotic invasive species.

Native Species – Those plant or animal species that were found within south Florida prior to the advent of Europeans.

Nonnative Species - Those plant or animal species that were introduced or expanded into the south Florida region as a result of human-related activities and are not native to Florida.

Exotic Invasive Species – Plant or animal species that are not native to south Florida and whose introduction causes or is likely to cause economic or environmental harm or harm to human health.

Brazilian pepper

Burmese pythons; Photo Credit: EDDMaps (http://www.eddmaps.org/report/images/25565.06.jpg)

can have significant effects on sedentary individuals such as nestling birds, but may not range throughout the region to gather prey. Other exotic species carry diseases that can significantly effect or eradicate important vegetation or wildlife species. A notable example is the ambrosia beetle that carries a fungus that kills members of the laurel family, including redbay and swamp bay. Exotic animals also displace native populations of similar species or directly prey on desirable native species. A notable example of the former is the island apple snail that can displace the native apple snail, the historical prey for the Everglade snail kite, while a notable example of the latter is the bromeliad weevil that attacks and kills bromeliads, including many of the air plants characteristic to the region. Feral pigs and armadillos alter vegetation communities through rooting in search of tubers and other underground plant materials, digging burrows, or depredating on ground nesting birds and reptiles. Secondary effects from rooting can include disturbing soils sufficiently for exotic plants to be established and changes to micro-topography that effect sheetflow characteristics. Although negative effects are significant, feral pigs and armadillos also provide food sources for Florida panthers.

Management activities to control exotic invasive species are ongoing within the ROGG Study Area. Big Cypress National Preserve, ENP, Fakahatchee Strand State Preserve, and the Picayune Strand State Preserve have developed management programs aimed at reducing exotic invasive species from native natural communities, which has greatly reduced the occurrences of exotic invasive species. Restoration of areas that were historically disturbed such as the removal of fill piles or filling of excavated water bodies also has reduced the substrate available for exotic plant infestation. Management activities vary depending on the target species, but typically include mechanical removal, herbicide application, prescribed fire, hunts for exotic animals, or introduction of biological control methods.

Exotic Species - Relevance to ROGG: The presence of exotic invasive species within the ROGG Study Area affected feasibility assessments for routing options, design of trail and trailhead facilities, and post-construction operation options. Specific influences on analysis for the ROGG included:

- **Trail Location** – Monocultures of exotic invasive plants occur on both previously filled areas and highly altered areas, such as the melaleuca stands south of U.S 41 near Krome Avenue. The presence of these monocultures does not limit trail routes for ROGG. In fact, trail routes that are extended through monocultures of exotic invasive plants may serve as a catalyst for removal and long-term management. Trail locations near high quality landscape features such as a bird rookery can serve as a corridor for exotic invasive animals to obtain access to those features. The feasibility study for ROGG incorporated a review of potential effects on desirable landscape features for use by exotic invasive species.
- **Mitigation** – The management plans for parks along the corridor place exotic invasive species control as a goal, which is often limited by sufficient funding to fully address the exotic invasive species. Exotic invasive plants occurring within road ROWs, other disturbed lands, or wetlands are a seed source for exotic plant invasion into adjacent natural areas. Control of exotic invasive plants in areas adjacent to high quality natural systems would remove seed sources. Similarly, control of exotic invasive plants within wetlands and/or other disturbed lands, especially when done in conjunction with a restoration plan to restore native biodiversity, would both enhance the function of the target systems as well as remove seed sources for adjacent lands. Both of these actions may serve as mitigation for natural resource impacts resulting from ROGG.
- **Facility Design and Implementation** – Disturbances in the landscape that result in exposed soils or new or expanded fill provide a substrate vulnerable to exotic plant invasion. Design options that minimize the establishment of these conditions during or after construction can limit the establishment of exotic invasive plants on the new trail facility. Boardwalks or other elevated structures that minimize ground disturbance or lessen the need for filled causeways limit the area available for exotic plant establishment. The use of appropriate landscape material, including native species, as a strategy for reducing the potential impacts from exotic invasive species was evaluated as elements affecting feasibility of the ROGG. Landscape materials of non-native plants will not be acceptable for ROGG. Similarly, species used in the landscape palette susceptible to exotic animals in the region such as plants in the laurel family should not be incorporated into the palette until issues associated with laurel wilt can be better understood and controlled. Incorporation of design elements that limit the effects from the use by exotic invasive animals were considered as part of the feasibility assessment.
- **Operations** – Exotic invasive plant species occur throughout the landscape and can invade areas that are disturbed for construction projects, such as a future ROGG segment. Maintenance activities to treat populations of exotic invasive species that arise within the ROGG corridor will be required for long-term operation of the system. Costs for this maintenance have been considered as part of the feasibility assessment. Management activities to control exotic invasive animal species will depend on actions in the adjacent natural lands and was not considered as a contributing factor for the feasibility of operation of the ROGG.

Exotic Species Summary

Exotic invasive species are a cause of extensive environmental damage to natural systems throughout south Florida. Exotic invasive species can displace or alter the composition of natural vegetation communities, change physical or ecological processes and nutrient availability, cause the death of native plant or animal species, and change conditions for the growth and reproduction of native plant or animal species. Management efforts can be both costly to implement and can cause unintended negative local effects on cultural resources or non-target species. The amount and density of exotic invasive plants varies based on disturbance and management history, with the larger monocultures occurring on vacant parcels, along the banks of the Old Tamiami Trail, and in areas with significant hydrological alteration.

Exotic invasive animals also occur within the ROGG Study Area, which can prey on native wildlife species, carry diseases that affect native species, displace native species, or alter vegetation communities through rooting or other soil disturbances. Some exotic invasive animals, including feral pigs and armadillos, serve as prey for Florida panthers. Management activities to control exotic invasive species are ongoing within the ROGG Study Area. Management activities vary depending on the target species, but typically include mechanical removal, herbicide application, prescribed fire, hunts for exotic animals, or introduction of biological control methods. Exotic invasive species influenced the analysis for the ROGG through evaluations of opportunities to route the trail through exotic invasive vegetation areas to remove those species and limit impacts to higher quality natural systems, the use of exotic species removal to mitigation for other natural resource impacts, and design options to minimize the introduction of exotic species as a result of ROGG through design, implementation, and long-term operations.

Ecological Processes

Natural ecological processes interact with the physical environment to shape the landscape and the ecology of the species within that landscape. Processes such as the seasonal variation in freshwater inundation or tidal fluctuations cycle every year and may periodically drastically exceed normal conditions such as during a flood or storm surge. These periodic events can result in vegetation community alterations. Other processes such as tropical storms occur infrequently or irregularly and can have significant effects on ecosystem composition and function based on a one-time event. Others occur regularly such as fire, but may vary in intensity based on the conditions present (i.e. drought, high moisture levels). The process of succession interacts with each of these to modify the condition and composition of vegetation and wildlife communities over time. In south Florida, ecological processes with the strongest influences on the ecology of the region include fire, hydrology, wind, tidal influences, sea level rise, and succession.

Fire

Fire is a defining ecological process for the composition and structure of vegetation communities of south Florida. Many of the vegetation communities within south Florida depend on frequent, generally low-intensity fires to sustain a diverse native herbaceous community, convert plant material to nutrients, or to stimulate renewed growth or reproduction. Other vegetation communities such as rockland hammock persist because of the preclusion of fire by natural or constructed barriers. Conversely, infrequent fires may affect the nature of the habitat because they allow the build-up of high fuel loads that can be vulnerable to a devastating fire, particularly during drought conditions.

Like other ecological processes affecting south Florida such as hydrology, the characteristics and patterns of fires have changed since drainage and development activities in the region expanded in the 20th century. Prior to the 1900s, fires ignited by lightning strikes or indigenous peoples burned across the wide areas of the landscape until the fires ran into natural barriers such as rivers, large near-permanently inundated strands or swamp forests, or areas with fuel loads insufficient to carry another fire.

Typically occurring during the summers when lightning from frequent thunderstorms was most common, fires would occur when soil moisture was generally high. This prevented fires from burning organic soils and confined fires to above-water vegetation. Fires during this time were generally frequent in marshes, wet prairies, and pinelands and low in intensity due to limited fuel accumulation, although periodically fires in drought periods could be substantially more intense. The construction of roads, levees, canals, and other structures added firebreaks to the region, lessening the scale at which fires typically burned. Hydrological changes exposed some areas of the Everglades to longer dry periods and/or reduced water levels, which led to increased occurrences of fires that consumed organic soils and damaged or killed the roots of plants.

Management practices in the early part of the century often focused on fire suppression, which resulted in the buildup of fuel loads within pyrogenic vegetation communities. When fire did occur, the additional fuel loads resulted in a more intense fire that killed otherwise fire-adapted plants leading to changes in community structure and succession. In recent decades, fire management programs have been adopted by the public landowners in the ROGG Study Area that have worked to reduce fuel loads and returned frequent fires to the landscape.

Hydrology

Hydrology as an ecological process is embedded within the description of the region's hydrology noted in Section 2.4 – Hydrology. This section provides both a history of hydrological alterations and a projection of the expected results of proposed restoration. The historical boundaries of vegetation communities were defined by the dynamic, but consistent sheetflow of water across the landscape. On a regional scale, this sheetflow of freshwater interacting with tidal pulses of saltwater or brackish water defined the boundary of coastal marshes and mangrove swamps. Locally, the boundaries of vegetation communities were strongly influenced by water depth, hydroperiod, and duration of drought. Individual plant species adapted to variation in water levels through a variety of mechanisms, including morphological adaptions such as cypress knees or mangrove prop roots, and reproduction cycles tied to seasonal water level fluctuations.

Similarly, native wildlife species adapted to the dynamic nature of hydrology in the region. For example, white ibis are highly nomadic and will fly en masse dozens of miles to take advantage of available prey exposed to precise conditions of inundation or saturation. The foraging behavior of white ibis and of all the other wading birds in south Florida are tied to the dynamic patterns of drought and inundation that drive community assemblages including invertebrate and vertebrate prey.

Although normal variation in hydrology was a primary influence on vegetation and wildlife of the region prior to regional alterations, extreme events such as floods or droughts also shaped the distribution of vegetation communities and wildlife behavior. While the wetland systems within south Florida generally accommodate freshwater flooding events where water levels exceed normal seasonal high levels, upland systems can experience modifications to understory vegetation composition and/or canopy tree survival depending on the length of time the flooding occurs. Flooding events that result from storm surges bring a combination of high water levels, exposure to salinity, and/or debris deposition that can kill species intolerant to those effects, including freshwater wetland species otherwise tolerant of high water levels alone. On the other end of the hydrological spectrum, drought conditions increase the potential for fires to burn through standing vegetation, leaf litter, and/or organic soils. Long-term drought conditions can result in transitions from wetter to drier vegetation communities as well as changes in plant physiology that make vegetation more susceptible to negative impacts of higher water levels when the water levels return.

The magnitude of alterations to hydrology in south Florida resulting from the extensive civil works program summarized in Sections 2.1 and 2.4 have changed unmistakably the patterns of flood and drought across the region, particularly in ENP. Regional hydrological alterations resulted in drought-like conditions in some portions of south Florida and longer, deeper inundation in others. These conditions became the new baseline condition upon which hydrologic processes affected the ecology of the region. Inundation levels continue to affect vegetative communities, prey availability, salinity levels and patterns of fire. Alterations to flow direction, duration and depth have substantially altered the juxtaposition and structure of natural communities across south Florida.

In some instances, hydrologic alterations have been exacerbated by other ecosystem drivers, such as concentration of nutrients. Increased inundation combined with elevated nutrient levels have changed vegetation and wildlife communities across the southern extent of the Everglades through modifications to periphyton and vascular plant composition across thousands of acres (e.g. sawgrass to cattail monocultures). Restoration activities to return water levels and inundation duration to conditions more consistent with historical hydrology are intended to redress much of the vegetation and wildlife changes that resulted from the regional hydrological alterations of the 20th century.

Big Cypress Natural Preserve Fire - Photo Credit: nps.gov

Water flow through an Old Tamiami Trail breach

Control structure between WCA3 and the L-29

Pinelands after Hurricane Andrew (NPS photo)

Tidally influenced wetlands in Ten Thousand Islands NWR

Successionary growth of shrubs on the banks of the Old Tamiami Trail

Wind

While coastal breezes are common on a daily basis in south Florida, the effect of wind as a process affecting ecological resources is primarily from irregular events associated with tropical storms. Daily coastal breezes generally are mild in intensity, although these breezes can carry salt spray a short distance inland, thereby affecting growth forms and species composition for vegetation communities near brackish or salt waters. However, most south Florida systems are adapted to these periodic breezes. Strong winds associated with tropical storms occur over a relatively short period of time with high intensity. These strong winds have little effect on wet prairies and marshes, but can topple trees and shrubs within forested upland and wetland systems. Loss of canopy trees removes surfaces on which the abundant epiphytes of the region occur and/or as creates openings that can be occupied by exotic invasive species.

Downed material from tropical storm winds can also serve as fuel for more intensive fires, which can ultimately result in changes to community composition. The effects of strong winds can be magnified within linear corridors where the narrow openings in the canopy to accommodate the corridor channel wind energy into an area that exposes canopy trees in the central portions of forest stands to destructive winds that would have historically passed over a non-fragmented forest stand.

Tidal Fluctuations

Daily tidal fluctuations coupled with levels of salinity are significant drivers in the type of coastal systems occurring within south Florida. The distinct zonation found within tidal marsh vegetation communities depends on the length and depth of daily tides and salinity levels. Mangroves occur on the margins of creeks and other open water bodies, including canals, within the ROGG Study Area. Historically, the broad sheetflow of water through the Everglades and Big Cypress intergraded with the tidal waters of bays of south Florida and established a wide area of brackish conditions. Channelization of this sheetflow into canals allowed more saline tidal waters to extend farther inland. Mangroves began to migrate up the margins of the canals subject to tidal influences to take up residence in areas that were generally freshwater systems prior to channelization. The construction of U.S. 41 changed the connection of tidal marshes north and south of U.S. 41 by limiting tidal waters to a few limited canals.

Sea Level Rise

Due to flat topography, sea level rise has the potential to significantly affect the composition and distribution of many of the vegetation communities of south Florida. Since the formation of the Everglades more than 5,000 years ago, vegetation communities of south Florida have experienced rising sea levels, although the pace of the rise has varied over time. Slowly rising sea levels introduce tidal influences farther inland, which translates to broad areas in the flat topography of south Florida. As the tidal influences increase, transitions from freshwater systems to coastal systems to open estuarine systems occur. Slow increases in sea level historically allowed for vegetation communities to gradually shift across the landscape. , The predicted rapid changes in sea level rise will likely devastate established communities as a result of alterations to tidal influences that occur more quickly than vegetation systems can adapt.

In recent years, the rate of sea level rise has increased. In December 2010, the Florida Oceans and Coastal Council produced a report entitled Climate Change and Sea-Level Rise in Florida. The opening paragraph of the Executive Summary states:

> "Sea level has risen slowly during the period of Florida's modern settlement. Over the course of centuries when sea level was stable by geologic standards, natural systems developed an intimate relationship with the land–sea boundary. Marshes and mangroves expanded to the very limit of their abilities; intertidal oyster reefs became closely calibrated to tides, and seagrass beds grew as deeply as light penetration allowed."

Based upon the most recent literature at the time of publication, the report documents the accelerated rate of sea-level rise in the past 20 years, and the ecological consequences of increased saltwater intrusion, higher storm surges, and vegetative community changes. Data from the Intergovernmental Panel on Climate Change (IPCC) were cited in the Report that project sea-level rise by 2100 to range from 1.5 feet to more than 3 feet. Under either scenario, the projections of heightened storm activity are pervasive. Various sources predict landward expansion of tidal communities, establishment of new areas of mangrove forests, and replacement of coastal communities with open water. These variations in the responses to sea-level rise depend on the physical conditions, tidal fluctuations and existing vegetative communities at particular locations along the south Florida coast.

Succession

Ecological succession is an ongoing process whereby vegetation and wildlife communities change over time in response to both the presence and lack of disturbances. Ecological processes such as fire, hydrology, and tropical storm winds disturb the growth of or kill some or all of the species within a community, leaving open spaces or altered conditions favorable for species tolerant of those disturbances to occur. The lack of those disturbances allows more disturbance-intolerant species to grow and thrive, potentially displacing the disturbance-tolerant species over time. Some communities, such as the rockland hammock, are intolerant of fire and/or tropical storm wind events and revert to pine rocklands or other early successional communities when the rare disturbance occurs. Others, like hydric pine flatwoods or wet prairies, are maintained through frequent disturbance that allows the characteristic diversity of the system to be maintained. Disturbances caused by human action such as timber removal, agricultural conversion of land, or fill placement also cause changes to communities, although the resulting successional trajectories may differ from those of the native community that was displaced. These may result from introduction of exotic invasive species or through changes in the natural ecological processes. For example, fill of a roadway creates both a fire break and drier conditions that allow shrubs to grow more densely than in the adjacent communities.

Ecological Processes - Relevance to ROGG: The ecological processes along the ROGG Study Area affected feasibility assessments for routing options, configuration and materials for trail and trailhead facilities, and long-term maintenance requirements. Specific influences on analysis for the ROGG included:

- **Fire** – Fire management within the ROGG Study Area consists primarily of the application of prescribed fire and wildfire control. Prescribed fire is planned to occur in certain appropriate weather and moisture conditions, to minimize effects on structures, and with control personnel and equipment able to access the areas to be burned. Similar to prescribed fire, wildfire control efforts require access to the areas that are being burned, but that access may require additional or different types of equipment due to more variable fire and fuel conditions. Trail routes for ROGG through fire dependent habitats needed to limit or avoid the fragmentation of habitat that removed capacity to apply prescribed fire or control wildfire with typical fire control equipment. The materials for the trail also must be fire resistant when occurring

within or adjacent to fire dependent habitats. To accommodate fire control efforts, the design of trails that occur within natural areas should provide suitable clearance or non-railed sections to allow for fire crews to access or evacuate over or under the trail. Trail maintenance should be conducted to limit the growth of shrubs or other aggregations of fuels that could burn over the trail facility.

- **Hydrology** – Extensive efforts to restore the hydrology of the Everglades and Big Cypress systems are underway. As part of the feasibility assessment, the effects of ROGG trail locations and design on regional efforts to restore hydrology was evaluated. All route locations and trail designs for ROGG that would compromise ongoing programs and projects to restore hydrology were determined to be infeasible. Post-restoration trail locations identified for CERP, CEPP, or other projects were identified as potential ROGG options, while options to use the design of ROGG to restore sheetflow downstream of U.S. 41 were also considered for feasibility. The design for the trail and trailhead facilities included provisions to address flooding from rainfall events and storm surge. The likelihood of water levels from higher elevation flood events covering the trail was assessed, although this option would require maintenance of the trail to remove mud or other flood debris following a flood event and/or access control measures during the flood event.

- **Wind** – Although trail locations under canopy trees are desirable for trail user comfort, the removal of trees to accommodate a trail corridor can cause gaps in the canopy that then become even more susceptible to tropical storm wind events. Locating the trail under canopy that does not require canopy tree removal was considered as part of the ROGG feasibility study. The future design of trail structures and trailhead facilities must meet appropriate codes for hurricane wind loads. Additional anchoring of boardwalks or other trail features that occur adjacent to canals was considered as part of the study to limit potential impacts to the loss of the structure control structures.

- **Sea Level Rise** – In addition to accommodating current and post-restoration hydrology, the design of trail facilities incorporated evaluations for the inundation levels, flood elevations, and tidal influences associated with the sea level under anticipated sea level rise models. This included evaluations for trail and trailhead base elevations, requirements to maintain positive drainage for stormwater systems, and higher storm surge and flood elevations.

- **Succession** – Elements to address management for succession included a management program to mow grassed banks and/or control shrub growth along fill sections following construction of the trail, use of previously altered sites that could benefit from planting to reset the succession trajectory and accommodation of fire management for adjacent fire dependent communities.

Ecological Process Summary

Natural ecological processes interact with the physical environment to shape the landscape and the ecology of the species within that landscape. Processes such as the seasonal variation in freshwater inundation or tidal fluctuations cycle every year and may periodically drastically exceed normal conditions such as during a flood or storm surge. These periodic events can result in vegetation community alterations. Other processes such as tropical storms occur infrequently or irregularly, but can have significant effects on ecosystem composition and function as a result of catastrophic one-time events. Others occur regularly such as fire, but may vary in intensity based on the conditions present (i.e. drought, high moisture levels). The process of succession interacts with each of these to modify the condition and composition of vegetation and wildlife communities over time. In south Florida, ecological processes with the strongest influences on the ecology of the region include fire, hydrology, wind, tidal influences, sea level rise, and succession.

Specific influences on analysis for the ROGG relative to ecological processes included accommodating fire management through incorporation of fire-resistant materials and maintenance of access by appropriate trail design, reviewing ROGG compatibility with regional hydrological restoration projects, incorporating design options to address wind effects, assessing effects of sea level rise, and managing succession.

Ecology Summary

The ecological resources of the ROGG Study Area provide both the impetus for establishing a regional greenway and the challenge of managing human access. These resources are uniquely adapted to the region's subtropical climate, geology and soils, and the overriding influence of water, but also extremely sensitive to perturbations caused by the presence and activity of humans who live, recreate, or visit within the systems. While the regional ecosystem provides a uniquely recognizable setting, a full appreciation for the ecological setting for the ROGG Study Area requires a more detailed review of specific elements, including vegetation communities, listed wildlife species, exotic species, wetlands, and ecological processes.

The ecological resources of the Everglades have experienced significant changes over the last century, yet are proving resilient after implementation of restoration efforts. Much of the Everglades is a near monotonous expanse of wet prairies dominated by sawgrass and dotted with tree islands, although ridge and slough landscapes add subtle diversity to the system. Regional drainage alterations have led to habitat changes and exotic/ invasive species encroachment, but restoration efforts targeted to restore appropriate hydrology promise possibilities of improved ecological function over time. Comprising the western 2/3 of the ROGG Study Area, the Big Cypress watershed exhibits similar ecological processes as the Everglades, but contrasts in ecological character and relative degree of alterations. The forested strands, sloughs, and prairies of the Big Cypress comprise one of the largest stands of interconnected cypress wetlands in Florida, and provide a home for rare and endangered species unique to North America. Although alterations in the hydrology of the Big Cypress occurred, the degree and intensity of these changes across the watershed were less concentrated than the levee and canal system through the Everglades.

Natural Resource Regulatory Context

Impacts to natural resources in the study area would require authorization from several agencies having jurisdiction over wetlands and water bodies and protected wildlife and plant species. The review and authorization for proposed impacts would be coordinated through a variety of regulatory mechanisms, ranging from NEPA coordination to application and approval of various environmental permits. Construction of the ROGG may require coordination with the USACE, USFWS, EPA, SHPO, SFWMD, FDEP, FFWCC and MDRER to address natural resource issues.

2.1.6 Public/Tribal Ownership

Landowners with large land holdings along the ROGG Study Area include the NPS, State of Florida through the Trustees of the Internal Improvement Trust Fund, SFWMD, Miccosukee Tribe of Indians of Florida, and USFWS. NPS owns and manages the ENP along the eastern end of the ROGG Study Area and the Big Cypress National Preserve in the central portion of the ROGG Study Area. The State of Florida ownership includes the Collier-Seminole State Park, Picayune Strand State Forest, and Fakahatchee Strand Preserve State Park that are managed through the FDEP Division of State Lands as well as the ROW for U.S. 41 that is managed through the FDOT. The SFWMD owns portions of WCA3 located on the eastern end of the alignment and the FFWCC manages portions of the WCA3 as the Frances S. Taylor Wildlife Management Area. The Miccosukee Tribe of Florida has a number of landholdings throughout the corridor. These holdings include trust lands such as the lands comprising the Miccosukee Indian Village as well as fee simple lands owned by the tribe, but not part of trust lands. The USFWS owns and manages the Ten Thousand Islands NWR located south of Fakahatchee Strand in the western portion of the ROGG Study Area as well as the Florida Panther NWR, which is located north of Fakahatchee Strand outside of the ROGG Study Area.

Public/Tribal Ownership - Relevance to ROGG: Public landholdings and their associated managing agencies within the ROGG Study Area maintain natural lands that could be accessible from ROGG, and they could serve as potential partners for the implementation of ROGG. On the other hand, routing ROGG through these landholdings will require extensive regulatory and public review. The lands held in public and tribal ownership within the ROGG Study Area affected feasibility assessments for routing options and regulatory review as well as opportunities for long-term partnerships for operation and maintenance. Specific influences on analyses for the ROGG included:

- **Potential Partnerships** – The public landholdings in the ROGG Study Area provide the landscapes, vistas, and facilities that are the reason for extensive visitation in the region. ROGG may serve as alternative facilities for the public to interact with the resources of the public landholdings, including potential pedestrian transportation corridors to reduce trips on U.S. 41. Public agencies are potential partners for the construction and maintenance of trail segments. These public agencies currently operate facilities such as the Shark Valley Visitor Center, Oasis Visitor Center, or the Collier-Seminole campground that could be incorporated into the trail head and/or destination locations for the ROGG. Other facilities, such as the ORV trail heads for the Big Cypress National Preserve or the Fakahatchee Strand Preserve State Park visitor center, are planned for the corridor and these facilities would provide additional opportunities for shared amenities or trail heads at destinations for ROGG.

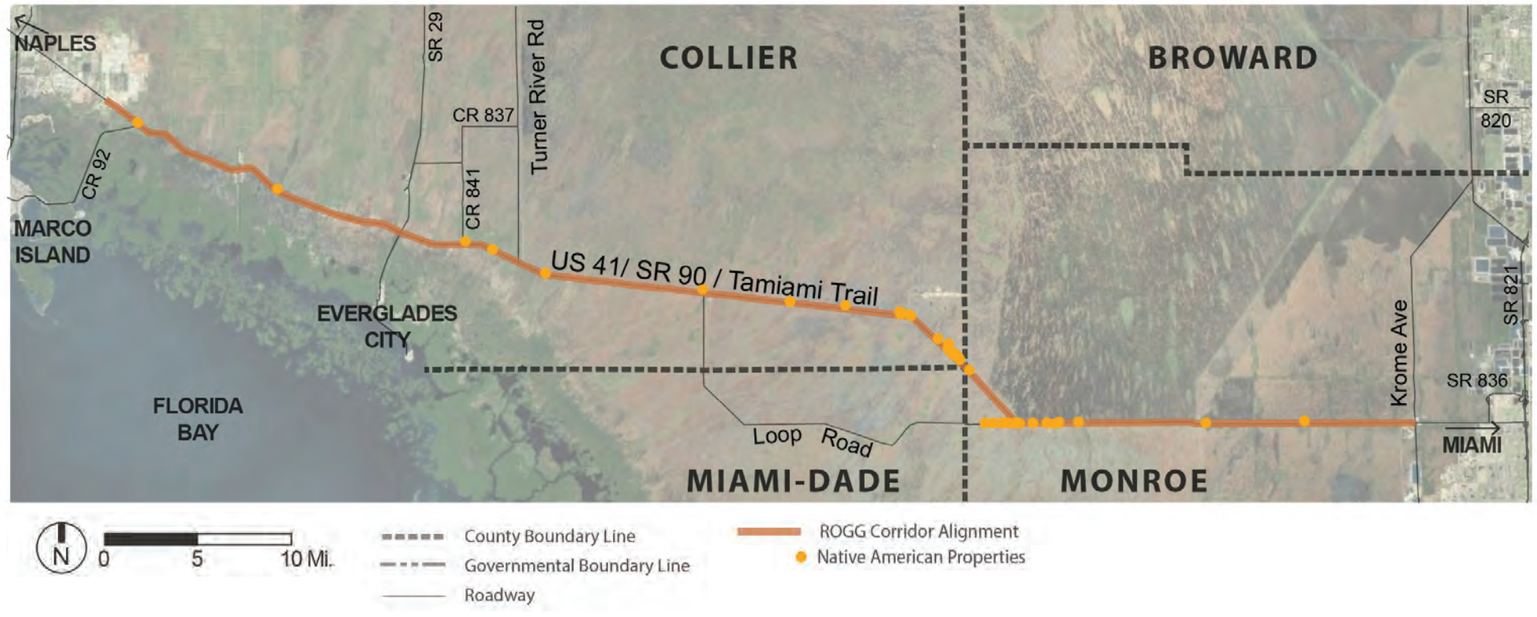
- **Regulatory Review** - Natural and cultural resources within public lands are both the attraction for visitors to the region and the primary responsibility of public landowners. Potential impacts to these resources will be subject to extensive public scrutiny due both to the aesthetic and natural resource values for which the land was initially acquired. In addition, potential impacts to these resources will be subject to extensive regulatory review, including NEPA coordination and permitting with local, state, and federal agencies for stormwater, wetlands, and listed species. These regulatory reviews will include extensive public involvement and comment on proposed activities, especially within federally owned lands. Proposed ROGG activities will also need to be incorporated into management plans for each of the public tracts as allowed uses over the management period covered by the plans.

- **Tribal Landholdings** – Tribal landholdings within the ROGG Study Area include trust lands and fee-simple (or similar) non-trust landholdings by the Miccosukee Tribe of Indians of Florida. Trust lands that are part of the reservation lands for the Miccosukee Tribe of Indians of Florida include: an approximately 33 acre area around the Miccosukee Indian Village, parcels on the north side of U.S. 41 used for commercial purposes, and parcels at Krome Avenue and U.S. 41 associated with the casino and tobacco shop. As part of their self-government powers as a sovereign nation, the tribe licenses and regulates activities within their jurisdiction, including within trust lands. This includes the capacity to exclude persons from tribal lands. The Tribe and/or members of the Tribe own other non-trust landholdings through fee-simple title within the ROGG Study Area. These lands are similar to other privately owned property in the corridor as they are subject to state and local regulations, codes, and taxation. The location of any part of ROGG within trust lands would require approval from the Tribe and would require additional coordination efforts to implement if considered suitable by the Tribe. The presence of trust lands could provide opportunities for ROGG users to utilize commercial enterprises of the Tribe as well as to learn about the cultural heritage of the Miccosukees in south Florida.

Public/Tribal Ownership Summary

Landowners with large land holdings along the ROGG Study Area include the NPS, State of Florida through the Trustees of the Internal Improvement Trust Fund, SFWMD, Miccosukee Tribe of Indians of Florida, and USFWS. Public landholdings and their associated managing agencies within the ROGG Study Area maintain natural lands that could be accessible from ROGG, and they could serve as potential partners for the implementation of ROGG. On the other hand, routing ROGG through these landholdings will require extensive regulatory and public review. The lands held in public and tribal ownership within the ROGG Study Area affected feasibility assessments for routing options and regulatory review as well as opportunities for long-term partnerships for operation and maintenance. Specific influences on analyses for the ROGG included an assessment of potential partnerships, regulatory review from facilities that would occur in these ownerships, and requirements associated with tribal holdings.

Native American Properties within 1 mile of U.S. 41 corridor

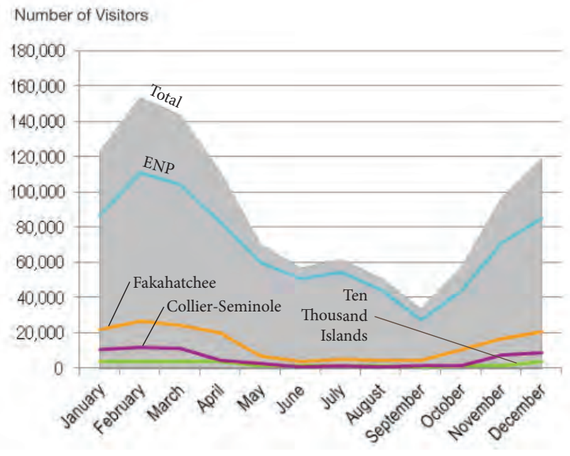


2.1.7 Transportation

The U.S. 41 corridor is an important connection between the east and west coasts of South Florida. From the time of its initial construction until 1969, U.S. 41 was the only corridor for vehicular traffic traversing the Everglades and Big Cypress. In 1969, I-75 was constructed through the northern portion of the Big Cypress and WCA3 to provide a limited access road between the east and west coasts of south Florida. While no longer used as the primary travel corridor between the dense urban areas of Naples and Miami, U.S. 41 is a significant corridor for access and scenic enjoyment parks, preserves, and other conservation lands of the region as well as access for tribal lands and individual parcel owners along the roadway.

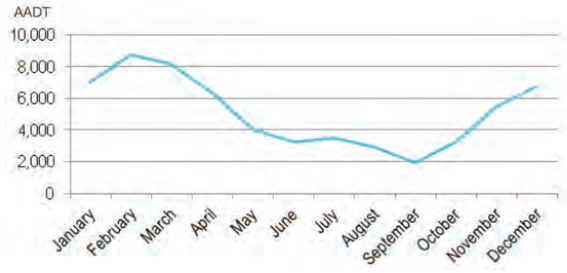
Visitation rates for parks within the corridor vary seasonally, but are a significant component of the vehicular traffic trips on U.S. 41. For four of the parks within the ROGG Study Area (ENP, Ten Thousand Islands NWR, Fakahatchee Strand Preserve State Park, and Collier-Seminole State Park) for which monthly visitation data is available, total visitation per month averages approximately 90,000 per month with visitation to the ENP comprising a significant portion of this visitation **(Graph 1)**. This average varies greatly over the course of the year, with total visitation rates during the peak visitation period in February exhibiting more than 150,000 people per month attending the parks and visitation rates in the late summer (September) exhibiting fewer than 35,000 visitors per month. Visitation rates for the Big Cypress National Preserve are tracked on an annual basis, but colloquial information from park staff indicates similar seasonal visitation patterns.

Graph1 : Estimated Visitors by Month



Traffic counts for U.S. 41 exhibit similar seasonal fluctuations as the visitation rates, although generally the roadway meets a high level of service level under FDOT classifications. Measured by dividing the total annual volume of vehicle traffic by 365, the Annual Average Daily Traffic (AADT) metric is a relatively straightforward measure for estimating how busy a roadway is. Based on data provided by FDOT for traffic in 2011, U.S. 41 within the ROGG Study Area averages approximately 5,500 vehicles per day **(Graph 2)**. However, the utility of this measurement is extremely limited in areas with extreme seasonal fluctuations in traffic.

Graph 2 : Estimated AADT by Month



Estimations of AADT on a month-by-month basis indicates that traffic averages approximately 9,000 vehicles per day, while traffic in the month with the lowest total visitation averages approximately 2,000 vehicles per day. The average daily volume of vehicles for U.S. 41 is generally below the minimum service capacity of 7,800 vehicles per day for a two lane, undivided rural road facility, which would indicate the road is a high quality traveler experience or generally not congested on an average operating basis (Level of Service A). However, vehicle use during seasonal peaks reduces the Level of Service to a B level for this type of roadway, indicating a slightly lower satisfaction level for travelers. Roadway Level of Service is a quantitative stratification of quality of service that measures by a scale of user satisfaction from A through F, with A being the best and F being the worst. Under most circumstances, the maximum service volume for Level of Service E equals the roadway's capacity.

In addition to traffic volume, other factors such as parking facilities and speed limits affect vehicular traffic and access along U.S. 41. Defined parking facilities are limited in size at most destinations and non-existent outside of potential destination locations and can overflow into the ROW during heavy visitation periods. For instance, visitors park their cars in long lines along U.S. 41 outside of the access gate to Shark Valley Visitor Use Area in ENP during event days and/or high visitation seasons since the parking lots for the facility can rapidly fill up. Even when lots are not full, many visitors park along the edge of the road so they can access Shark Valley to walk, view wildlife, bicycle or take a tram tour on the 15-mile loop. Similarly, the use of the ROW for temporary parking to access fishing locations, hunting locations, or scenic views is common along U.S. 41 throughout the ROGG Study Area. Finally, the posted daytime speed limit varies through the corridor, though anecdotal evidence indicates that many motorists exceed the posted speed limit throughout the corridor. High posted speed limits coupled with vehicles exceeding speed limits provides potential conflicts between vehicles and non-motorized use of the corridor by pedestrians and bicyclists.

The ROGG Study Area is currently not served by transit, although a new system that is being initiated by the City of Homestead to serve the ENP may serve as a model for future transit servicing park destinations in the future. The closest current transit routes within Miami-Dade County extend to SW 137th Avenue and U.S. 41, which is approximately four miles east of the eastern terminus of the ROGG Study Area at Krome Avenue. The closest current transit route within Collier County extends to the Big Cypress Flea Market, which is approximately one and half miles from the western terminus of the ROGG Study Area. A new transit service is currently being developed to provide transit access to portions of the ENP outside of the ROGG Study Area. Based on city approvals in August 2013, the City of Homestead is initiating a free trolley service that in anticipated to extend from downtown Homestead to the ENP Visitor Center and Anhinga Trail and the Biscayne National Park Visitor Center. The routes are currently being developed in coordination between the City of Homestead, National Parks Conservation Association, national parks staff, and community stakeholders.

Bicycling is an activity that occurs regularly within the ROGG Study Area, although there are limited facilities to accommodate bicycling separate from the U.S. 41 roadway and vehicular traffic. Residents of communities and/or individual parcels in the ROGG Study Area bicycle along roads for recreation and access to jobs or other daily activities. Typically, this bicycle access occurs on the narrow shoulders of the roadways, although bridge crossings can restrict bicycle access to the roadway lanes due to narrow bridge widths. Separation between bicyclists and vehicles on these roads is limited due to the narrow width of road shoulders and the lack of bicycle lanes or other separated facilities. Off-road bicycle access is available on the levees on the eastern side of the ROGG Study Area, the tram road within the Shark Valley Visitor Use Area, and other trails within parks and preserves in the corridor. The recently constructed one mile long bridge for U.S. 41 near Shark Valley did not include separated bike lanes. Long distance cycling through the corridor currently requires the use of the road lanes or shoulder.

Pedestrian access within the corridor is common around destination locations, temporary stops for scenic views, and/or daily travel in the corridor, although the majority of the ROGG Study Area has limited available facilities to separate pedestrians from vehicular traffic. Destination locations such as Shark Valley Visitor Use Area and Oasis Visitor Center provide boardwalks, trails, or other locations for pedestrians to interact or view natural resources and scenery, but often also serve as origination points for pedestrians to walk along the shoulders of roads by the destination.

The Florida Scenic Trail provides a north-south pedestrian trail in the vicinity of the Oasis Visitor Center. When travelers park on the shoulder of the roads, pedestrians move along the roads either on shoulders or on the margin of travel lanes as there are no sidewalks or other separated pedestrian facilities along the roads consistent with the rural nature of the area. Levees in the eastern portion of the ROGG Study Area are open for pedestrian travel, although these areas have limited shade or potable water availability. Long-distance pedestrian routes for hiking or travel from east to west within the ROGG Study Area currently occurs almost exclusively along the U.S. 41 road corridor.

Transportation - Relevance to ROGG: The transportation characteristics and options within the ROGG Study Area provide the context for standards and requirements for future ROGG facilities for safe pedestrian, bicyclist, transit, and vehicular access. Transportation options within the ROGG Study Area affected feasibility assessments for routing options, design requirements, and coordinated uses that would benefit potential ROGG users. Specific influences on analysis for the ROGG included:

- **Vehicular Traffic** – Although U.S. 41 generally has a high level of service for vehicles, the speed of vehicles and variable traffic volumes pose a constraint to use of the existing narrow shoulder and maintained ROW by pedestrians and bicyclists. Generally, routes for ROGG that occur on or adjacent to the shoulder of the road increase potential conflict points between ROGG users and vehicular traffic versus routes that are separated from the road. The increased vigilance

required by trail users for vehicles for trail routes that occur on or adjacent to the maintained ROW may also lessen the experience of trail use as opposed to the trail experience for separated facilities. Efforts to enhance compatibility of vehicular traffic with pedestrian use in the maintained ROW, such as lowering speed limits, would likely be subject to intense public scrutiny.

- **ROW Parking** – Parking within the ROW of U.S. 41 throughout the corridor affects potential options for routing the ROGG as well as the design of future ROGG facilities for routes within the maintained ROW of U.S. 41. Pull-off parking along many stretches of the U.S. 41 corridor have occurred for many years and are part of the cultural appeal for travelers along the corridor. Pull-off parking within the maintained ROW provides potential conflict points with ROGG routes that occur on or adjacent to the road shoulder throughout the corridors. These conflict points include both traffic movements during the parking process that would require vehicles to cross the ROGG trail and potentially interact with pedestrians using ROGG or the physical blocking of the ROGG through the placement of a parked vehicle.

  Within areas where the maintained ROW is constrained in size by bridges, guardrails, or other features, the physical impediment of a parked vehicle in the ROW may require pedestrian users to route into the road travel lane or require crossing of a guardrail. Accommodations for vehicles crossing the ROGG trail should be incorporated in design of the future trail. Options to separate ROGG facilities from parking areas through either spatial or structural separation would decrease conflict points between ROGG and vehicles seeking to park on the U.S. 41 ROW. However, defined parking areas on or adjacent to the ROW and/or structural elements that would separate ROGG trail users from vehicular traffic that also limit the ability to park in the ROW would likely be subject to intense public scrutiny.

- **Bridges** – Existing short bridges for U.S. 41 constrain bicycle and pedestrian use along maintained ROW because of narrow pavement widths and reflector requirements leading to and from the bridge. The narrow pavement widths compress the space available for bicycle and pedestrians to pass by bridges without moving into the travel lane. In addition, reflectors that enhance the striping pattern to provide visual clues to vehicles approaching these bridges can provide a rough surface for bicyclists. Solutions to address these constraints were incorporated into the feasibility assessment for ROGG. New bridges being constructed as part of the regional restoration efforts include wider areas of pavement for pull-off zones for vehicles, but do not include separated bicycle lanes or trail facilities. Options to add lanes or trail facilities to the new bridges would best be accomplished during planning and design of the facilities prior to construction, but could be added after construction of the bridge is complete. The effects of these different options for provide pedestrian facilities over new bridges was considered as part of the feasibility assessment for ROGG.

- **Transit** – Although no transit currently occurs within the corridor, the ROGG routes and design connections to points with the potential to be served by transit are an important consideration for future ROGG facilities. ROGG facilities may serve to as connections to increase access for pedestrians or bicyclists between transit stops and destination locations or as the main transit stop. Design considerations that accommodate transit access to trail heads was considered as part of the feasibility assessment.

  City of Homestead has approved plans to initiate trolley service from the City's historic downtown district to both ENP and Biscayne National Park. This service will be offered free of charge and operate on weekends during the winter peak tourism season from November to May beginning in winter, 2013. Destinations within Everglade National Park include the Ernest Coe Visitor Center and Anhinga Trail. Neither of these planned destinations are within the ROGG Study Area. The origination point in downtown Homestead will be accessible via Miami-Dade County Public Transportation routes. Funding for this program includes federal grants for four trolleys and the Miami-Dade County People Transportation Plan half penny sales tax.

- **Design Considerations** - The design of trail systems on or in the vicinity of road ROWs are required to meet a variety of design and regulatory requirements. For ROGG, design of the future trail components would need to be consistent with FDOT and FHWA standards, such as the minimum five foot wide separation between the outside edge of a road shoulder and the inside edge of a shared use path. In addition, ROGG trail components would need to meet the requirements for bike routes set out in the American Association of State Highway and Transportation Officials (AASHTO) Guide for the Development of Bicycle Facilities.

Transportation Summary

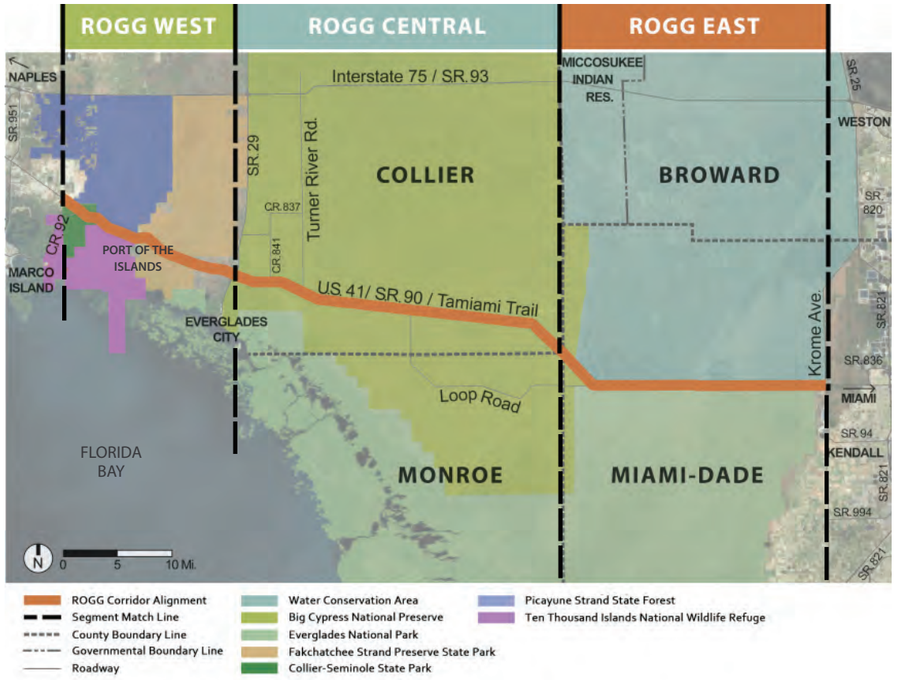
The U.S. 41 corridor is an important connection between the east and west coasts of South Florida. While no longer used as the primary travel corridor between the dense urban areas of Naples and Miami, U.S. 41 is a significant corridor for access and scenic enjoyment of parks, preserves, and other conservation lands of the region as well as access for tribal lands and individual parcel owners along the roadway. Visitation rates for parks within the corridor vary seasonally, but are a significant component of the vehicular traffic trips on U.S. 41. Traffic counts for U.S. 41 exhibit seasonal fluctuations similar to the visitation rates for the parks, although generally the roadway meets a high level of service level under FDOT classifications. Estimations of AADT on a month-by-month basis indicates that traffic averages approximately 9,000 vehicles per day during the busiest visitation month, while traffic in the month with the lowest total visitation averages approximately 2,000 vehicles per day. The average daily volume of vehicles for U.S. 41 is generally below the minimum service capacity of 7,800 vehicles per day for a two lane, undivided rural road facility (Level of Service A), although vehicle use during seasonal peaks meets the Level of Service B level for this type of roadway.

The posted daytime speed limit varies through the corridor, though anecdotal evidence indicates that many motorists exceed the posted speed limit throughout the corridor. Defined parking facilities are limited in size at most destinations and non-existent outside of potential destination locations and can overflow into the ROW during heavy visitation periods. Similarly, the use of the ROW for temporary parking to access fishing locations, hunting locations, or scenic views is common along U.S. 41. Considerations for vehicular traffic relevant to ROGG include the influence of the volume of traffic using U.S. 41 as well as the speed of traffic for trail experience and safety, the potential location of the trail relative to traffic lanes, modifications to road design or speed limits that would be subject to intense public scrutiny, limited availability of defined parking facilities, and accommodations for temporary parking in the ROW on future ROGG uses.

Non-vehicular transportation currently occurs along U.S. 41, although defined facilities to accommodate these sues are limited to non-existent. The ROGG Study Area is currently not served by transit, although a new system that is being initiated by the City of Homestead to serve the ENP may serve as a model for future transit servicing park destinations in the future. The closest current transit routes occur approximately four miles from the eastern terminus of the ROGG Study Area and approximately one and half miles from the western terminus of the ROGG Study Area. Bicycling is an activity that occurs regularly within the ROGG Study Area, although there are limited facilities to accommodate bicycling separate from the U.S. 41 roadway and vehicular traffic, especially for long distance cycling.

Pedestrian access within the corridor is common around destination locations, temporary stops for scenic views, and/or daily travel in the corridor, although the majority of the ROGG Study Area has limited available facilities to separate pedestrians from vehicular traffic. Long-distance pedestrian routes for hiking or travel from east to west within the ROGG Study Area currently occurs almost exclusively along the U.S. 41 road corridor. Considerations for non-vehicular transportation within the ROGG Study Area included evaluations of current and future facilities on existing and proposed bridges for U.S. 41, options for transit connections, and accommodations or facilities to separate vehicular and non-vehicular users.

2.2 CORRIDOR EXISTING CONDITIONS



Regional Map defining ROGG West, ROGG Central, and ROGG East segments

Exploring the existing conditions of the ROGG Study Area reveals vast landscapes full of ecological wonders, but also an area full of limitations born from the desire to restore and preserve a landscape that cannot be found anywhere else on earth. Opportunities to explore and sightsee in the Everglades are largely confined to experiences from vehicles or other motorized devises, such as airboats or swamp buggies. Better understanding of the Study Area on a landscape observational level is needed to fully comprehend the complexities of this region as well as the isolation the Everglades provides.

The purpose of this section is to document the conditions and features occurring within the ROGG Study Area and the implications of those conditions and features for the routing, connections, and configuration of the ROGG. To summarize the existing conditions of the Study Area, this section contains five elements:

- *Overview of the ROGG Study Area* – This element summarizes the selection of the Study Area and notes the boundaries of the Study Area's planning segments.
- *Review Methodology* – This element describes the review process utilized by the Project Team to document existing conditions.
- *Existing Conditions* – This element summarizes existing conditions found within each segment of the Study Area.
- *Existing Points of Interest* – This element summarizes the characteristics of existing points of interest and identifies focus areas that present opportunities or challenges.
- *Opportunities and Constraints Summary* - For each Study Area segment, this element summarizes important opportunities and constraints.

2.2.1 Overview of the ROGG Study Area

The portion segment of U.S. 41 identified for the ROGG feasibility study and master plan was selected because it is the southern-most east to west transportation corridor connecting both sides of the Florida peninsula and is the main visitor travel corridor for access to six federal and state public lands including:

- Everglades National Park (ENP)
- Big Cypress National Preserve
- Ten Thousand Islands National Wildlife Refuge (NWR)
- Fakahatchee Strand Preserve State Park
- Collier-Seminole State Park
- Picayune Strand State Forest

General Geographic Description

Located at the southern tip of peninsular Florida, the proposed ROGG would run for approximately 76 miles, from Krome Avenue (SW 177th Ave.) in Miami-Dade County on Florida's southeast coast to C.R. 92 and beyond to 6L's Road near Naples, Florida. In addition to the large number of parks and preserves, the ROGG Study Area also occurs within the jurisdictions of at least six different governing bodies including:

- United States Federal Government
- State of Florida
- Miami-Dade County
- Collier County
- Miccosukee Indian Tribe of Florida
- Seminole Indian Tribe of Florida

The ROGG Study Area closely aligns with that of U.S. 41; a two-lane, two-way historic highway linking Miami on the east coast to Naples on the west coast of the state. Although the majority of the vehicular transportation burden was relieved by the construction of I-75 (Alligator Alley) in 1969, U.S. 41 is still the only paved road linking the eastern and western coasts of South Florida that is available for use by cyclists, pedestrians, and hikers. ROGG would serve as a critical pedestrian linkage between the municipalities of Miami, Naples, Everglades City, and the Miccosukee Indian Village.

The primary conflict between U.S. 41 and ROGG is not the volume of traffic on the roadway, but rather the rate of speed and constrained ROW in that traffic is traveling. For the majority of its length, U.S. 41 has a ROW that is approximately 100 feet to 200 feet wide. However, only a small portion actually comprises the maintained U.S. 41 ROW, typically 50 feet. Much of the remaining ROW is relatively undisturbed wetlands or natural areas. The U.S. 41 ROW is significantly more constrained east of the Miami-Dade County line due to limited shoulder widths, continuous guardrails on both sides of the road, and nearby canal banks. The potential for a continuous trail along the western portions of the Study Area would not be without a challenge as well; the western 18.2 miles contains 36 bridges that the trail that would need to traverse.

There are numerous potential destinations along the ROGG Study Area that range from local eateries to large National Parks. Because of its adjacency to numerous parks and natural areas, ROGG would provide trail users with vital access to a wide variety of natural sites and unique ecosystems. Trail users will have access to natural environments, such as those seen in the Everglades National Park and Big Cypress National Preserve.

Pristine natural environments are habitats for native flora and fauna which together provide users a prime destination for bird watching, photography, fishing, and unique opportunities for environmental education and outreach. Furthermore, many of the natural areas within the Study Area are conducive for active-recreation activities, such as hiking, biking, kayaking, or exploring in an ORV.

The trail itself may become a destination, albeit one of varying value for different users. The greenway would provide local residents with new opportunities for active recreation and alternative transportation near their homes. It would also serve as a regional draw for distance cyclists or endurance runners who want to be able to travel for long, uninterrupted distances and by tourists seeking a day-trip to explore the Everglades.

Segments

Over the span of 76 miles, the ROGG Study Area provides a diverse collection of landscape types and conditions offering variation in experiences. In addition, man-made barriers helped define segments that were studied and documented in further detail. For this study, three distinct segments were defined using geographical borders and man-made features. Following are descriptions of each of the segments:

ROGG West

Beginning at 6Ls Road, east of the city of Naples, the western portion of the ROGG Study Area extends for 18.2 miles to S.R. 29/ C.R. 29. U.S. 41 in this portion of the Study Area crosses 12 roadway intersections and 37 waterways with associated bridges. Potential connections include six adjacent private attractions, four local and state parks and three existing trailheads. Major road interchanges include: S.R./C.R. 29 and C.R. 92 / San Marco Road. Traveling east, the width of the ROW of U.S. 41 within the Study Area is fairly uniform.
Unique ecological systems of the ROGG West segment

include the Picayune and Fakahatchee Strands, which are comprised of cypress strands, wet prairie, and pine flatwoods in lowland areas and subtropical hardwood hammock in upland areas. Florida panther habitat exists in the area, including public lands that connect to the Panther NWR located immediately north of the ROGG Study Area.

ROGG Central

ROGG Central spans from S.R. 29/ C.R. 29 to the Miami-Dade County Line, covering a total distance of 32.7 miles. U.S. 41 within this portion of the Study Area includes at least ten roadway intersections and 28 bridges. Three private attractions, two housing communities, seven parks and six trailheads facilities are located along or adjacent to U.S. 41. Major road intersections in ROGG Central include C.R. 84 / Birdon Road, C.R. 839 / Turner River Road and C.R. 94.

The ROGG Central segment of the Study Area is dominated by one large ecologically significant area: Big Cypress National Preserve. The primary ecological communities consists of wet prairie and cypress forest, while areas of mangrove are present near the coast.

ROGG East

Traveling east, the ROGG East segment spans a distance of 26.2 miles, from the Miami-Dade County Line to Krome Avenue (SW 177th Ave.). U.S. 41 exhibits 27 roadway intersections or driveways and five waterways with associated bridges in this portion of the Study Area. Connections include nine private attractions, private residences, one park and one trailhead. Krome Avenue and Loop Road are the two primary road intersections within the ROGG East segment.

Bordered primarily by ENP to the south, the ROGG East segment contains vast swaths of sawgrass and marsh ecological communities with scattered tree islands. Viewsheds are typically wide and far reaching, while views within the U.S. 41 corridor are largely contained by invasive vegetation or levees. Extensive restoration projects associated with (CERP) are proposed throughout this segment of the ROGG Study Area.

2.2.2 Review Methodology

The Project Team began to research and analyze each segment of the ROGG Study Area by compiling extensive GIS databases for physical conditions, landscape features, recreation elements, transportation features, and other aspects to prepare base maps. In November 2012, the Project Team performed a three-day long analysis of the Study Area, beginning at the western end at C.R. 92 and working east to Trail Glades Sports Shooting Range on U.S. 41 in Miami-Dade County. The analysis of the Study Area conducted during the site review included high-level observations of existing facilities, maintained ROW, natural resources, and potential opportunities, constraints and impacts to the feasibility of constructing the ROGG.

The results of this analysis included the identification of focus areas representing points of interest within the ROGG Study Area that may pose opportunities or constraints for the feasibility assessment and master plan. Most of the identified focus areas either consisted of areas with typical conditions found in the segment or unique conditions requiring innovative solutions for the feasibility assessment. General categories of focus areas were identified as part of this analysis, including ROW characteristics, existing trailheads and trails, cultural resources, environmentally sensitive resources, and bridges. Descriptions of existing conditions for specific focus areas identified in each ROGG segment are provided in the segment descriptions later in this chapter, but the following provides a general description of these focus areas and the characteristics comprising the definition of the focus area.

1. Right-of-Way (ROW)

This category of focus areas consists of exceptionally narrow or wide portions of two aspects of ROW: Maintained ROW and Designated ROW. Maintained ROW is the area consisting of U.S. 41 that is owned by FDOT, is grassed or routinely cleared of vegetation, and maintained by Collier or Miami-Dade Counties, while Designated ROW is defined as the entire roadway property owned by the FDOT. Focus areas with narrow Maintained ROW exhibit ROW widths of 40 feet or less as a width less than 40 feet would not accommodate the existing 28 foot wide highway and an additional 12 feet for an implemented pathway. Focus areas with wide Maintained ROW exhibit ROW widths greater than 75 feet, which would allow for the trail and additional parking or amenities. Designated ROW within ROGG Study Area varies in width from 34 feet to over 200 feet. Designated ROW less than 50 feet in width would pose a challenge for the addition of a trail. The following characteristics summarize focus areas for ROW:

Characteristics:

- Maintained ROW less than 40 feet
- Maintained ROW greater than 75 feet
- Designated ROW less than 50 feet

2. Existing Trailheads and Trails

This category of focus areas consists of trails and trailheads that exist within the ROGG Study Area and provide opportunities to connect ROGG to other regional trail systems. Focus areas includes existing trailheads and trails that begin or cross U.S. 41.

Characteristics

- Any trails or trailheads that begin or cross the U.S. 41

3. Cultural Resource Features

Designated Historic Structures

This category of focus areas consists of historic structures and the facilities adjacent to those structures that occur within the Study Area. These structures were taken into account during the planning and design of the Study Area, as they should not be negatively impacted by ROGG activities.

Characteristics

- Any structures within a one mile radius of the corridor that have been designated as historic

Culturally Significant Lands

This category of focus areas include significant lands within tribal ownership, cultural resource sites, or other features used in the daily and/or ceremonial life of tribal members within the Study Area. Potential impacts from ROGG facilities will need to be avoided unless otherwise approved by the tribes.

Characteristics:

- Residential or commercial sites within tribal ownership within the Study Area used for daily and/or ceremonial uses
- Portions of the Study Area located within 1/2 mile of a ceremonial site

4. Environmentally Sensitive Resource Features

Although wetlands, listed species habitat, hydrological system components, and other environmental resources occur throughout the Study Area, this category of focus areas addresses specific landscape features, specific identified improvements for regional hydrological restoration, and/or Critical Habitat locations within the Study Area. The implementation of ROGG at these locations may require unique or additional permitting requirements or designs for a trail to accommodate specific operating conditions, future hydrological restoration activities, or listed species requirements. In addition to these focus areas, improvements for ROGG will be required to address potential effects on all of the environmental resources within the Study Area. Characteristics of Environmental Resource Feature focus areas include any designated Critical Habitat, structures required for implementing CERP or other restoration projects, or unique landscape features.

Characteristics:

- Areas within one mile radius of the U.S. 41 corridor of any designated Critical Habitat, structures for CERP related projects or unique landscape features.

5. Primary Hubs

For the purposes of the focus area analysis, primary hubs are defined as existing activity centers that provide, or could potentially provide, access to trail-related activities, food, water, restrooms, lodging and/or multi-modal transportation. Primary hub focus areas may include parking, restrooms, multi-modal transportation access, and/or facilities for food and water.

Characteristics:

- Private and publicly owned sites with existing or potential future parking, restrooms, multi-modal transportation access and/or facilities for food and water

6. Bridges

This focus area category consists of bridges on U.S. 41. Many of these bridges are narrow with limited shoulders between travel lanes and bridge guard walls. Narrow bridges pose a challenge for the feasibility of the trail, as additional construction or modification of existing structures would be required to accommodate a trail facility on the bridge or the construction of separate facilities would be required.

Boardwalk trail at Kirby S. Storter Park (Big Cypress National Preserve)

2.2.3 ROGG West Existing Conditions

Overview

The ROGG West segment is 18.2 miles of the overall Study Area, beginning at 6L's Road in southeast Naples and terminating at S.R. 29/ C.R. 29. The western most segment running from 6L's Road to C.R. 92 was contained in the FDOT NEPA Study (415621-1-22-01) entitled U.S. 41 PD&E Study from C.R. 951 to C.R. 92 and will not be included in further analysis or documentation as part of this Feasibility Study and Master Plan process.

Although the shortest of the three segments, the ROGG West segment is home to several significant state and federal park facilities, including the Fakahatchee Strand Preserve State Park, Ten Thousand Islands NWR, and Collier-Seminole State Park. The large amount of natural lands within and adjacent to these facilities has made this segment a prime destination for fishing and airboating, resulting in the presence of several commercial providers and rental companies.

Two principal route opportunities exist and both are parallel to U.S. 41. Direct proximity to the U.S. 41 ROW is the main alignment alternative for this segment of ROGG. Two Old Tamiami Trail segments totaling less than one mile in length provide two short additional alignment alternatives. Following are summaries for each alternative alignment option:

Route Alignment Options Observed

U.S. 41 - Primary Alignment

Summary of Existing Condition

Opportunities for alternative alignments are limited in ROGG West due to the proximity of the Tamiami Canal to the immediate north side with a guardrail barrier and extensive wetlands south of the maintained U.S. 41 ROW. Maintained ROW dimensions average between 50 feet and 60 feet in width. U.S. 41 shoulders The southern shoulder typically averages between 15 and 18 feet in total width, while the paved portions typically vary in width from four to eight feet. The grassed shoulder typically extends an additional 10 to 14 feet. The southern shoulder slopes at an average 1:5 slope to the south and is abutted by wetlands for the majority of the segment's length. The width of the northern shoulder is constrained to an average width of six to seven feet by the presence of a guardrail barrier adjacent to the Tamiami Canal.

A key feature to the U.S. 41 roadway in the ROGG West segment is the presence of 36 bridges. At many of the existing bridges, the roadway shoulders condense to three feet in width to accommodate the bridge widths that typically provide 30 to 32 feet of total clearance. An additional unique item is that U.S. 41 briefly becomes a divided, four-lane highway for approximately 0.5 mile at its intersection with the Port of the Islands residential community.

Vegetation along U.S. 41 in ROGG West is composed largely of cypress swamp, wet prairie and mangrove wetlands. The majority of the wet prairies occur on the north side of U.S. 41, with the highest concentration being located between Collier-Seminole State Park and the entrance to the Fakahatchee Strand Preserve State Park. In this same area, mangrove wetlands become more prevalent, predominantly on the south side of U.S. 41, with the highest concentration occurring to the east-southeast of Collier-Seminole State Park. The lower height and decreased density of vegetation within wet prairies allow for long views and vistas from the roadway, especially in the western portions of the alignment.

Critical Nodes

1. U.S. 41 and C.R. 92/San Marco Road: C.R. 92/San Marco Road connects U.S. 41 with Marco Island to the southwest. This intersection forms the western terminus of the ROGG West segment and the overall ROGG Study Area.

2. U.S. 41 and Newport Drive/Peacock Lane: Located approximately six miles east of C.R. 92, Newport Drive and Peacock Drive are the primary vehicular connections into the Port of the Islands residential developments.

3. U.S. 41 and Old Tamiami Trail (near the Fakahatchee Strand Preserve State Park): Approximately 9.3 miles east of C.R. 92, U.S. 41 intersects with two spurs of Old Tamiami Trail roadbed.

4. U.S. 41 and S.R. 29/ C.R. 29: The intersection of U.S. 41 and S.R. 29 is the eastern terminus of the ROGG West segment. S.R. 29 serves as a linkage both north to I-75 and south to Everglades City and ENP Gulf Coast Visitor Center at Chokoloskee.

Old Tamiami Trail Spurs - Alternative

Summary of Existing Condition

The current alignment of U.S. 41 bisects an "S" curve that was present in the historical alignment of Old Tamiami Trail, resulting in two bifurcated roadbed segments to the north and south of U.S. 41 near the entrance to the Fakahatchee Strand Preserve State Park. The roadbed is composed of severely degraded asphalt, and is surrounded by overgrown, dense vegetation on both sides. There is vehicular access to this spur at its westernmost terminus via an access roadway. The northeastern spur of Old Tamiami Trail has a canal running along its northern edge, which has pulled the Tamiami Canal away from the current U.S. 41 alignment in the vicinity of the Old Tamiami Trail spur. The western terminus of this spur is separated from U.S. 41 and is the future location of a new visitor center and parking area for Fakahatchee Strand Preserve State Park.

The planned visitor center will be located on the north side of U.S. 41, immediately east of the current location of the Big Cypress Bend Boardwalk at the Fakahatchee Strand Preserve State Park. The visitor center is planned to utilize the northeastern Old Tamiami Trail spur as the site for the center and parking facilities. Planned amenities include parking for 50 vehicles, a drop-off area, restrooms and information kiosk. Direct access to the ROGG is preferred by State Park staff. A targeted completion date has not be set.

The southwestern spur of Old Tamiami Trail does not have an adjacent canal. The roadbed is of a similar construction to that of its northern counterpart; however, it is in better physical condition. The southern spur is accessible from U.S. 41 via two paved access roads, located approximately 400 feet apart at the eastern terminus of the spur. This spur dead-ends approximately 100 feet from its western intersection with the U.S. 41 roadway.

Critical Nodes

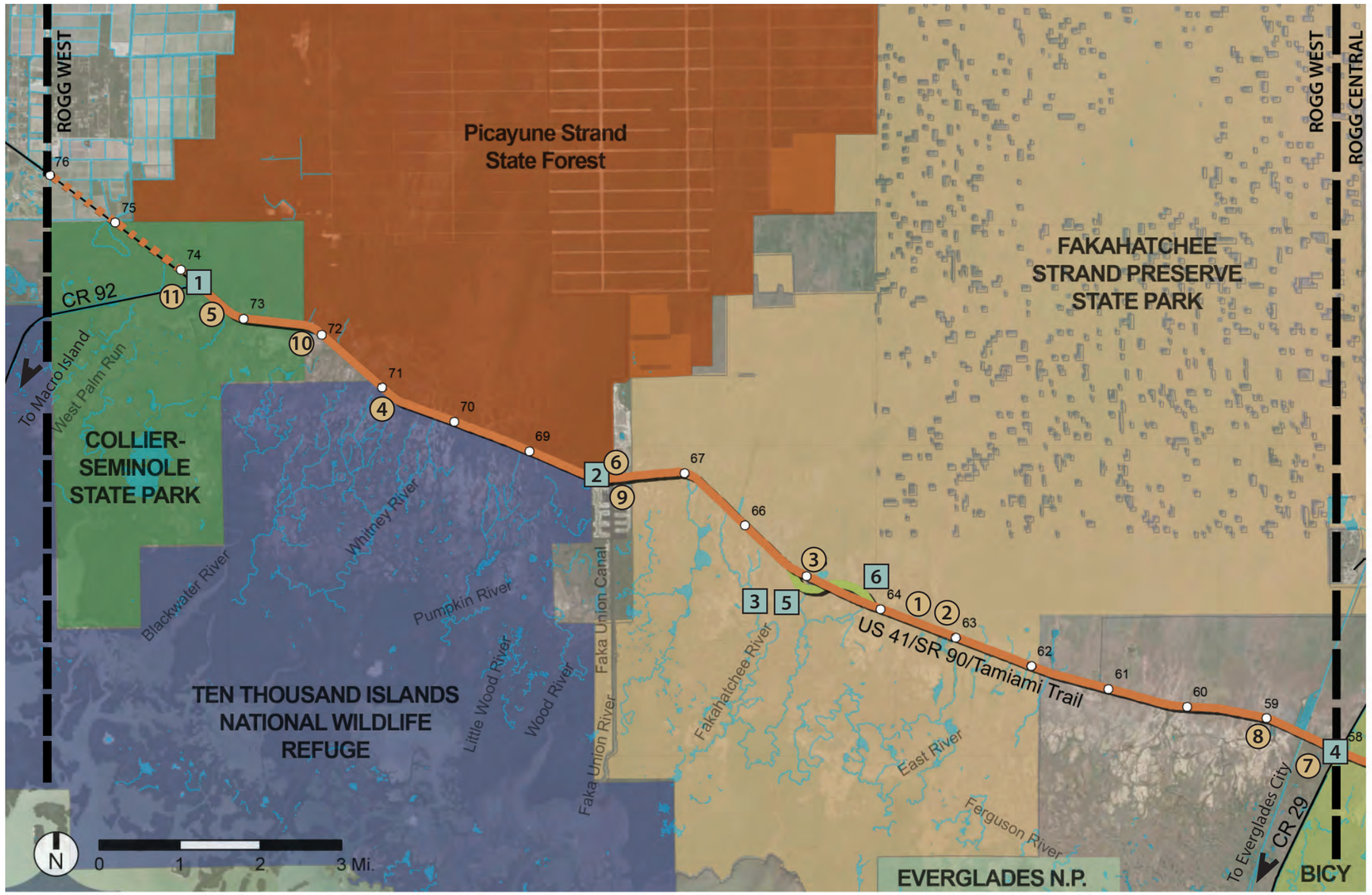
5. U.S. 41 and Old Tamiami Trail (southern spur): The southern spur only has access from U.S. 41 at its eastern terminus via two paved access roads.

6. U.S. 41 and Old Tamiami Trail (northern spur): In contrast, the northern spur has access only at its western terminus via a roughly paved access road, but is currently blocked by a locked vehicular gate.

The Bay City Walking Dredge at Collier-Seminole State Park

Looking west along U.S. 41 in the ROGG West vicinity showing existing guardrail and overhead utility lines on the northern side of the roadway and maintained ROW to the south side of the roadway.

ROGG West - Existing Conditions Base Map



ROGG West

Location: C.R. 92/San Marco Road to S.R. 29

Length: 18.2 miles

Critical Nodes

1. U.S. 41 and C.R. 92/ San Marco Road
2. U.S. 41 and Newport Drive/Peacock Lane
3. U.S. 41 and Old Tamiami Trail (near the Fakahatchee Strand Preserve)
4. U.S. 41 and S.R. 29
5. U.S. 41 and Old Tamiami Trail (southern spur)
6. U.S. 41 and Old Tamiami Trail (northern spur)

Points of Interest

1. Wayside Park
2. Small Roadside Park and Canoe Launch
3. Fakahatchee Strand State Preserve
4. Ten Thousand Islands National Wildlife Refuge and Marsh Trail
5. Collier-Seminole State Park
6. Picayune Strand State Forest
7. Intersection of S.R. 29 and U.S. 41
8. Swampland Airboat Tours
9. Port of the Islands Everglades Adventure Resort
10. Corey Billie's Airboat Rides
11. Intersection of C.R. 92 and U.S. 41

Legend

- Segment Match Line
- County Boundary Line
- Governmental Boundary Line
- Roadway
- Mile Marker (from Krome Ave.)
- U.S. 41 Alignment
- Old Tamiami Trail Alignment
- Waterway
- Big Cypress National Preserve
- Fakahatchee Strand Preserve State Park
- Everglades National Park
- Collier-Seminole State Park
- Ten Thousand Islands National Wildlife Refuge
- Picayune Strand State Forest
- Point of Interest
- Critical Node

See page 44 and 46 for description of # items.

2.3.4 ROGG West Points of Interest

A key attribute of the ROGG West segment is the segment's ecological diversity provides for a unique and varied natural setting that is readily observable from U.S. 41. The ROGG West segment is home to three state preserves, parks, or forests, and one national wildlife refuge. Additionally, ROGG West is also home to one of the few densely populated residential developments found along the entire ROGG Study Area: the Port of the Islands Resort.

Public Points of Interest

Parks and Preserves

1. Wayside Park: Located approximately 16.3 miles east of C.R. 92, a small roadside park is located along the south side of U.S. 41 that provides users with limited paved parking, and several picnic tables located in the shade of existing trees. The parking area provides approximately 15 unlined parking spaces. This area has the potential to become a trailhead parking area for ROGG.

2. Small Roadside Park and Canoe Launch: Approximately 0.3 mile east of Wayside Park along the south side of U.S. 41 is a gravel road that leads to open water where a canoe launch is located. There is limited, unpaved parking at the launch, the majority of which occurs at the southern terminus of the gravel roadway.

3. Fakahatchee Strand Preserve State Park: Also referred to as "the Amazon of North America," the Fakahatchee Strand Preserve State Park entrance is located approximately 9.3 miles east of C.R. 92 along the north side of U.S. 41. The Park is an approximately 80,000-acre, freshwater swamp stretching from U.S. 41 to I-75, which is unique in part because it is the only place in the world where cypress and royal palm both occur in the canopy of an old growth swamp. Available recreation activities at the Preserve are passive in nature, including as walking, hiking, and wildlife viewing. The primary attraction is the 0.6 mile Big Cypress Bend Boardwalk.

4. Ten Thousand Islands National Wildlife Refuge and Marsh Trail: Located 3 miles east of C.R. 92 and south of U.S. 41, the 35,000-acre Ten Thousand Islands NWR contains one of the largest expanses of mangrove forest in North America covering approximately 23,000 acres. These mangroves provide habitat for more than 200 species of fish and almost 200 species of birds. The remaining 12,000 acres in the Refuge occur along the Refuge's northern border and consist primarily of brackish marsh and ponds, coastal oak hammocks, and tropical hardwoods.

5. Collier-Seminole State Park: The primary entrance to the Collier-Seminole State Park is located along the south side of U.S. 41, approximately 0.4 miles east of C.R. 92. The 7,271 acre park offers users a wide range of recreational activities, including kayaking, cycling hiking, fishing, birding, and picnicking. For a fee, the park rents canoes and camp sites (including primitive, youth, and full-facility sites). Collier-Seminole State Park is located within the vast mangrove forests of southwest Florida and is the native home of one the rare royal palm stands in Florida. In addition, the park is also a National Historic Mechanical Engineering Landmark as it maintains the last remaining "walking dredge" originally used to build U.S. 41 in the late 1920's.

6. Picayune Strand State Forest: Located near Port of the Islands Everglades Adventure Resort, access to Picayune Strand State Forest consists of a gravel parking lot located on the north side of U.S. 41 immediately west of the Faka Union Canal.

Private/Commercial Points of Interest

7. Intersection of S.R. 29 and U.S. 41: There is a small commercial core at the intersection of S.R. 29/ C.R. 29 and U.S. 41 that consists of the Collier County Sheriff's Station and the Everglades Chamber of Commerce (both in the ROGG Central segment), as well as a gas station and Subway restaurant in the ROGG West segment portion of the intersection.

8. Swampland Airboat Tours: Located approximately one mile west of S.R. 29 on the south side of U.S. 41, Swampland Airboat Tours is a private company that provides guided airboat tours. The site includes a paved parking area, private water access, and a small outbuilding to the rear of the parking lot, which contains a gift shop.

9. Port of the Islands Everglades Adventure Resort: The Port of the Islands Everglades Adventure Resort is a private, adventure-themed resort that is located within the Port of the Islands residential development that is six miles east of C.R. 92 on the south side of U.S. 41. The resort offers a variety of lodging accommodations as well as outdoor adventure activities such as rifle marksmanship, hiking adventures, eco-excursions, bicycling, and hunting expeditions as well as tennis and swimming. In addition, the resort offers more passive activities, including birding, photography and chartered fishing. There is also a full-service marina owned by the Collier County Parks and Recreation Department providing direct access to the backwaters of the Everglades and the Gulf of Mexico.

10. Corey Billie's Airboat Rides: Located 1.6 miles east of C.R. 92 along U.S. 41, Corey Billie's Airboat Rides is the closest private airboat tour provider to the greater Naples area. In addition to guided tours, the site provides a gift shop with restroom facilities, a paved parking lot, and water access via a boardwalk.

11. Intersection of C.R. 92 and U.S. 41: Located at the intersection of U.S. 41 and C.R. 92/ San Marco Rd., this area is a small commercial node that consists of a gas station, an alligator exhibit (Hold & Hug Alligator Exhibit), and a restaurant (Lagoona Grille). All facilities are in separate structures on the south side of U.S. 41; although they share a linear parking lot.

Canoe and boat launch at Collier-Seminole State Park

Entrance to the Ten Thousand Islands National Wildlife Refuge

The Big Cypress Bend Boardwalk at Fakahatchee Strand Preserve State Park

Typical Existing Conditions

Roadway (ROW)

Typical ROW along the ROGG West segment averages an maintained width of 65 feet wide, and ranges from 45 to 95 feet. This portion of the corridor is typically uniform in scale and construction. Travel lanes vary from 11-12 feet in width, while shoulders for the highway are typically five feet wide on the south side and range from five to twelve feet on the north side. Images of the typical roadway cross-section are shown below.

Typical paved ROW with narrow paved shoulder on north side

Typical roadway section with wider shoulder between travel lane and guardrail

Bridges

With the exception of the bridge just west of Port of the Islands, most bridges in the corridor are identical in scale and construction. The typical bridge is approximately 32 feet wide overall with two 12-foot wide travel lanes and four foot wide shoulders on both sides of the road. Bridges within the corridor pose difficulty for the implementation of the trail due to their narrow width.

Port of the Islands bridge for U.S. 41, view from west-bound lanes looking west

Typical narrow bridge crossing for U.S. 41

Landscape (habitat)

Typical habitat of the western portion of the ROGG Study Area includes oak hammock, marsh, wet prarie and mangrove forest. Scattered pinelands occur, especially on the western portion of the ROGG West segment. Cattail dominated marshes occur within areas historically used for agriculture.

Freshwater marsh and wet prairie

Mangrove and stream crossings

Focus Areas

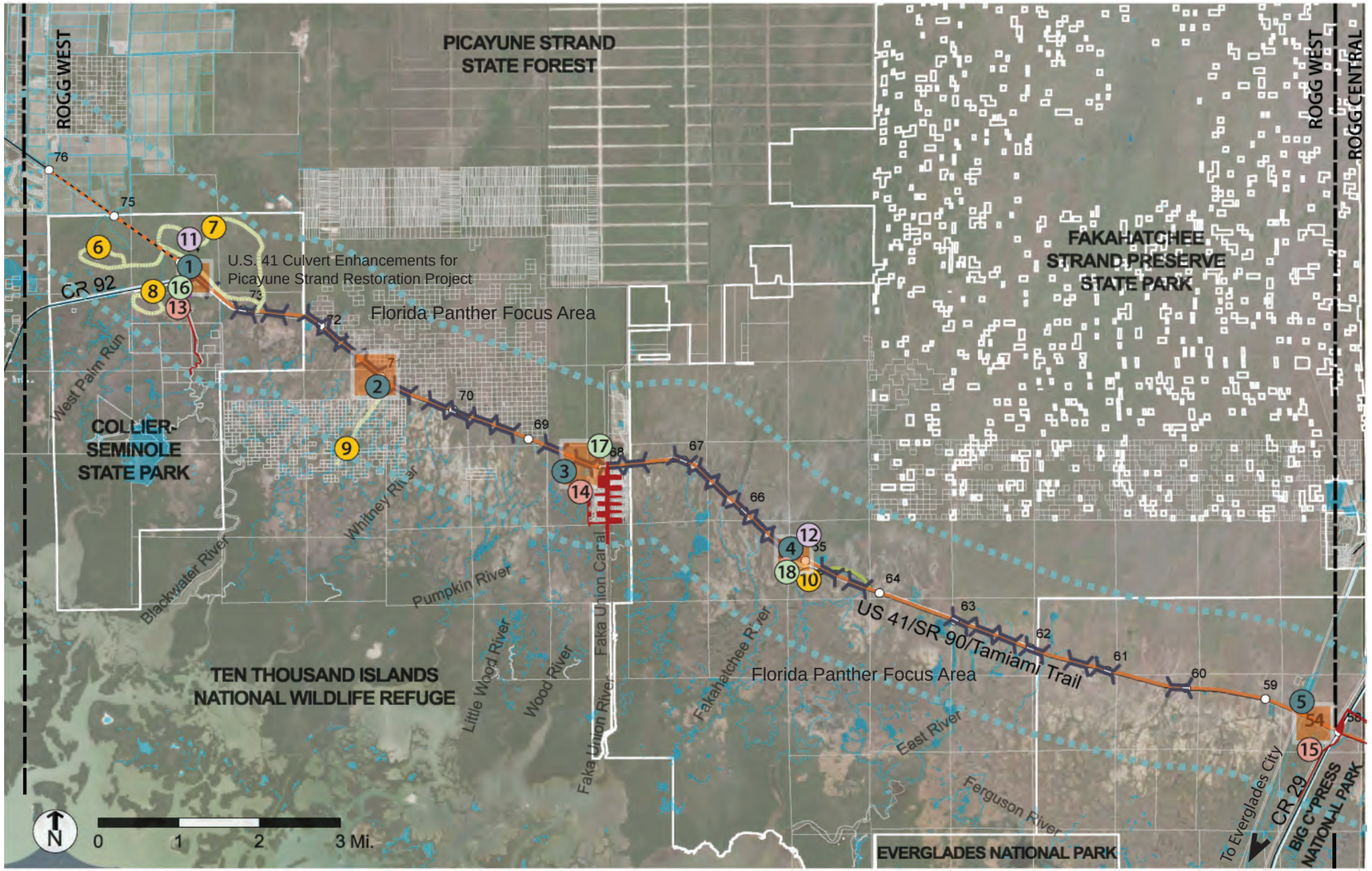
1. **Right-of-Way**
   Narrow:
   - None Observed

   Wide:
   - San Marco Road to Collier Seminole State Park
   - Ten Thousand Islands NWR Marsh Trail
   - Port of the Islands
   - Fakahatchee Strand Preserve State Park
2. **Existing Trails and Trailheads**
   - Big Cypress Bend Boardwalk at Fakahatchee Strand Preserve State Park
   - Collier-Seminole State Park
   - Ten Thousand Islands NWR Marsh Trail
3. **Designated Historic Structures**
   - Weaver's Station within the Fakahatchee Strand Preserve State Park
4. **Environmentally Sensitive Resources Features**
   - Area east of C.R. 92 (Critical Habitat)
   - Port of the Islands (Critical Habitat)
   - U.S. 41 Culvert Enhancements for Picayune Strand Restoration Project
   - Florida Panther Focus Area
5. **Primary Hubs**
   - Collier-Seminole State Park
   - Port of the Islands Marina
   - Fakahatchee Strand Preserve State Park
   - Everglades City
6. **Bridges**
   - 36 bridges overall

Old Tamiami Trail Spur

City Hall in Everglades City

ROGG West Focus Areas Map



Legend

- Segment Match Line
- County Boundary Line
- Governmental Boundary Line
- Roadway
- Mile Marker (from Krome Ave.)
- U.S. 41 Alignment
- U.S. 41 Alignment (within FDOT NEPA Study 415621-1-22-01)
- Old Taimiami Trail Alignment
- 1 Mile Study Area
- Existing Trail
- Waterway
- Bridge
- ROW Focus Area
- Critical Habitat
- # Right-of-Way (ROW)
- # Existing Trailheads and Trails
- # Cultural Resources Feature
- # Environmentally Sensitive Resources Feature
- # Primary Hub

See page 49 for identification of # items.

Right-of-Way (ROW)

Wide ROW includes any maintained ROW greater than 70 feet. Wide ROW allows for ample space for any proposed trail and room for potential parking spaces.

Five portions of U.S. 41 have a wide ROW within the ROGG West segment:

1. San Marco road throughout the Collier-Seminole State Park entrances
2. Ten Thousand Islands NWR Marsh Trail
3. Port of the Islands
4. Fakahatchee Strand Preserve State Park
5. S.R. 29/ C.R. 29 intersection

Existing Trailheads and Trails

Existing trails and trailheads that occur on or along the Study Area may be an opportunity to connect to a proposed trail.

Five trails currently exist within the ROGG West segment:

6. Collier-Seminole 3.5 Mile Bike Trail
7. Collier-Seminole Hiking Trail
8. Royal Palm Hammock Trail
9. Ten Thousand Islands NWR Marsh Trail
10. Big Cypress Bend Trail

Environmentally Sensitive Resources Features

Critical Habitat for the West Indian Manatee is found in several locations within the ROGG West segment. Critical Habitat spans portions of:

13. Collier-Seminole State Park
14. Port of the Islands Marina
15. S.R. 29 intersection

The entire segment is within the Florida Panther Focus Area, which is part of the core habitat for Florida panthers in Florida. The Picayune Strand Restoration CERP project includes the installation of culverts under U.S. 41 for hydrological improvements in the area.

Primary Hubs

Four existing primary hubs are present in the ROGG West segment:

16. Collier-Seminole State Park
17. Port of the Islands
18. Fakahatchee Strand Preserve State Park
- Everglades City (not shown)

Restrooms, parking and access to trails are available at three locations. Private parking, restrooms and access to food and drink are available in Everglades City

Cultural Resource Features

There are two designated historic sites or landmarks within the ROGG West segment. Weaver's Station is within the Fakahatchee Strand Preserve State Park and is used to host one of U.S. 41's original way stations built by Barron Collier in 1928.

The Bay City Walking Dredge is located in Collier-Seminole State Park and is a National Historic Mechanical Engineering Landmark.

11. Bay City Walking Dredge
12. Weaver's Station

Bridges

36 bridges occur along U.S. 41 within the ROGG West segment and are shown on the adjacent map.

Typical Bridge

ROGG West Opportunities and Constraints Summary

The ROGG West segment of the Study Area enjoys an abundance of existing destinations and activities for future trail users to enjoy. Existing conditions are favorable for the implementation of an alternate mode of transportation, which would allow for large influxes of visitors to access destinations while also enjoying the natural wonders of the landscape between the destinations.

The biggest opportunity observed for ROGG West was an abundance of existing facilities that could serve as trailheads with minimum improvements needed. Most existing destinations provide parking, while some provide nearby restrooms and access to food and water, both of which are commonly needed amenities for trailheads. An additional planned facility is the new visitor center for Fakahatchee Strand Preserve State Park, which will include parking, restrooms and information for visitors. Each of the existing four separate state and federal lands entities immediately adjacent to U.S. 41 provide either parking and/or restrooms for trail users.

An opportunity to provide connections into three communities, including Naples, San Marco and Everglades City, also makes this portion of the Study Area unique. With needed hotels and restaurants already in place, these communities stand to benefit economically from an increased number of visitors using the trail. Connections to existing trails and boardwalks at Collier-Seminole State Park, Ten Thousand Islands NWR and Fakahatchee Strand Preserve State Park offer additional opportunities for various user types that may seek hiking, kayaking, canoeing, back-packing, mountain biking, and other types of outdoor recreation.

Constraints along the ROGG West segment consist primarily three items: bridges, wetlands, and Florida panther habitat. In total, 36 bridges exist along the ROGG West segment with many having been constructed using a pile and slab technique that prevents the use of cantilever design for expansion to the bridge when routing the trail. In addition, most bridges are 32 feet in width which does not allow for an appropriate bike lane of five feet per FDOT standards for roadway with posted speed limits of 45 mph. This results in a need to evaluate separate trail bridges at many locations, which will increase potential impacts to surrounding areas and costs for construction.

The second major constraint is existing wetlands. Though the designated ROW for U.S. 41 ranges from 150 to 200 feet in width, the maintained ROW is much smaller with widths typically ranging between 45 and 65 feet. The north side of the ROW contains several constraints due to the proximity of the Tamiami Canal, existing utility lines, and a vehicle guardrail. The south side of the ROW contains most of the remaining designated ROW that the existing U.S. 41 roadbed and fill currently do not occupy. However, eight feet of stabilized shoulder is needed for emergency pull-offs, resulting in approximately seven to twelve feet of remaining maintained ROW which the trail could utilize.

The third major constraint is the location of the corridor within the Panther Focus Area. While not considered Critical Habitat under the terms of the ESA, the USFWS has designated the Panther Focus Area as part of the core habitat for Florida panthers within the state. Construction within the Panther Focus Area is allowed, but mitigation is required for impacts to habitats identified in guidelines by the USFWS. This mitigation can add substantial costs to the implementation of any project requiring impacts to both uplands and wetlands within the area. Though these constraints present a number of challenging situations, the ROGG has the ability to remain flexible in routing and design with a number of innovative solutions.

Beginning of ROGG Central at the Collier County-line along U.S. 41

Big Cypress National Preserve Oasis Visitor Center

Unimproved portion of Loop Road, approximately 5.3 miles west of the Collier County-line

2.2.5 ROGG Central Existing Conditions

Overview

Spanning a distance of approximately 32.7 miles between the Collier County/Miami-Dade County line and S.R. 29/ C.R. 29, the ROGG Central segment is the longest of the three trail segments. It traverses one of the corridor's most significant assets: Big Cypress National Preserve. Access to natural resources via Florida Scenic Trail, ORV trailheads, campgrounds, and the Big Cypress National Preserve Visitors Center is available. In addition, ROGG Central includes several roadside parks and the Ochopee Post Office, described at the smallest post office in the United States. At the western terminus of the Study Area, S.R. 29 provides access to Everglades City.

Two principal route opportunities exist within the ROGG Central segment. The primary route alternative consists of the U.S. 41 ROW. A separate route alternative consists of Loop Road. Following are summaries of each alternative alignment option:

Route Alignment Options Observed

U.S. 41 - Primary Alignment

Summary of Existing Condition

The U.S. 41 potential alignment consists of maintained ROW and natural systems in the remainder of the ROW. Maintained ROW averages between 50 feet and 60 feet in width, which is wider than the average width found in the ROGG West segment. The additional width in maintained ROW in ROGG Central provides a sense of openness in this segment. Guardrails typically occur on the north side of the roadway as a barrier between U.S. 41 and the Tamiami Canal. The canal along U.S. 41 in this segment is narrower (approximately 20 feet) than the L-29 canal found in the ROGG East segment.

Roadway shoulders are typically structured turf, which contrasts with the pavement seen in many portions of the ROGG West segment. The shoulders on the north side of the roadway typically are level and average approximately six to eight feet in width as measured from the travel lanes. The widths of the northern shoulders are constrained by the presence of a guardrail adjacent to the canal bank. The southern shoulder averages between eight to ten feet in width and typically slopes for an additional five to ten feet to the edge of the adjacent wetlands. The paved shoulders have recently been expanded to four feet from S.R. 29/ C.R. 29 to the Miami-Dade County line. Vegetation consists primarily of cypress strands and wet prairies common to the Big Cypress National Preserve. Long views and vistas from the roadway are available.

Critical Nodes

4 U.S. 41 and S.R. 29/ C.R. 29: The intersection of U.S. 41 and S.R. 29/ C.R. 29 is the western terminus of the ROGG Central Study Area. S.R. 29 serves as a linkage north to I-75 and C.R. 29 connects south to Everglades City and Chokoloskee.

7 U.S. 41 and Loop Road (Monroe Station): Approximately 4.3 miles west of the Big Cypress National Preserve Oasis Visitor Center is Monroe Station; an historic U.S. 41 station and the western terminus of Loop Road. From Monroe Station, Loop Road continues south, eventually turning to the east and reconnecting with U.S. 41 in the ROGG East segment.

8 U.S. 41 and Collier County /Miami-Dade County Line: Located approximately 26.2 miles west of Krome Avenue, the intersection of U.S. 41 and the Collier County / Miami-Dade County line is the eastern terminus of the ROGG Central segment. At this location, there is an existing gravel lot and pull-off area on the south side of U.S. 41.

Loop Road- Alternative

Summary of Existing Condition

Although the eastern terminus of Loop Road is in the ROGG East segment, 20.7 miles of Loop Road's 23.5 mile alignment is within the ROGG Central segment. The majority of Loop Road is a narrow, gravel road with limited or no shoulders. The exception is the first several miles (in the ROGG East segment) where the road surface is asphalt. The gravel portion of Loop Road is approximately 24 to 30 feet in width, with three foot wide unpaved shoulders on either side. The designated ROW width of Loop Road is 50 feet. Although unpaved, the gravel road has been recently improved by the addition of new drainage culverts, and a re-graded surface within Monroe County. The westernmost portions of Loop Road in Collier County are in poor condition due to significant erosion and weathering. In this section, there are currently many rills and deep ruts, including some more than 12 inches in depth, that hold water after storm events.

The shoulders of the roadway are immediately abutted by dense vegetation, although the majority of the landscape beyond the shoulders of the roadway is composed of cypress swamps and isolated pockets of wet prairie. Views from the road into the surrounding landscape are limited, due largely to the density of the vegetation that includes invasive species.

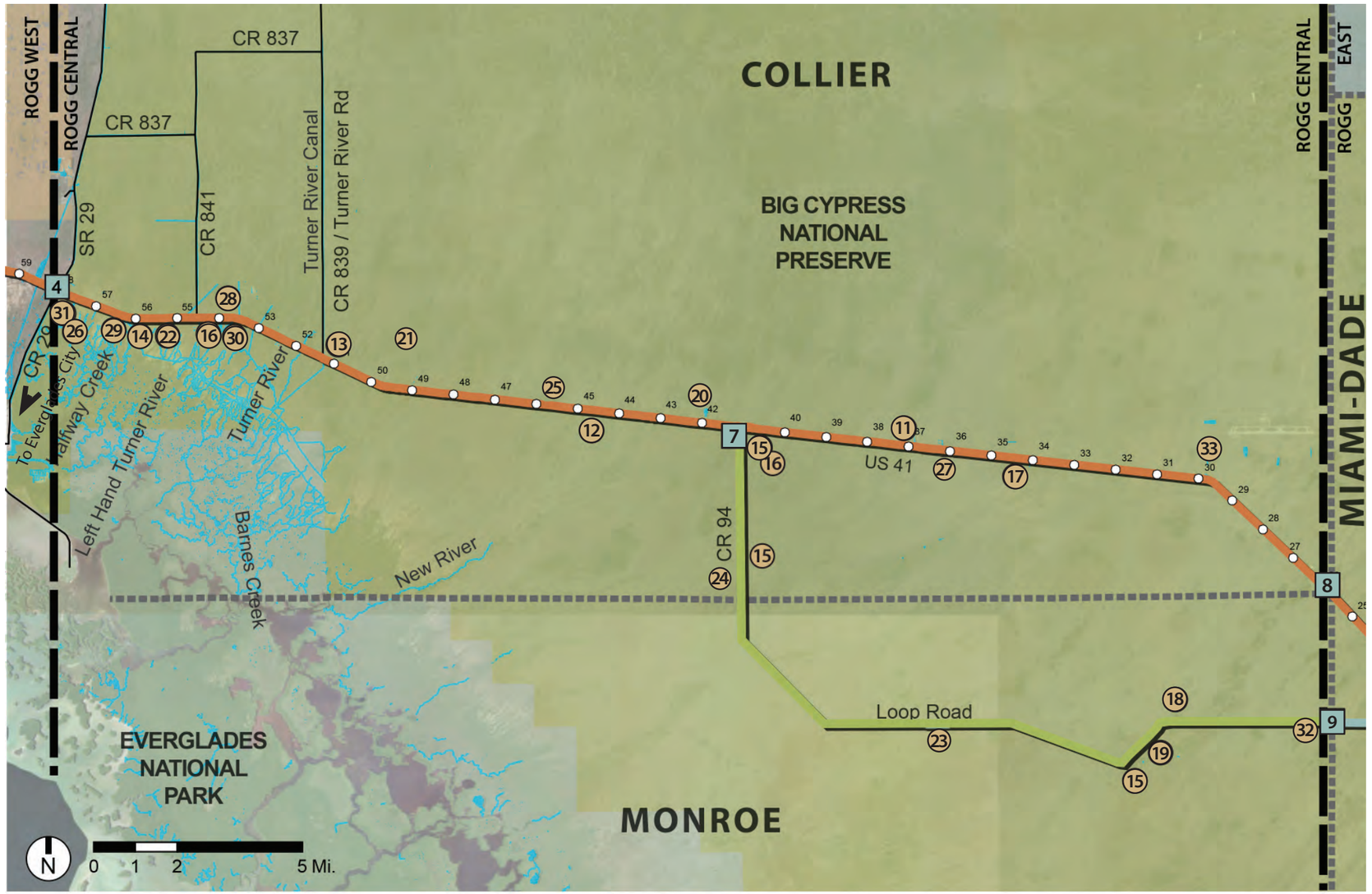
There are few structures or destinations along Loop Road. Several existing primitive campgrounds and four ORV trailheads are planned to be constructed along Loop Road. These trailheads could provide better access and parking along Loop Road, although most will have limited amenities. There are private residences along Loop Road within the ROGG Central segment, although the overwhelming majority of these occur within the first several miles south of Monroe Station, on the eastern portions of Loop Road.

Critical Nodes

7 U.S. 41 and Loop Road (Monroe Station): Approximately 4.3 miles west of the Big Cypress National Preserve Oasis Visitor Center is Monroe Station; an historic U.S. 41 station and the western terminus of Loop Road. From Monroe Station, Loop Road continues south, eventually turning to the east and reconnecting with U.S.41 in the ROGG East segment.

9 Loop Road (ROGG Central) and Loop Road (ROGG East): Approximately 2.8 miles west of the Loop Road, Old Tamiami Trail, and U.S. 41 junction is the boundary line between the ROGG East and ROGG Central segment along the Loop Road alignment. There is no development or significant features at this location.

ROGG Central - Existing Conditions Map



Legend

- Segment Match Line
- County Boundary Line
- Governmental Boundary Line
- Roadway
- Mile Marker (from Krome Ave.)
- U.S. 41 Alignment
- Loop Road Alignment
- Waterway
- Big Cypress National Preserve
- Fakahatchee Strand Preserve State Park
- Everglades National Park
- (#) Point of Interest
- [#] Critical Node

See page 50, 52 and 53 for description of # items.

ROGG Central

Location: S.R. 29/C.R. 29 to Collier County/Miami-Dade County Line

Length: 32.7 miles

Critical Nodes

- [4] U.S. 41 and S.R. 29
- [7] U.S. 41 and Loop Road (Monroe Station)
- [8] U.S. 41 and Collier County Line
- [9] Loop Road (ROGG Central) and Loop Road (ROGG East)

Points of Interest

- (11) Big Cypress National Preserve Oasis Visitors Center
- (12) Kirby S. Storter Roadside Park
- (13) H.P. Williams Roadside Park
- (14) Big Cypress National Preserve Welcome Center and Headquarters
- (15) Monroe Station
- (16) Ochopee Post Office
- (17) Midway Campground
- (18) Pinecrest Campground
- (19) Mitchell's Landing Campground
- (20) Monument Lake Campground
- (21) Burns Lake Campground
- (22) Wildlife Creek Campground
- (23) Pace's Dike ORV Trailhead
- (24) Sig Walker ORV Trailhead
- (25) Skillet Strand North and South ORV Trailheads
- (26) Collier County Sheriff's Station and the Everglades Area Chamber of Commerce Welcome Center
- (27) Clyde Butcher's Home and Studio
- (28) Joanie's Blue Crab Café
- (29) Wooten's Everglades Airboat Tours
- (30) Trail Lakes Campgrounds and Everglades Adventure Tours
- (31) Jungle Erv's Airboat Rides
- (32) Loop Road Environmental Education Center
- (33) Dade-Collier Training and Transitional Airport

2.2.6 ROGG Central Points of Interest

ROGG Central's location within the Big Cypress National Preserve makes it a very desirable location for natural or environmental experiences along the entire corridor. Established in 1974, Big Cypress National Preserve consists of 729,000 acres of freshwater swamp and is home to a diverse variety of native flora and fauna including over 180 species of birds and several endangered species such as the Florida Panther. In addition, Big Cypress serves to protect and facilitate the traditional use of the land by the Seminole and Miccosukee Indian Tribes of Florida and Gladesmen.

As part of Big Cypress National Preserve, there are several smaller roadside parks, seven campgrounds, and three future ORV trailheads providing access to over 424 miles of off-road trails. The ROGG Central segment is also the location of several cultural and historical resources, such as the home and studio of the renowned South Florida nature photographer Clyde Butcher, and the Ochopee Post Office. These facilities could be integrated into ROGG as trailheads or destinations for ROGG users.

Public Points of Interest

Parks and Preserves

11 Big Cypress National Preserve Oasis Visitors Center: The Oasis Visitors Center is located in the eastern third of the Big Cypress National Preserve, approximately 21 miles east of S.R. 29. The center provides a base for seasonal ranger-led programs, the Preserve's ORV permits office, and numerous exhibits related to the natural and cultural history of the Preserve. In addition, the facility offers a paved parking lot (33 car spaces, two ADA accessible spaces, and 12 RV/bus spaces), educational kiosk, canoe launch, boardwalk trail, Everglades Association bookstore, and public restrooms. Immediately north of this site is the Oasis Ranger Station U.S. Government Airport. The Visitor Center provides access to the Florida Scenic Trail as well.

12 Kirby S. Storter Roadside Park: Located approximately 13.5 miles east of S.R. 29 on the south side of U.S. 41, Kirby Storter is a small roadside park that offers a paved parking lot (29 spaces, one ADA accessible), restroom facilities, five picnic pavilions, an informational kiosk, and an elevated accessible boardwalk that is more than 2,100 feet long leading into a cypress strand.

13 H.P. Williams Roadside Park: H.P. Williams Park is a small, triangle-shaped park immediately east of the intersection of Turner River Road and U.S. 41, approximately 6.7 miles east of S.R. 29. This park offers users picnic benches, an accessible boardwalk, an educational kiosk, restroom facilities, and a paved parking lot with approximately 40 spaces (two ADA accessible spaces).

14 Big Cypress National Preserve Welcome Center and Headquarters: Located 2.5 miles east of S.R. 29, the Big Cypress National Preserve Welcome Center serves as a home base for the agencies managing all public lands within the Big Cypress Swamp. This center hosts seasonal, ranger-led programs, and offers both indoor and outdoor interactive exhibits that provide education materials for visitors concerning the history and importance of the Big Cypress Swamp and its ecosystems. The Center provides indoor public restrooms, a swamp-buggy display, bookstore, gift shop, public meeting room, and an elevated boardwalk overlooking a wetland and borrow pond. Approximately 1,500 feet east of the Welcome Center is the Preserve Headquarters complex. This facility houses staff and volunteers associated with the day to day management of the Big Cypress National Preserve.

Historic and Cultural Sites

15 Monroe Station: After the development of the original U.S. 41 in the late 1920s, six service stations were constructed along the remote portions of the trail to provide travelers with a resting points and facilities. Located at the southeast corner of Loop Road and U.S. 41, Monroe Station is one of two remaining original stations. In April of 2000, Monroe Station was added into the National Register of Historic Places with a period of historical significance listed from 1928 to 1934, during which time the site helped foster transportation, exploration, and settlement. Currently, the station building is in poor condition, and is not open to the public. The current, primary function of the site is as an ORV trailhead and parking lot for adjacent ORV trails.

16 Ochopee Post Office: The Ochopee Post Office is located approximately 4.3 miles east of S.R. 29 on the south side of U.S. 41. At a total of 61.3 square feet, it is the smallest, active Post Office in the United States. The structure is surrounded by a gravel and asphalt parking lot. The building used to be a storage facility for irrigation pipes of an adjacent tomato farm and was converted into a post office in 1953 after a fire destroyed Ochopee's previous post office and general store.

Historic Monroe Station and future ORV trailhead

View north from U.S. 41

Joanie's Blue Crab Café restaurant


Example of a narrow shoulder at one of the bridge crossings in ROGG Central

Campgrounds

17 Midway Campground: Located approximately 24 miles east of S.R. 29, Midway Campground surrounds a small lake and offers restrooms, potable water, 26 RV sites (with electric hookups), and ten tent camping sites.

18 Pinecrest Campground: Located 5.8 miles west of U.S. 41 on the north side of Loop Road, Pinecrest offers ten primitive camping sites (no water or restroom facilities).

19 Mitchell's Landing Campground: Mitchell's Landing is a primitive campground located along Loop Road,approximately seven miles west of the eastern terminus of Loop Road at U.S. 41. This site has 15 tent sites, but no water access or restroom facilities. Access is provided via a secondary gravel road.

20 Monument Lake Campground: Located 0.8 mile west of Monroe Station, Monument Lake Campground offers restrooms, potable water, lake access, 26 RV sites, and ten tent camping sites. There are no existing RV hook-ups for water, sewer, or electrical at this site.

21 Burns Lake Campground: Burns Lake is a primitive campground surrounding a small lake. The campground does not provide running water, although there is a vault toilet near the day use area. This camp site is located 8.1 miles west of Monroe Station, and approximately one mile north of U.S. 41 on Burns Lake Road. As of December 2012, there were 14 tent sites available due to construction.

22 Wildlife Creek Campground: The Wildlife Creek Campground is located approximately one mile east of the Big Cypress National Preserve Welcome Center. This site is used primarily by Preserve volunteers and contains a large fill area, lake, and individual campsites, each with a concrete pad, picnic table, and an electrical hook-up.

ORV Trailheads

15 Monroe Station: (see Historical and Cultural Sites)

23 Pace's Dike ORV Trailhead: The future Pace's Dike trailhead will be located on the southern side of Loop Road, approximately ten miles southwest of Monroe Station. Pace's Dike would provide five to ten spaces for both passenger and ORV vehicles, a picnic area, restroom facilities, and an information kiosk.

24 Sig Walker ORV Trailhead: Located approximately three miles south of Monroe Station, on the east side of Loop Road, the Sig Walker trailhead will provide trail access, vault toilets, picnic shelters, and gravel ORV parking areas.

25 Skillet Strand North and South ORV Trailheads: The Skillet Strand ORV Trailhead consists of two components: Skillet Strand North and Skillet Strand South. Located on the north side of U.S. 41 approximately 4.7 miles west of Monroe Station, Skillet Strand North trailhead is an unimproved site that offers only trail access. Future renovations for this site are planned, Skillet Strand South occurs on the south side of U.S. 41 across from Skillet Strand North. This trailhead is planned as a new facility that would provide passenger vehicle and ORV parking, a picnic area, restroom facilities, and information kiosk.

Municipal or Governmental

26 Collier County Sheriff's Station and the Everglades Area Chamber of Commerce Welcome Center: The Collier County Sherriff's station and the Everglades Area Chamber of Commerce Welcome Center are located at the southeast corner of the intersection of U.S. 41 and S.R. 29/ C.R. 29. The Welcome Center has restroom facilities, multiple parking spaces, and a shop for sundries.

Private/Commercial Points of Interest

27 Clyde Butcher's Home and Studio: Clyde Butcher is an internationally renowned black-and-white photographer whose primary subject matter is natural landscapes. Butcher was honored by the state of Florida with the highest award given to an artist: the Artist Hall of Fame Award. Many of Butcher's most famous works are representative of the Big Cypress and Everglades landscapes. His home and studio are located approximately five miles east of Monroe Station, on U.S. 41. This site offers a gift shop, art gallery, nature trails, and a rentable cottage at the rear of the property.

28 Joanie's Blue Crab Café: Located 4.4 miles east of S.R. 29/ C.R. 29 on the north side of U.S. 41, Joanie's Blue Crab Café is a locally-owned restaurant that specializes in local seafood and traditional Everglades fare. In addition to the indoor restaurant, this site also provides outdoor picnic seating areas and a paved parking lot.

29 Wooten's Everglades Airboat Tours: Located two miles east of S.R. 29/ C.R. 29 on the south side of U.S. 41, Wooten's Everglades Airboat Tours is a private company that provides guided airboat tours and swamp buggy rides. In addition, the site offers live alligator shows, an animal sanctuary, a gift shop, and a large gravel parking lot.

30 Trail Lakes Campgrounds and Everglades Adventure Tours: The Trail Lakes Campground is a 30-acre, for-profit camping facility located approximately four miles east of S.R. 29/ C.R. 29 on the south side of U.S. 41. Campground amenities include 150 campsites, restroom and shower facilities, laundry, pet areas, a scenic lake view, picnic shelters, trash stations, and electrical hook-ups for RVs. In addition to providing campsites, Trail Lakes Campground also rents/sells camping supplies, provides guided adventure tours, and is home to a wildlife exhibit and the "Skunk Ape Research Center."

31 Jungle Erv's Airboat Rides: Jungle Erv's is a private company providing guided airboat tours as well as a wildlife exhibit. The ticket office for Jungle Erv's is located adjacent to the Sheriff's station on the south side of U.S. 41 , although the main facility for the tours is approximately 0.5 mile west of S.R. 29/C.R. 29 in the ROGG West segment.

32 Loop Road Environmental Education Center: Located 12 miles west of Shark Valley along Old Loop Road, this education center offers overnight group camping programs available to elementary and middle school-aged children and a variety of amenities, including a chickee hut, picnic areas, five platform tents, grills, restrooms, a pond, nature trails, and a butterfly garden.

33 Dade-Colllier Training and Transition Airport: Located 28 miles east of S.R. 29/ C.R. 29, the Dade-Collier Training and Transition Airport is a secure facility managed by Miami-Dade Aviation Department. An approximately three mile entrance road contains grass parking opportunities near U.S. 41.

Typical Existing Conditions

Roadway (ROW)

Roadway ROW in the ROGG Central segment averages an overall maintained ROW of 58 feet wide with a range from 40 to 71 feet. This portion of the corridor is typically uniform in scale and construction. The Tamiami Canal typically lies adjacent to, and north of U.S. 41. Shoulders are generally narrow on the north side of the road as there is a guardrail between the travel lane and canal. The south shoulder is typically wider with a two to four-foot wide paved shoulder and grassed bank to the adjacent wetland edges. Portions of the ROW exhibit guardrails on both sides of the road. Loop Road is typically 24 to 30 feet wide with three foot wide unpaved shoulders on either side of the road.

Typical paved U.S. 41 ROW with guardrails on the north and grassed shoulder to south

Typical ROW conditions along Loop Road

Bridges

Bridges in the ROGG Central segment are typically nearly identical in scale and construction. The typical bridge measures approximately 32 feet wide overall. Bridges within the corridor pose difficulty for the implementation of the ROGG as the narrow width provides little additional space between the travel lanes and the guardrail barriers of the bridge edges.

Conditions found on typical bridge with narror shoulders and barrier

Typical canal bridge

Landscape (habitat)

Typical habitat of the western portion of the ROGG Study Area ranges from cypress strand, marsh, wet prarie and pinelands.

Typical cypress habitat

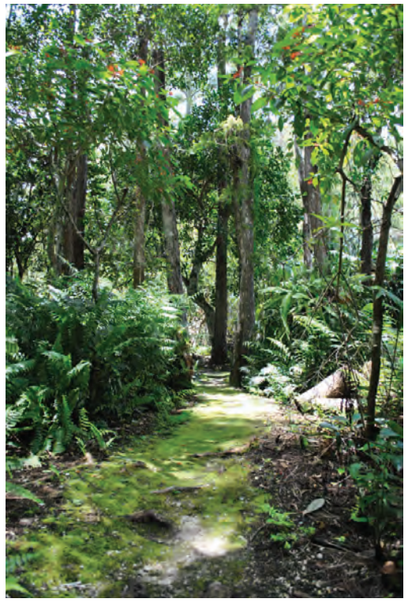
Typical wet prairie habitat

Focus Areas

1. **Right-of-Way**
   Narrow:
   - None Observed

   Wide:
   - Joanie's Blue Crab Café
2. **Existing Trails and Trailheads**
   - Oasis Visitor Center boardwalk
   - Fire Prairie Trail at Turner River Road
   - The Florida Trail terminus at the Oasis Visitor Center
   - Kirby Storter Boardwalk
   - Loop Road at Monroe Station
   - Big Cypress Welcome Center
   - Future ORV trailheads (Skillet Strand North and South, Sig Walker, Pace's Dike)
3. **Cultural Resources Features**
   - Ochopee Post Office Historical Site
   - Monroe Station
   - Corn Dance ceremonial sites
   - Battle of Turner River battlefield
   - 1936 Meeting Monument
4. **Environmentally Sensitive Resources Features**
   - Critical Habitat for manatee in waterways from S.R. 29, east to Birdon Road
   - Florida Panther Focus Area
   - FDOT RADS System
   - Turner River
5. **Primary Hubs**
   - Big Cypress Welcome Center
   - Oasis Visitor Center
   - H.P. Williams Roadside Park
   - Everglades Area Chamber of Commerce Welcome Center
6. **Bridges**
   - 28 total

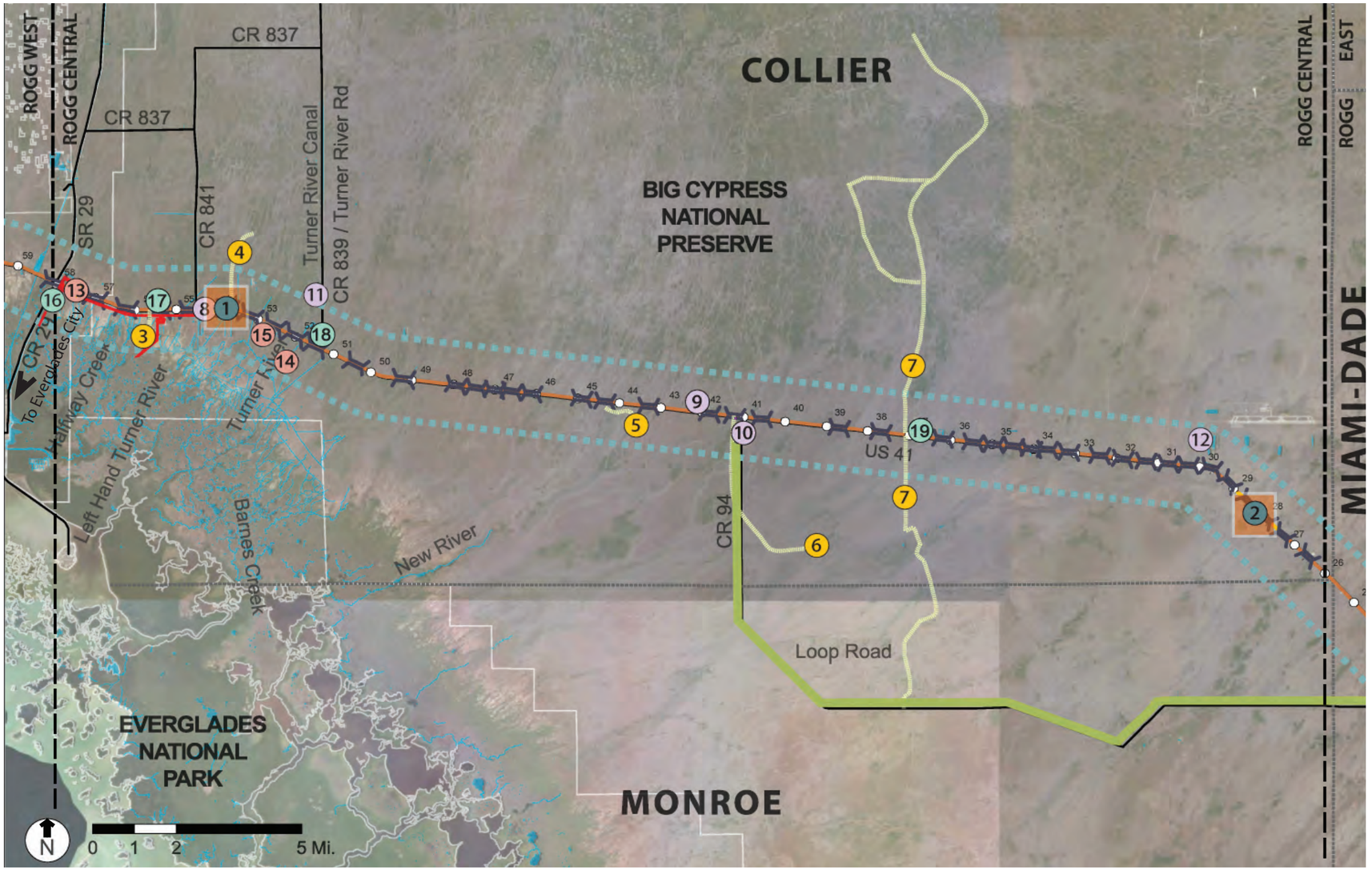
Boardwalk trail at Kirby S. Storter Park at Big Cypress National Preserve



Walking trail at Clyde Butcher's Big Cypress Gallery

Boardwalk at Kirby S. Storter Park in Big Cypress National Preserve

ROGG Central - Focus Areas Map



Legend

- Segment Match Line
- County Boundary Line
- Governmental Boundary Line
- Roadway
- Mile Marker (from Krome Ave.)
- U.S. 41 Alignment
- Loop Road Alignment
- 1 Mile Study Area
- Existing Trail
- Waterway
- Bridge
- ROW Focus Area
- Critical Habitat
- # Right-of-Way (ROW)
- # Existing Trailheads and Trails
- # Cultural Resources Feature
- # Environmentally Sensitive Resources Feature
- # Primary Hub

See page 57 for identification of # items.

Right-of-Way (ROW)

Wide ROW includes any maintained ROW greater than 70 feet. Wide ROW allows for ample space for a proposed trail and the potential of parking. Two portions of U.S. 41 have a wide ROW:

1. Joanie's Blue Crab Restaurant
2. A private driveway at mile marker 28.2

Cultural Resource Features

Three structures have been designated as historic places by the U.S. National Register of Historic Places.

8. The Ochopee Post Office Historical Site
9. 1936 Seminole Conference at Monument Lake Campground
10. Monroe Station

Two culturally significant locations exist in the corridor:

11. Battle of Turner River Battlefield
12. Within 1/2 mile of ceremonial site

Environmentally Sensitive Resource Features

Critical Habitat for the West Indian manatee is found in the very western portion of the ROGG Central segment . The entire segment is within the Florida Panther Focus Area, which is part of the core habitat for Florida panthers in Florida. The FDOT has installed a RADS system in portions of this segment, including an area near Turner River.

13. West Indian Manatee Critical Habitat
14. Turner River
15. RADS location

Existing Trailheads and Trails

Existing trails and trailheads that occur on or along the Study Area may be an opportunity to connect to a proposed trail. Five trails currently exist along the ROGG Central segment:

3. Big Cypress Welcome Center
4. Burns Lake Trail
5. The Kirby Storter Boardwalk
6. The Gatorhook Trail on Loop Road
7. The Florida National Scenic Trail

The Florida Trail, which is accessible at the Big Cypress Oasis Visitor Center, spans over 1400 miles throughout the state of Florida. Future amenities at Skillet Strand (North and South), Pace's Dike, and Sig Walker ORV trailheads

Primary Hubs

Three existing primary hubs are located within the ROGG Central segment that provide restrooms, parking and access to trail:

16. Everglades Area Chamber of Commerce Welcome Center
17. Big Cypress Welcome Center
18. H.P. Williams Park
19. Big Cypress National Preserve Oasis Visitor Center

Bridges

Twenty-eight bridges occur along U.S. 41 within the ROGG Central segment and are shown on the adjacent map.

Typical Bridge

ROGG Central Opportunities and Constraints Summary

Spanning the longest length of the three segments, ROGG Central offers a number of opportunities and constraints which makes this area unique. This portion of the Study Area is dominated by the presence of the Big Cypress National Preserve, which offers eight existing and proposed destinations that can serve as trailheads. Two primary destinations are the Big Cypress Swamp Welcome Center and the Oasis Visitor Center, both managed by the NPS. These destinations contain existing parking, restrooms, boardwalks and educational opportunities for trail users and are directly linked to U.S. 41.

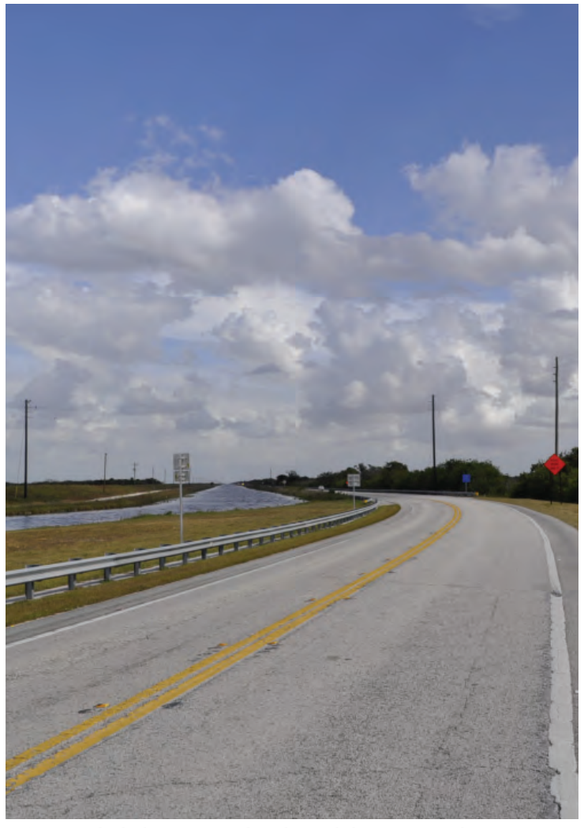
Other existing destinations include campgrounds and historic structures, including Monroe Station which is currently being expanded with new parking and restroom facilities. Trail connectivity to the Fire Prairie Trail at Turner River Road and the Florida National Scenic Trail at the Oasis Visitor Center provide opportunities for visitors to experience the landscape away from U.S. 41, including backcountry camping allowed by the NPS with appropriate permits. Access to canoeing and kayaking is also available via launches at the Big Cypress Swamp Welcome Center, Wildlife Creek Campground, and the Turner River Canoe Launch. Loop Road also offers opportunities for trail users to explore deep within the Big Cypress National Preserve. However, limitations such as a narrow ROW and gravel surface may provide challenges to the feasibility of ROGG within this alternative.

Constraints for ROGG Central are similar to those of ROGG West. Although there are fewer existing bridges within this segment, the design of the bridges are similar to bridges in ROGG West and will not support cantilevering. Although a slightly wider maintained ROW in this segment reduces some of the challenges around impacts to the nearby wetlands for an alignment along U.S. 41. However, the occurrence of a number of federally or state listed species may impact overall opportunities. One of the most significant listed species issues is the location of the corridor within the Panther Focus Area. While not considered Critical Habitat under the terms of the ESA, the USFWS has designated the Panther Focus Area as part of the core habitat for Florida panthers within the state. Construction within the Panther Focus Area is allowed, but mitigation is required for impacts to habitats identified in guidelines by the USFWS. This mitigation can add substantial costs to the implementation of any project requiring impacts to both uplands and wetlands within the area. Additional constraints include the presence of Critical Habitat for manatees shown on the ROGG Central Focus Areas Map.

The presence of a Radar Animal Detection System (RADS) in the Turner River area presents a constraint that the development of ROGG itself may actually benefit. RADS are currently being tested in this area to increase awareness of wildlife activity along U.S. 41. However, due to the proximity of detection devices to the highway's shoulders, many of the system components suffer from errors caused by vehicles parking along the roadway or from vandalism. By locating the devices on the outside of the trail, the devices could be located further from vehicle traffic and in a manner which limits opportunities for errors.

This segment also includes cultural resource features that would need to be accommodated by future ROGG facilities. These include Native American ceremonial sites and historic places designated on the U.S. National Register of Historic Places. A CRAS will most likely be needed to identify properties and assess effects. Prior to an archaeological survey an Archaeological Research Permit will need to be obtained from the Department of Interior for any portion of the project with in federal lands. A State of Florida Archaeological Permit will most likely be required prior to surveys within state lands.

Segment of Old Tamiami Trail South of U.S. 41 in Everglades National Park



U.S. 41 corridor looking east near the ValueJet Flight 592 Memorial

2.2.7 ROGG East Existing Conditions

Overview

The ROGG East Study Area is approximately 26.2 miles long, stretching from Krome Avenue (SW 177th Ave.) in western Miami-Dade County to the Collier County /Miami-Dade County line. This segment is severely constrained for trail use due to the limited shoulder width and continuous guardrails on both sides of the road as well as by the improvements associated with CERP and related projects. Significant destinations include the Miccosukee Indian Village, the ValuJet Flight 592 Memorial, Francis S. Taylor WMA, and ENP. In addition, the easternmost access to Loop Road, a potential trail connection, can be found just west of the Miccosukee Indian Village.

Route Alignment Options Observed

Within the ROGG East segment of the Study Area, five possible alignment routes have been identified that will be evaluated as part of this feasibility study, including:

1. U.S. 41
2. Old Tamiami Trail
3. L-28 Levee
4. Loop Road
5. L-29 Levee

The following are descriptions of existing conditions of each.

U.S. 41 - Primary Alternative

Summary of Existing Condition

Although U.S. 41 spans the entire length of the ROGG Study Area, the segment stretching from Krome Avenue west to the Collier County-line is one of the most physically constrained portions of the roadway. This is largely due to the limited amount of maintained ROW, narrow paved shoulders, and the presence of vehicular guardrails on both sides of the roadway in certain portions. In addition, the adjacency of the L-29 canal to the road constrains trail options on the north side of the road. The most challenging existing section of the segment occurs in the three miles extending west from Krome Avenue, where there are approximately two feet of paved shoulder on either side of the travel lanes that are immediately abutted by a concrete barrier. This particular condition is the result of ongoing construction to elevate the U.S. 41 roadbed. While it is expected to remain for some time, the final ROW width and condition of this segment of U.S. 41 will be modified to be consistent with the Tamiami Trail Modifications: Next Steps/ Final Environmental Impact Statement.

A one mile long bridge recently opened on the eastern end of the ROGG East segment to replace the existing U.S. 41 roadbed and allow for better sheetflow under the roadway consistent with recommendations from CERP and related studies. Several additional bridge improvements to U.S. 41 totaling 5.5 miles in length are planned as part of the Tamiami Trail Modifications: Next Steps Environmental Impact Statement. These range from a 0.4 mile long bridge near the existing Frog City site to a 2.6 mile long bridge extending over the Blue Shanty Canal and past several existing airboat ride operations. A trail on these bridges are not currently in the plans. It is anticipated that adding bicycle/pedestrian facilities to the existing bridge design would increase construction costs.

The northern side of U.S. 41 is paralleled by canals for its entire length in the ROGG East segment, with the largest canals occurring in the first 24 miles west of Krome Avenue. The L-29 Canal (C-4) has associated water control structures as well as gravel maintenance roads running along the northern levee. The last two miles of the ROGG East segment are bordered by the L-29 Canal, although the canal is narrower in width (15 to 20 feet wide) than the 75 to 100 foot width of the L-29 canal on eastern portions of this segment.

The majority of the viewshed along U.S. 41 in the ROGG East segment is bordered by dense vegetation for most of the length of the road that limits long views over the marshes and prairies of the Everglades. This is especially true in the western portion of the ROGG East segment where a dense canopy of cypress and various shrub species are present on both sides of the roadway. Along the L-29 Canal in the eastern portion of the segment, the only significant vegetation is located on the southern side of the road due to the presence of the canal to the north. Views north from U.S. 41 are generally impeded by the L-29 levee located along the L-29 Canal (C-4).

Critical Nodes

8 Collier County/Miami-Dade County line: This occurs approximately 26.2 miles west of Krome Avenue (See ROGG Central).

10 U.S. 41 and Loop Road: This occurs at the eastern terminus of Loop Road, located approximately two miles east of the Collier County /Miami-Dade County line.

11 U.S. 41 and Krome Avenue (SW 177th Ave.): Krome Avenue runs north to the U.S. 27/ Okeechobee Road area and south through Kendall to Homestead. It is considered the eastern terminus of the ROGG Study Area.

Old Tamiami Trail - Alternative

Summary of Existing Condition

Old Tamiami Trail is the historical, but now abandoned, alignment of U.S. 41. The primary functioning infrastructure along the Old Tamiami Trail currently consists of serves as an overhead utility corridor with utility lines located on the south edge of the roadbed. This alignment is approximately 9.5 miles in length and runs parallel to, and approximately 100 to 150 feet south of, U.S. 41. The roadbed surface is comprised of deteriorated asphalt. The banks of the roadbed have become overgrown with vegetation, including areas that are effectively blocked by overhanging vegetation. This vegetation limits visibility both into and out of the alignment. The roadbed is bordered for its entire length on the north by a canal originally used to provide fill for the roadbed.

There are four primary access points linking U.S. 41 to the Old Tamiami Trail alignment, three of which are gravel access roads. The fourth connection location is at the Miccosukee Indian Village where the last three miles of Old Tamiami Trail is still an active roadway serving the village residents. In the Miccosukee Indian Village portion of the Old Tamiami Trail, the roadbed is bordered by residential, commercial, and natural land uses, the majority of which occur on the south side of the roadway.

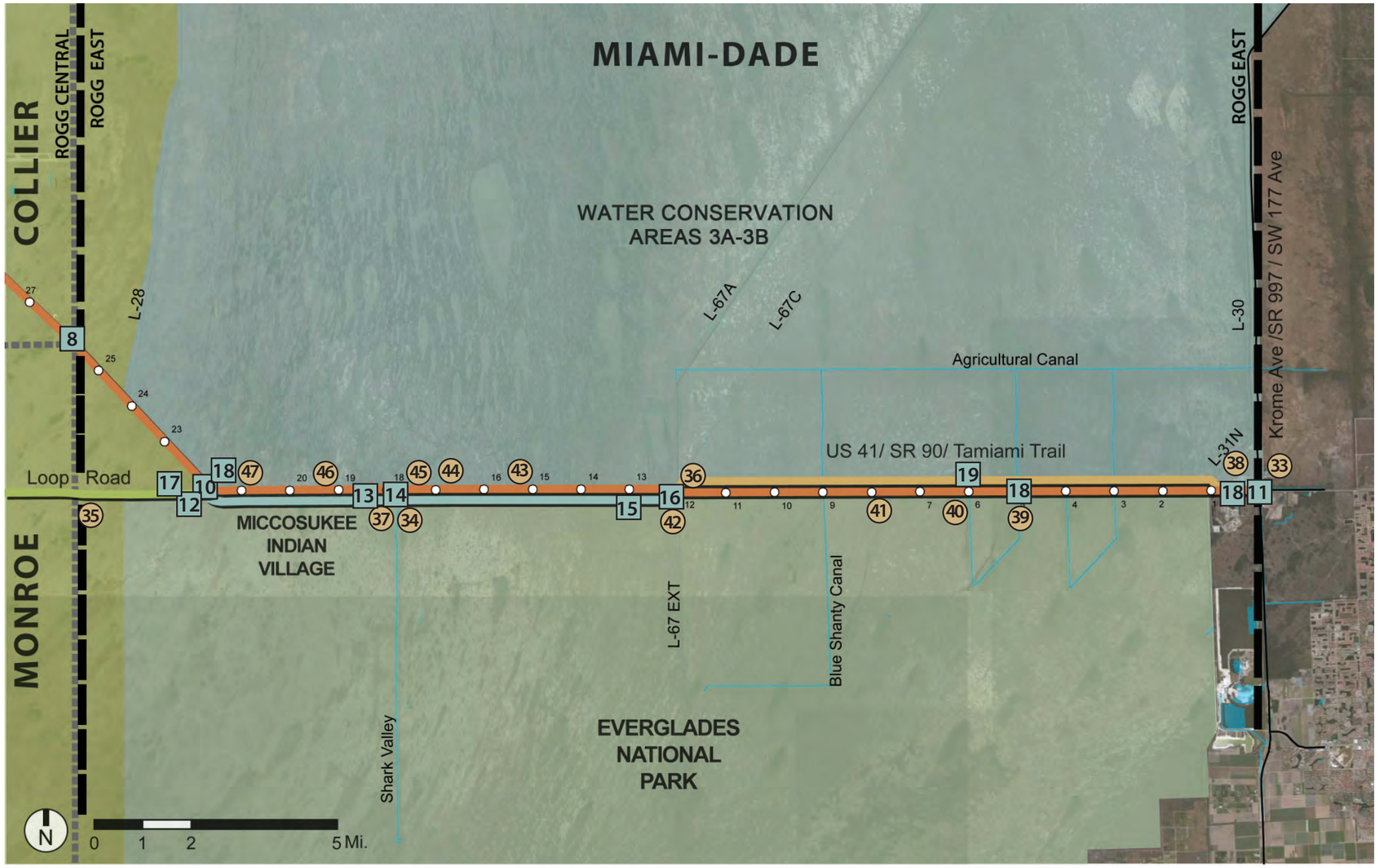
There are several significant breaks in the roadbed where segments up to 600 feet in length have been removed to allow for water from the L-29 Canal to flow south. This effectively renders these portions of the Old Tamiami Trail alignment impassible without a bridge or culvert.

Critical Nodes

12 Old Tamiami Trail and Loop Road: The western terminus of Old Tamiami Trail occurs at the intersection with Loop Road, which is approximately four miles east of the Collier County/Miami-Dade County line.

13 Miccosukee Indian Village: Old Tamiami Trail serves as a main street for the Miccosukee Indian Village, linking many of its residences to the village center. There are three paved access roads linking U.S. 41 to Old Tamiami Trail within the village, all of which are also referred to as Old Tamiami Trail.

ROGG East - Existing Conditions Map



Legend

- Segment Match Line
- County Boundary Line
- Governmental Boundary Line
- Roadway
- Mile Marker (from Krome Ave.)
- U.S. 41 Alignment
- Loop Road Alignment
- Old Tamiami Trail Alignment
- L-29 Levee Alignmentt
- Waterway
- Water Conservation Area (WCA)
- Big Cypresss National Preserve
- Everglades National Park
- (#) Point of Interest
- [#] Critical Node

See page 58, 60 and 61 for description of # items.

ROGG East

Location: Collier County/Miami-Dade County Line to Krome Avenue (SW 177th Ave)

Length: 26.2 miles

Critical Nodes

- [8] Collier County/Miami-Dade County Line
- [10] U.S. 41 and Loop Road
- [11] U.S. 41 and Krome Avenue (SW 177th Ave.)
- [12] Old Tamiami Trail and Loop Road
- [13] Miccosukee Indian Village
- [14] Everglades National Park / Shark Valley Entrance
- [15] U.S. 41 and gravel road
- [16] U.S. 41 and Old Tamiami Trail
- [17] U.S. 41 and Loop Road
- [18] Canal Bank Access Points
- [19] Tigertail Residential Community

Points of Interest

- (33) Miami-Dade County Trail Glades Sports Shooting Range
- (34) Everglades National Park / Shark Valley Entrance
- (35) Boundary Line ORV Trailhead
- (36) ValuJet Flight 592 Memorial
- (37) Miccosukee Indian Village
- (38) Miccosukee Resort and Gaming Center
- (39) The Originial Coopertown Air Boats
- (40) Gator Park
- (41) Everglades Safari Park
- (42) Buffalo Tiger Airboat Rides
- (43) Osceola Gift Shop
- (44) Tigertail Airboat Rides
- (45) Miccosukee Restaurant
- (46) Chief Osceola Airboat Rides
- (47) Tippy's Everglades Outpost

Loop Road as seen near U.S. 41

ValuJet Flight 592 Memorial north of U.S. 41

Entrance to the Miccosukee Indian Village from U.S. 41

14 Everglades National Park / Shark Valley Visitor Use Area: The entrance road to the Shark Valley Visitor Use Area from U.S. 41 intersects with the Old Tamiami Trail alignment.

15 U.S. 41 and gravel road: This single-purpose gravel roadway links U.S. 41 and the Old Tamiami Trail alignment, located approximately two miles from the eastern terminus of Old Tamiami Trail.

16 U.S. 41 and Old Tamiami Trail: The first access point to the Old Tamiami Trail alignment occurs at a gravel intersection just south of the ValuJet Flight 592 Memorial, approximately 12 miles west of Krome Avenue.

Loop Road - Alternative

Summary of Existing Condition

Loop Road (C.R. 94) connects to Old Tamiami Trail and U.S. 41 approximately four miles east of the Collier County/Miami-Dade County line. Loop Road initially traverses due west from U.S. 41 and then turns north to reconnect with U.S. 41, thus forming a "loop."

The first 2.8 miles of Loop Road's approximately 23.5-mile length are located within the boundary of the ROGG East segment and Miami-Dade County. This portion of Loop Road is unique in that it is one of the few places along its length where there are concentrated residential areas. Similar to western portions of Old Tamiami Trail, this segment of Loop Road is a paved roadway, which is bordered by a vegetated canal to the north and either residential or natural areas to the south. Beyond the residential areas, the roadway is bordered on both sides by vegetation, which becomes significantly denser towards the west. Additionally, there are overhead power lines running on the southern edge of the roadbed within the ROGG East segment.

Critical Nodes

17 U.S. 41 and Loop Road: A paved access road located approximately four miles east of the Collier County/Miami-Dade County line creates the eastern terminus of Loop Road. This location also serves as the western terminus of the Old Tamiami Trail alignment.

L-29 Levee - Alternative

Summary of Existing Condition

The L-29 Canal, also known as the C4 Canal, and levee run parallel to the northern side of U.S. 41 within the eastern portion of the ROGG East segment. The canal begins one mile west of Krome Avenue and extends west 11 miles where it terminates at the intersection of Loop Road and U.S. 41, approximately 12 miles west from Krome Ave. The canal is separated from the U.S. 41 roadbed by a vegetated canal bank and a vehicular guardrail. The water surface of the canal is approximately 130 feet in width for the majority of its length within the ROGG East segment, although it does narrow to approximately 60 to 80 feet in width west of the L-67 Canal extension.

The northern levee of the L-29 Canal has two parallel access roads with one at the top of the levee bank and one at the bottom on the southern side of the levee. These access roads are surfaced with unimproved gravel and vary in width from nine to 15 feet. Although the canal access roads are primarily for waterway and utility maintenance, members of the Miccosukee Indian Tribe of Florida are allowed conditional vehicular use. There are no access control gates or signage along either of the access roads. There are two paved bridges that are approximately 20 feet in width occurring along the levee roads at existing water control structures, both of which service the upper access road only.

There are only two locations along U.S. 41 where vehicular bridges provide access from U.S. 41 to the levee roads. The first occurs near the eastern terminus of the ROGG East segment, while the second occurs near the ValuJet Flight 592 Memorial. These bridges are located at water control structures to provide for ingress and egress of authorized service vehicles and personnel.

Proposed plans for the CEPP would likely drastically affect the suitability for accommodating the ROGG on the access roads of all or portions of this levee. The CEPP preferred Blue Shanty alternative involves removing portions of the L-29 levee adjacent to the bridges currently being constructed and planned for U.S. 41. Potential options include removal of the entire levee and using the L-29 Canal to spread water flow. The preferred alternative would remove a significant segment of the L-29 levee, which would remove a significant alternative alignment and potentially limit the long-term feasibility for trail use along the levee.

Critical Nodes

18 Canal Bank Access Points: There are several locations along U.S. 41 where there are vehicular bridges that provide access to the canal levee access roads. At this time, these locations are primarily for the ingress and egress of authorized service vehicles and personnel. Examples of these access points can be found at the following locations:

- L-29 Access bridge (vehicular).
- Bridge at Cooper Town Airboats (pedestrian only).
- L-28 Access bridge (vehicular).

19 Tigertail Residential Community: Approximately six miles west of Krome Avenue, there is a small residential community located on the northern side of the L-29 canal, known as Tigertail. The community is approximately 2.1 acres in size and consists of approximately 21 buildings or structures. There is an existing pedestrian bridge connecting a parking area along U.S. 41 to the community. However, direct vehicular access requires the use of the levee roadways.

Tigertail residential community with the L-29 Canal in the foreground

2.2.8 ROGG East Points of Interest

ROGG East offers a variety of stops and destinations that appeal to a wide range of user groups. Publicly accessible points of interest are oriented heavily towards parks and natural areas as well as cultural or historic sites. With the exception of the Miccosukee Restaurant, private or commercial points of interest are largely represented by companies that provide airboat tours and "Everglades experiences," such as fishing and wildlife observation.

Public Points of Interest

Parks and Preserves

33 Miami-Dade County Trail Glades Sports Shooting Range: Located 0.3 mile east of Krome Avenue, the Miami-Dade County Trail Glades Sports Shooting Range is actually outside of the project study area. However, it could serve as an auxiliary trailhead or destination due to its location near the eastern terminus of the study area. The park is home to one of Miami-Dade County's public shooting ranges, and is currently managed by MDPROS. Although the shooting range occupies the majority of developed area of the site, there are some underutilized auxiliary open spaces and paved parking areas that may be available for use as trailhead facilities.

34 Everglades National Park / Shark Valley Visitor Use Area: Located approximately 18 miles west of Krome Avenue, Shark Valley provides exemplary opportunities for wildlife observation. Shark Valley offers users over seven miles of trails (both paved and boardwalk), guided tram tours, a nature center and bicycle rentals. A new visitor center and restroom is complex is under construction and existing parking capacity is limited, which can be overwhelmed quickly during peak seasons. Alternative parking areas that could service ROGG and Shark Valley may be able to be connected via ROGG.

35 Boundary Line ORV Trailhead: The Boundary Line trailhead is located along the south side of Loop Road, approximately 2.3 miles west of U.S. 41 near the Monroe and Miami-Dade County lines. The site is unimproved and offers only trail access. Planned improvements include parking, restroom facilities, and informational kiosks that could be utilized as a trailhead.

Historic and Cultural Sites

36 ValuJet Flight 592 Memorial: The ValuJet Flight 592 memorial was constructed in 1999 and dedicated to the remembrance of the 110 people who perished in the crash of ValuJet Flight 592 in 1996. Flight 592 crashed into the Everglades shortly after takeoff north of the current memorial site in the Everglades. The memorial consists of 110 concrete pillars arranged in an arrow that points in the direction of the crash site. The memorial was designed by students at the University of Miami, in conjunction with the American Institute of Architects. The site provides three gravel parking spaces and can be accessed via a gravel access road and bridge at the existing USACE S-333 Water Control Structure.

37 Miccosukee Indian Village: Located approximately 18.5 miles west of Krome Avenue, the Miccosukee Indian Village is home to many members of the Miccosukee Indian Tribe. The Miccosukee's core social services, such as police, schools, and governmental buildings, are located in the Village. Additionally, visitors to the Village can find numerous cultural resources in the form of historic artifacts, craft and cooking demonstrations, special events, and a history museum. There is an extensive parking area at the eastern entrance that provides parking for visitors to the village. This parking area is within trust lands for the Miccosukee Indians and would require their approval for any use associated with ROGG.

Private/Commercial Points of Interest

38 Miccosukee Resort and Gaming Center: In addition to the aforementioned Miccosukee Indian Village, the Miccosukee Indian Tribe of Florida also owns and operates a resort and gaming center located at northwest corner of the intersection of Krome Avenue and U.S. 41. The resort offers hotel accommodations, various forms of electronic gaming, a salon, teen area, an events center, and several restrooms. In addition to the interior amenities, the site provides a substantial amount of paved parking. Similar to the Miccosukee Indian Village, the site occurs within trust lands for the Miccosukee Indians. Any use of the parking facilities would require the approval of the Miccosukee Indians.

39 The Original Coopertown Air Boats: Located on the south side of U.S. 41, approximately five miles west of Krome Avenue, The Original Coopertown Air Boats is a private company that provides air boat rentals and tours into ENP. The site offers 30 paved parking spaces and a restaurant. A pedestrian bridge crossing the L-29 canal is located north of the site.

40 Gator Park: Located 1.3 miles west of Coopertown Air Boats (6.3 miles west of Krome Avenue) on the south side of U.S. 41, Gator Park offers airboat tours, wildlife viewing, a restaurant, RV camping, 39 parking spaces, and cultural demonstrations relevant to life in the Everglades.

41 Everglades Safari Park: Located 2.8 miles west of Gator Park (9.1 miles west of Krome Avenue), Everglades Safari Park offers services and amenities including airboat tours in ENP, wildlife exhibits, dining area, cultural demonstrations and 50 parking spaces.

42 Buffalo Tiger Airboat Rides: Located approximately 3.4 miles west of Everglades Safari Park (12.5 miles west of Krome Avenue) near the ValuJet Flight 592 Memorial, Buffalo Tiger Airboat Rides is a private company that specializes in seasonal airboat rides and tours. The site is located north of U.S. 41 and consists of a small building, parking lot, and a dock with chickee huts.

43 Osceola Gift Shop: The Osceola Gift Shop is a small retail store located along the north side of U.S. 41, approximately three miles east of the Miccosukee Indian Village (15.4 miles west of Krome Avenue). In addition to the gift shop's main building, there are several chickee huts, and 22 parking spaces (two ADA accessible).

44 Tigertail Airboat Rides: Located 1.4 miles west of the Osceola Gift Shop (16.8 miles west of Krome Avenue), Tigertail Airboat Rides is a private company offering airboat tours and rides. It offers several chickee huts, water access, eight paved parking spaces (one ADA accessible), and portable toilets.

45 Miccosukee Restaurant: Located approximately 1.7 miles east of the Miccosukee Indian Village along the north side of U.S. 41, the Miccosukee Restaurant specializes in traditional Native American cuisine as well as contemporary fare. Although the restaurant is the primary function of the site, there is also a Miccosukee Indians Information Center, an airboat dock, several chickee huts, and 35 paved parking spaces (two ADA accessible).

46 Chief Osceola Airboat Rides: Chief Osceola Airboat Rides is a small private company located in the central portion of the Miccosukee Indian Village (19 miles west of Krome Avenue), which provides airboat rides and tours. Amenities on site include a boat ramp, several chickee huts, a small outbuilding, and 20 paved parking spaces (two ADA accessible).

47 Tippy's Everglades Outpost: Described as a "one-stop-shop for everything outdoors," Tippy's Everglades Outpost is a private retail business that also provides airboat tours, a multi-level dock and gazebo, wildlife and history exhibits, and a restaurant.

View of WCA3 in ROGG East segment

Entrance to the bike/tram trail at Shark Valley in Everglades National Park

Typical Existing Conditions

Roadway (ROW)

Typical ROW along the ROGG East segment averages an overall maintained ROW of 76 feet wide, but ranges from 38 to 168 feet. This roadway surface of U.S. 41 varies in its design in this portion of the ROGG Study Area. However, the L-29 canal is located to the immediate north of the road and is present throughout the eastern portion of the Study Area. A recent one-mile long bridge has been completed as part of the hydrological restoration projects ongoing in the region. The goal of this project is to allow water flow and restore aquatic habitat connectivity through an area currently separated by levees. Images of the typical roadways cross-section are shown below.

Typical roadway section with guardrails on both sides of the road

Typical roadway section lacking guardrails

Bridges

The typical bridge is approximately 32 feet wide with two 12 foot travel lanes. The new one-mile bridge is wider than the other existing bridges with ten foot wide curb lanes on the outside travel lanes. Bridges within this area of the Study Area pose difficulty for the implementation of the trail due to their narrow width.

U.S. 41 water control structure crossing with no shoulders

Approach to water control structure crossing

Landscape (habitat)

Typical habitat of the eastern portion of the ROGG Study Area ranges from wet prairie, marsh and shrub wetland, to maleleuca-dominated marsh.

View from top of L-29 levee looking out to the WCA

Old Tamiami Trail existing roadbed and vegetation

Focus Areas

1. **Right-of-Way**
   Narrow:
   - L-28 Access Canal
   - Cooperstown Air Boats
   - Everglades Safari Park
   - One-Mile Bridge

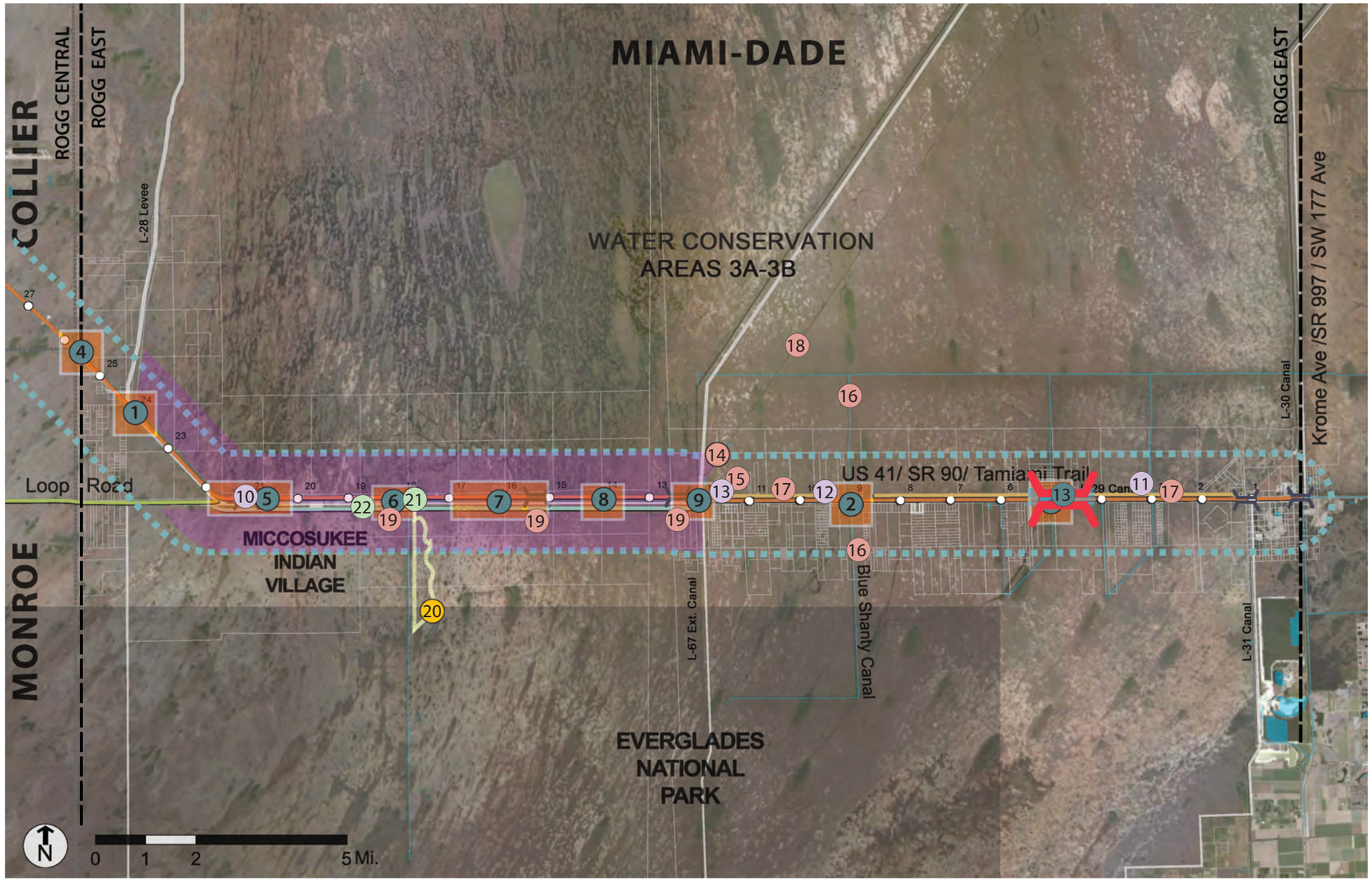
   Wide:
   - Collier/Dade County Line
   - Loop Road, East Terminus
   - Miccosukee Indian Village
   - Tigertrail Airboat Rides
   - Osceola Gift Shop
   - Old Tamiami Trail
   - Buffalo Tiger Airboat Rides/L-29 Levee
2. **Existing Trails and Trailheads**
   - The Bobcat Boardwalk
   - Otter Cave Hammock Trail
   - Tram Road
3. **Cultural Resource Features**
   - Miccosukee Indian Village
   - Tigertail Residential Community
   - Osceola Residential Community
   - ValuJet Flight 592 Memorial
4. **Environmentally Sensitive Resource Features**
   - Snail Kite Critical Habitat spans U.S. 41 for 12.4 miles
   - L-28 Canal and Levee
   - L-67C Levee
   - Blue Shanty Canal
   - Old Tamiami Trail Breaches
   - CEPP Projects
5. **Primary Hubs**
   - ENP Shark Valley Visitor Use Area
6. **Bridges**
   - Six total

Looking west from atop the L-29 Levee in the ROGG East Study Area

Entrance to Shark Valley, Everglades National Park

Western portion of ROGG East Study Area

ROGG East - Focus Areas Map



Legend

- Segment Match Line
- County Boundary Line
- Governmental Boundary Line
- Roadway
- Mile Marker (from Krome Ave.)
- U.S 41 Alignment
- Loop Road Alignment
- Old Tamiami Trail Alignment
- L-29 Levee Alignment
- 1 Mile Study Area
- Waterway
- Bridge
- ROW Focus Area
- Critical Habitat
- Existing Trail
- # Right-of-Way (ROW)
- # Existing Trailheads and Trails
- # Designated Historic Structure/ Landmark
- # Environmentally Sensitive Resource
- # Primary Hub

See page 65 for identification of # items.

Right-of-Way (ROW)

There are three areas found in the Study Area with a narrow ROW. Those areas with a ROW less than 40 feet wide within the ROGG East segment include:

1. L-28 Access Canal
2. Cooperstown Air Boats
3. Everglades Safari Park

Wide ROW includes any maintained ROW greater than 70 feet. Wide ROW allows for ample space for a proposed trail and the potential of parking. Large portions of wide ROW are found in the East ROGG segment. Six portions of U.S. 41 have a wide ROW:

4. Collier/Miami-Dade County Line
5. Loop Road East Terminus
6. Miccosukee Indian Village/Tigertrail Airboat Rides/ Osceola Gift Shop
7. Old Tamiami Trail
8. Buffalo Tiger Airboat Rides/L-29 Levee
9. L-29/ValuJet Flight 592 Memorial

Cultural Resource Features

Four culturally significant locations exist in the corridor:

10. Miccosukee Indian Village
11. Tigertrail Residential Community
12. Osceola Residential Community
13. ValuJet Flight 592 Memorial

Environmentally Sensitive Resource Features

Snail Kite Critical Habitat exists throughout the entire western half of the ROGG East segment.

14. Snail Kite Critical Habitat
15. CERP Area
16. Blue Shanty Canal
17. L-28 Levee and Canal
18. L-67C Levee
19. Old Tamiami Trail Breaches

Existing Trailheads and Trails

Trails and trailheads that already occur on or along the Study Area could act as an opportunity to connect to a proposed greenway trail.

The only trails currently existing along ROGG East are the Shark Valley Trails within ENP. Trails within the park include:

20. The Bobcat Boardwalk
20. Otter Cave Hammock Trail
20. Tram Road

Tram Road extends over 15 miles round trip and is used for tram rides, bicycling and walking. Otter Cave Trail is 0.25 mile long and provides access through a tropical hardwood forest. The Bobcat Boardwalk Trail is 0.5 in length and travels through saw grass slough and tropical hardwood forests.

Primary Hubs

Everglades National Park-Shark Valley Entrance and the Miccosukee Indian Village are the two existing primary hub areas within the ROGG East segment that provide parking, access to trails, restrooms and concessions.

21. Everglades National Park-Shark Valley Entrance
22. Miccosukee Indian Village

Bridges

Five bridges occur along U.S. 41 in the ROGG East sgement. The one-mile bridge has been completed and is highlighted in red on the adjacent map.

- One-mile long bridge
- Typical Bridge

ROGG East Opportunities and Constraints Summary

Contained entirely within Miami-Dade County, the ROGG East segment experiences the highest volume of visitors of all the segments due to the proximity of the Shark Valley entrance to ENP, Miccosukee Indian Village, and nine private attractions near the Miami metropolitan area. Miami-Dade also has the largest existing transit network which can be connected directly to the ROGG, providing options for residents to take transit to the eastern terminus of ROGG or potentially farther west to Shark Valley and the Miccosukee Indian Village.

Shark Valley is currently one of the fastest growing visitor use areas in terms total number of visitors for all of ENP entrance points, while it is also one of the most constrained for expanding to meet these increased needs. A new visitor center and restroom facility is under construction at Shark Valley. The park facility frequently experiences parking lot capacity issues during the peak visitation season. Development of the ROGG and coordination of transit could help relieve some of the vehicle traffic congestion issues at Shark Valley, while the addition of other opportunities along the ROGG East segment could provide additional opportunities for visitors to experience the Everglades could offset the growth in total number of visitors and their impacts at Shark Valley.

Existing facilities at a number of locations such as Shark Valley, Miccosukee Indian Village and ValuJet Flight 592 Memorial offer potential trailhead amenities, such as parking, restrooms and educational elements. ROGG East also includes the greatest number of possible alignments, include one within the U.S. 41 maintained ROW on new or proposed bridges, within existing levee ROWs along the L-29, within the Old Tamiami Trail corridor, or Loop Road. Each potential alignment should be studied in greater detail in order to determine all options in the feasibility of constructing the ROGG.

Environmental and cultural opportunities include a focused effort to remove exotic species to improve both habitat and viewsheds. Culturally significant lands include Native American lands in the western areas of ROGG East segment, which includes the Miccosukee Indian village area.

This segment also has the greatest amount of proposed changes to the landscape as part of the recommended restoration efforts of the CEPP and related projects. These proposed improvements include the addition of several new bridges along U.S. 41 and the removal of the existing roadbed, partial and complete removal of some levees, removal of the Old Tamiami Trail roadbed and fill, and the addition or upgrades to several water control structures. The immediate time-lines for these restoration efforts are not known and ultimately could take decades to implement. As such, the addition of the ROGG to the existing levee network, within the Old Tamiami Trail corridor, or as part of the proposed bridges could still proceed in coordination with these efforts and ultimately could be constructed as a temporary route until the time of removal, although these uses would need to not inhibit future restoration activities.

2.3 LITERATURE REVIEW

"Floridians have spent most of the 20th Century trying to destroy the Everglades, and much of it trying to save the Everglades, often at the same time."

– Governor Chiles, 1991

Influencing Document Samples

Introduction

The purpose of this section is to document the extensive literature base that exists as a result of years of evaluations and studies in the region, provide a summary of a portion of this literature for reports and studies particularly relevant to ROGG, and assess the planning implications for the feasibility and master plan of the ROGG stemming from this literature base. This section begins with an overview of the various types of documents that are potentially relevant to the current conditions, proposed restored conditions, and/or regulatory setting for the ROGG. The remainder of this section consists of brief summaries of the contents of representative documents and an assessment of the relevance for the regulatory requirements, design considerations, physical setting, or other factors relevant to the feasibility assessment and master plan for ROGG. Each document summary provides the timeframe of issuance, responsible agency, the purpose of the document, and items identified in the document that would need to be addressed through design considerations and ends with an assessment of potential implications for planning efforts.

2.3.1 Guiding Documents

The ROGG occurs within an area that has been the subject of a number of planning and implementation studies associated with the roadway corridor or the greater Everglades systems. In an effort to build upon the works of previous adopted plans and studies and to ensure coordination with other official documents that could influence the development of ROGG, multiple sources of information were reviewed. These sources identify designated improvements, regional studies, and regulations that could influence the development of or feasibility assessment for ROGG. They can be classified into five broad categories:

Guiding Document Categories:

- Governing Codes and Ordinances
- Master Plans and Management Plans
- Transportation Studies and Plans
- Environmental and Cultural Recourse Documents
- Design Guidelines and Methodologies

An overview of each of these categories is provided:

Governing Codes and Ordinances

Future improvements required for ROGG are subject to regulations consisting of statutes, codes, and ordinances promulgated and enforced by local, state, and federal agencies. These regulations identify requirements that need to be met for projects to be implemented. They also identify activities or actions that are prohibited from occurring for a spectrum of issues, including potential impacts to natural or cultural resources, incompatible land uses, and unauthorized construction activities. Federal codes and ordinances include acts passed by the U.S. Congress, such as the ESA and the National Historic Preservation Act, as well as Executive Orders and regulatory guidance criteria established by federal agencies. State codes and ordinances consist primarily of the Florida Statutes and FAC. Guidance documents of state regulatory agencies, such as the Environmental Resource Permitting Manual for ERPs, also provide insight on implementation for the codes. Local regulations such as the Miami-Dade County Land Development Regulations and the Collier County Land Development Code provide the requirements for planning, constructing, and operating systems within the respective counties. Regulatory agencies typically review projects as part of the permit application process for each of these different categories of codes and ordinances. Future improvements for ROGG will be required to comply with these regulations and with the permit processes associated with the regulations.

Master Plans and Management Plans

This category of influencing documents consists of master plans and management plans that guide the use of public lands and/or recreational open space within the ROGG Study Area. The NPS has established master plans and/or management plans for the ENP and Big Cypress National Preserve that guide resource management and long-term improvements for these parks. Supplemental plans such as the Big Cypress National Preserve Long-Range Interpretive Plan and/or NPS ENP Superintendent's Compendium provide additional details and guidance on implementation for specific components of the overall master/management plans. Similarly, the state of Florida requires management plans for all public lands owned by the state to guide resource management and long-term improvements. Required to be updated every 10 years or when substantial changes are anticipated to occur to the subject property, these management plans address a variety of components associated with the management of the public land. These include documentation of existing conditions and uses, master plans for proposed improvements, and management requirements. Management plans are in place for all state-owned lands within the ROGG Study Area.

Miami-Dade County and Collier County have also prepared master plans for the system of parks, recreation and open space within each county. These plans identify parks and recreation needs as well as proposed system improvements for each county. All of these plans provide guidance on existing and future destinations for ROGG as well as management requirements for the properties that need to be addressed or maintained by future ROGG facilities. Improvements for ROGG that are determined to be feasible may require updates to the management plans for some or all of the facilities, which requires an extensive public review process for each plan.

Transportation Studies

The transportation system within the ROGG Study Area includes pedestrian, bicycle, and vehicular modes that have been subject to planning and evaluation studies since the Tamiami Trail was originally established. The FHWA and FTA are federal agencies that provide funding, planning support, and review of transportation projects and have jointly assessed needs for transportation requirements for federal lands in recent years. The FDOT owns and manages the U.S. 41 ROW, including monitoring traffic conditions and use of the roadway, and is the lead agency for conducting reviews for most improvements occurring within the ROW. FDOT has conducted several NEPA-compliant Project Development and Environment (PD&E) studies in recent years for improvements to portions of U.S. 41 within the ROGG Study Area for lane and shoulder improvements. FDOT also administers the ETDM process to review potential environmental effects during the planning phase of qualifying transportation projects and has conducted several ETDM screenings for the ROGG in recent years.

Miami-Dade County and Collier County have developed transportation facility plans that include assessments for pathways, greenways, and bicycle and pedestrian use within the counties. Transportation studies provide design criteria, assessment and review of environmental issues, and other considerations for the design and construction of facilities on and adjacent to U.S. 41 as well as regional systems to connect with and/or enhance as part of the ROGG.

Environmental and Cultural Resource Documents

The natural and cultural resources of the ROGG Study Area are some of the most intensively studied in the region and subject to extensive regulatory requirements, all of which have resulted in a diverse array of completed documents f. The USACE together with the SFWMD and other partners are implementing the restoration of the Everglades system consistent with plans and projects identified in CERP and through more detailed PIRs. The NPS has prepared EA/EIS documents for various improvements within the ENP and Big Cypress National Preserve as well as the EIS for the bridging improvements on U.S. 41 in the eastern portion of the ROGG Study Area. As part of the EA/EIS/PIR reviews, cultural resource assessments for significant areas and/

Governing Codes and Ordinances

- Clean Air Act of 1970, as amended
- Clean Water Act of 1972, as amended
- Coastal Zone Management Act of 1972, as amended
- Collier County Growth Management Plan
- Collier County Land Development Code
- Endangered Species Act of 1973
- Energy Independence and Security Act of 2007
- EO 11593: Protection and Enhancement of the Cultural Environment
- EO 11988: Floodplain Management
- EO 11990: Protection of Wetlands
- EO 13443: Facilitation of Hunting Heritage and Wildlife Conservation
- Florida Administrative Code
- Florida Coastal Management Zone
- Florida Statutes
- Miami-Dade County Comprehensive Development Master Plan
- Miami-Dade County Land Development Regulations
- Miami-Dade County Zoning Codes and Ordinance
- National Environmental Policy Act of 1969, as amended
- National Historic Preservation Act of 1966, as amended
- National Parks Omnibus Management Act of 1998
- Noise Control Act of 1972
- NPS Organic Act
- Section 106 of the National Historic Preservation Act of 1966
- SFWMD Basis of Review for Environmental Resource Permit Applications
- SFWMD Public Use Rule
- Water Resources Development Act of 1992

Master Plans and Management Plans

- Everglades National Park / Master Plan (1979)
- NPS Everglades National Park – East Everglades Addition Land Protection Plan (1991)
- NPS Big Cypress National Preserve General Management Plan and Final Environmental Impact Statement (1991)
- NPS Big Cypress National Preserve Water Resources Management Plan (1996)
- FDEP Fakahatchee Strand Preserve State Park Unit Management Plan (2000)
- NPS Big Cypress National Preserve Long-Range Interpretive Plan (2002)
- FFWCC – A Conceptual Management Plan for The Everglades Complex of Wildlife Management Areas (Everglades/Francis S. Taylor, Holey Land and Rotenberger Wildlife Management Areas) (2002)
- FDEP Collier – Seminole State Park Unit Management Plan (2004)
- Miami-Dade County Aesthetics Master Plan (2008)
- Miami-Dade County Parks and Open Space System Master Plan (2008)
- NPS Everglades National Park Visitor Study (2008)
- USACE Regional Draft Report for the Conceptual Recreation Plans for the Master Plan of the Comprehensive Everglades Restoration Program (2008)
- Florida Division of Forestry Ten-Year Resource Management Plan for the Picayune Strand State Forest (2008)
- NPS Big Cypress National Preserve Addition Final General Management Plan/Wilderness Study/Off-Road Vehicle Management Plan/Environmental Impact Statement (2010)
- SFWMD Recreation Management and Partnership Plan: Land Stewardship Division (2011)
- Collier County Parks and Recreation Master Plan (2011)
- NPS Everglades National Park Superintendent's Compendium (2012)
- NPS Big Cypress National Preserve Superintendent's Compendium (2012)
- NPS Everglades National Park Draft General Management Plan / East Everglades Wilderness Study / Environmental Impact Statement (GMP) (2013)

or cultures within the corridor have been completed. The USFWS has issued Biological Opinions that address potential impacts, mitigation, and protection measures for listed species for a number of projects within the ROGG Study Area. These documents provide information about design criteria, future improvements within the ROGG Study Area that need to be accommodated by ROGG facilities, environmental and cultural resource conditions and issues, and the regulatory considerations that would influence the feasibility assessment and master plan for ROGG.

Design Guidelines and Methodologies

Federal, state, and local regulatory and resource management agencies have prepared design guidelines and project evaluation methodologies for planning and design, environmental assessments, and operation of new facilities, including greenways like ROGG. Implementation guidelines and manuals have been developed by regulatory agencies for implementing national, state, or local standards in the development of an improvement, such as the Americans with Disabilities Act Accessible Guidelines. Other design guidelines provide best practices for planning, design, and development of facilities like those that would be needed for ROGG. These documents identify minimum standards and/or evaluation criteria for planning or design elements for the feasibility assessment and master plan for ROGG.

A second set of documents in this category consist of evaluation methodologies for potential impacts to natural and cultural resources that would result from a proposed improvement, such as the USFWS Panther Habitat Assessment Methodology. These methodologies typically include minimum requirements for maintaining the resource, thresholds for determining permit requirements, documentation and survey requirements to provide to reviewing agencies, and/or criteria that establish the degree of impact and/or mitigation that would be required for a given improvement.

Transportation Studies

- North Dade Greenways Master Plan (1997)
- Miami-Dade MPO Bicycle Facilities Plan (2001)
- FHWA / FTA Federal Lands Alternative Transportation Systems Study (2001)
- FDOT US 41 PD&E Study from CR 951 to CR 92 (2008)
- Miami-Dade MPO Bicycle and Pedestrian Plan Update (2009)
- Florida Scenic Highways Project Evaluation Report (2009)
- FDOT De-Designation of the Tamiami Trail National Scenic Byway (2009)
- ETDM Summary Report for Project #12596 – River of Grass Greenway; Programming Screen (Published January 2010, April 2010, March 2011)
- Automated Bicycle Rental System and Parking Plan Study (2011)
- FDOT Environmental Determination for Tamiami Trail PD&E (2011)
- FDOT AADT Report (2011)
- Collier MPO Comprehensive Pathways Plan (2012)

Environmental and Cultural Resource Documents

- Central and Southern Florida Project Comprehensive Review Study Final Integrated Feasibility Report and Programmatic Environmental Impact Statement (1999)
- USFWS Biological Opinion for the Modified Water Deliveries to Everglades National Park Project, Experimental Water Deliveries Program, and the C-111 Project (1999)
- USFWS Biological Opinion for the Final Recreational Off-Road Vehicle Management Plan Supplemental Environmental Impact Statement for the Big Cypress National Preserve (2000)
- NPS Final Recreational Off-Road Vehicle Management Plan Supplemental Environmental Impact Statement for Big Cypress National Preserve (2000)
- NPS Scenic Corridor Visitor Safety Highway Improvements Environmental Assessment (2001)
- Big Cypress
- USFWS Biological Opinion for the Tamiami Trail Portion of the Modified Water Deliveries to Everglades National Park Project (2006, 2008 modification, 2010 modification)
- URS Corporation (for FDOT) Cultural Resource Assessment Study for US-41 PD&E from Collier Boulevard to San Marco Drive (2007)
- NPS Pilot Spreader Swale Project Environmental Assessment (2008)
- Tamiami Trail Modifications Final Integrated Limited Reevaluation Report and Environmental Assessment (2008)
- Documentation and Evaluation of Coopertown (8DA6767) and the Airboat Association of Florida (8DA6768) and an Assessment of Effects of Modifications to Tamiami Trail (2009)
- NPS Big Cypress National Preserve Commercial Services Plan & Environmental Assessment (2009)
- USFWS Final Fish and Wildlife Coordination Act Report for the Decompartmentalization Physical Model Project (2009)
- USFWS Biological Opinion for the Picayune Strand Restoration Project (2009)
- USFWS Final Fish and Wildlife Coordination Act Report for the L-30 Seepage Management Pilot Project (2009)
- Collier County Guide to Historic Sites in Collier county (2010)
- NPS Environmental Assessment for the Loop Road Improvements, Big Cypress National Preserve (2010)
- USFWS Biological Opinion for the Draft Final General Management Plan for the Big Cypress National Preserve – Addition (2010)
- USFWS Biological Opinion for the Everglades Restoration Transition Plan, Phase 1 (2010, 2012 modification)
- USFWS Biological Opinion for the Tamiami Trail Modifications: Next Steps Project (2010)
- USFWS Coordination Letter for the Roadside Animal Detection System (RADS) Project at US Highway 41 – Turner River (2010)
- NPS Tamiami Trail Modifications: Next Steps / Final Environmental Impact Statement (2011)
- USACE Ethnographic Study and Evaluation of Traditional Cultural Properties of the Modern Gladesmen Culture (2011)
- USFWS Biological Opinion for the Krome Avenue Widening from US 27 to US 41 (2011)
- USACE / SFWMD Central Everglades Planning Project Proposed Final Array (2012)
- NPS Environmental Assessment for the Designated ORV Trail Heads and Turn Lanes, Big Cypress National Preserve (2012)
- Comprehensive Everglades Planning Project (CEPP): Proposed Final Array (PDT #18) (2012)
- USFWS Biological Opinion for the Big Cypress National Preserve ORV Trail Heads and US 41 Turn Lanes Construction (2012)
- Central Everglades Planning (CEPP) Project Draft Integrated Project Implementation Report (PIR) and Environmental Impact Statement (EIS) (2013)
- Copeland Prairie Mitigation Plan (2013)

Design Guidelines and Methodologies

- DO 87A: NPS Transportation Guidebook and Park Road Standards (1984)
- USFWS Habitat Management Guidelines for Wood Stork in the Southeast Region (1990)
- NPS Guidelines for Evaluating and Documenting Rural Historic Landscapes (1999)
- AASHTO Guide for the Development of Bicycle Facilities (1999)
- Florida Department of Transportation: Bicycle Facilities Planning and Design Handbook (2000)
- USFWS Cape Sable Seaside Sparrow Species Conservation Guidelines (2003)
- Manual on Uniform Traffic Control Devices for Streets and Highways (2003 ed. And 2009 ed.)
- AASHTO Guide for the Planning, Design and Operation of Pedestrian Facilities (2004)
- Americans with Disabilities Act Accessible Guidelines (2004 ed. and 2009 ed.)
- USACE / SFWMD Central and Southern Florida Project Comprehensive Everglades Restoration Plan Program Management Plan Master Recreation Plan (2004)
- USFWS Draft Species Conservation Guidelines for American Crocodile (2004)
- USFWS Draft Snail Kite Management Guidelines (2006)
- USFWS National Bald Eagle Management Guidelines (2007)
- USFWS Florida Panther (Puma concolor coryi) Recovery Plan (2008)
- Miami-Dade Trail Design Guidelines and Standards (2010)
- USFWS Wood Stork Core Foraging Analysis Methodology (2010)
- AASHTO Guide for the Development of Bicycle Facilities (2012)
- USFWS Panther Habitat Assessment Methodology (2012)
- FDOT Project Traffic Forecasting Handbook (2012)
- FDOT Plans Preparation Manual (2013)

2.3.2 Significant Guiding Document Summaries

More than 100 guiding documents across the five categories identified above were reviewed as part of the feasibility assessment and master plan for ROGG. Although all have some relevance to the planning, design, and future operation of ROGG, several documents have particular relevance to specific aspects of ROGG. This section provides a summary of the 26 of the most relevant documents, the vast majority of which are from the categories of master/management plans, transportation studies, and environmental and cultural resource documents. These summarized are arranged chronologically by category with the oldest articles summarized first to provide the foundation upon which later reports and studies were based. Although the governing codes and ordinances and design guidelines and methodologies are significant for the project, the studies summarized below have particular relevance to specific components or segments of ROGG. Some of the governing codes and ordinances for environmental issues are addressed in Section 2.1 – Context. These summaries are comprised of the name and date of publication of the document, a brief overview of the content and key elements, and an assessment of the relevance of the document to the feasibility assessment and master plan for ROGG.

Governing Codes and Ordinances

South Florida Water Management District (SFWMD) Public Use Rule; 2006

SFWMD has established regulations governing public access to certain District lands with permitted outdoor recreation uses, including those of the WCAs in the ROGG Study Area. The intent of the regulations is to protect water resources, native plant communities, fish and wildlife populations and other natural features along with any historic and cultural improvements. As part of the original C&SF Project, these WCAs included vast swaths of wet prairie, marsh, and tree island landscapes. Adjacent to approximately 20 miles of the ROGG Study Area is the Francis S. Taylor Wildlife Management Area (WCA3B). Ownership is mixed with the State of Florida, SFWMD and private ownership, while the FFWCC provides management of the area. The following rules pertinent to the feasibility assessment and master plan for ROGG regulate the public use of this area:

40E-7.520 Scope and Applicability
(4) Consistent with the environmental sensitivity of these areas and the purposes for which the lands were acquired, and all rights, privileges, and protections afforded by the provisions of Section 373.1395, F.S., all District lands are hereby deemed open and available to the public for outdoor recreational purposes and access unless otherwise limited, restricted, or prohibited by special provision in this rule. Nothing in this rule shall prevent other federal, state, or local agencies, including but not limited to those with management contracts with the District, from requiring compliance with their own rules, permits, regulations, ordinances, or laws to the fullest extent of their lawful authority.

40E-7.521 Definitions
(16) "Outdoor recreational purposes" means natural resource based outdoor recreational activities including, but not limited to, fishing, hunting, horseback riding, bicycling, swimming, camping, hiking, canoeing, boating, airboating, scuba diving, birding, sailing, jogging, picnicking, nature study, water skiing, and visiting historical, archaeological, scenic or scientific sites.

(23) "Recreational trail" means saddle animal riding, hiking, canoeing, bicycling, or jogging trails for use by the public.

40E-7.528 Bicycling
Bicycling is allowed on vacant undesignated lands and on Right of Way on existing canal maintenance berms and levee tops. On all other District lands, bicycling is allowed on designated trails and established roads except where restricted by signs. Lands requiring a Specific Use License for bicycling are identified in Rules 40E-7.538, 40E-7.5381, 40E-7.5382, 40E-7.5383 and 40E-7.5384, F.A.C.

40E-7.532 Operating Hours
District lands shall be open to public use twenty-four (24) hours a day seven (7) days a week except during authorized closures as set forth in subsection 40E-7.523(3), F.A.C., above or unless otherwise specified in Rules 40E-7.538, 40E-7.5381, 40E-7.5382, 40E-7.5383 and 40E-7.5384, F.A.C.

40E-7.5381 Special Provisions for Right of Way of the District
The following shall be prohibited on all Right of Way of the District; which include rights-of-way, canals, levees, maintenance berms, and spoil mounds:

(9) Pets, with the exception of service animals, leashed animals and animals otherwise under the effective control of the owner.

Relevance to ROGG: Elements of this Public Use Rule with particular relevance to the feasibility assessment and master plan for ROGG include:

- **Public Access** – SFWMD allows for public access and use of many lands adjacent to the ROGG Study Area for outdoor recreation activities. Regulations defined by SFWMD include use of bicycles within levee right-of-ways, along maintenance berms and on levee tops. Direct implications for ROGG include the potential use of SFWMD levees, levee berms and/or levee right-of-ways for the use of hiking, biking or other outdoor recreation uses. In addition, the pedestrian and bicycle access that could occur on levees would also connect to blueway connections for the canals in the system. These canals may be used for canoeing, kayaking or other water related outdoor recreation activities. Coordination with the SFWMD and other regulatory agencies in the region is needed to address public access on private lands with SFWMD easements as well as potential issues associated with using the levees relative to regional hydrological restoration goals. The feasibility assessment and master plan for ROGG included evaluations for the use of the levees and other infrastructure for use as permanent or temporary trail facilities as well as for potential connection points to other regional greenway systems.

Master/Management Plans

Everglades National Park/Master Plan; 1979

The current Master Plan, approved in 1979, has been used to guide management decisions for the ENP for more than 30 years. The plan established the highest priority of the ENP to protect the wilderness habitats and wildlife species within the park. It emphasized the regional context as it was recognized that planning solely for management inside the park would not take into consideration major external forces such as changes in hydrology, natural environment, and population growth. This regional focus included a call for pursuing partnerships with other similar interests as well as the need to develop a regional master plan for land and water use. The ENP Master Plan identified a general development plan to guide improvements to balance the need to address increasing numbers of visitors with the protection of the park's resources.

The ENP Master Plan included an assessment of critical issues and the identification of management goals and objectives for long-term management of the park. Critical issues identified in the plan included the sustainability of water quality and volume of water entering the park from the north; the encroachment of continued urban, suburban, and agricultural sprawl; the accommodation of an increasing number of visitors; the control of boat access and commercial and sport fishing; adequate environmental research and education; and regional planning and monitoring. Management goals identified in an appendix to the plan included a variety of measures, including the preservation of water flow and the natural environment within the park, collaboration with federal, state, and local agencies to protect park resources; and enhanced measures for visitor access control and environmental education.

Relevance to ROGG: Aspects of the ENP Master Plan with particular relevance to the feasibility assessment and master plan for ROGG include:

- **Regional Cooperation** – The ENP Master Plan provides a clarion call for participation on regional solutions to resource management issues, which has been built upon for the formation and implementation of CERP and other regional restoration activities. The park relies on regional solutions for hydrological inputs to sustain the environmental quality that is part of the aesthetic and character visitors to the park experience. The plan was a catalyst for regional cooperation efforts now being realized through the bridge construction for U.S. 41, CEPP improvements, and other hydrological restoration activities. For ROGG, this regional cooperation provides both an example of methods to successfully address problems and opportunities between human use and resource protection and a setting of public engagement and long-term changes in infrastructure that require accommodation for any potential ROGG facilities.
- **Destination** – The Shark Valley Visitor Use Area of the ENP is a primary destination within the eastern portion of the ROGG Study Area. The ENP Master Plan confirmed this area as a significant visitor contact point in the northern portion of the park due to access from U.S. 41 and called for the continuation of uses still in place today. These include protection of the natural setting, hiking and biking on the Shark Valley Loop Road, concessions for bicycles, and the guided tram service. The recent construction and improvements to the visitor center at Shark Valley were also identified as a need and future improvement within the Master Plan. The feasibility assessment and master plan for ROGG included evaluations for connection points to this destination to both provide additional pedestrian access to the site and a secondary outlet and experience for park visitors. Options to provide or connect to trailhead amenities including restrooms at the visitor center at the existing facilities were also evaluated.

- **Parking** – The ENP Master Plan identified the need for additional parking facilities at the Shark Valley Visitor Use Area to meet the needs of the increasing visitor base, which is an issue that continues to affect visitor use and resource management at this entrance to the park. However, management objectives to minimize impacts on natural areas and the limited upland areas available at the facility limit the options for additional on-site parking facilities. For ROGG, this limits potential options for establishing Shark Valley as a primary trailhead facility with available parking for ROGG users. However, for those able to park at Shark Valley, the existing bicycle rental concession provides options for future expansion to use ROGG facilities as long as visitors can used the Shark Valley parking areas as a starting location. Opportunities to provide alternative parking facilities either as part of future ROGG facilities or to connect additional parking facilities outside of Shark Valley to the visitor use area using ROGG were evaluated as part of the feasibility assessment and master plan.

- **Resource Protection** – The ENP Master Plan provides a strong management mandate for protection of the park's natural and cultural resources. Expansion of existing facilities or construction of new facilities in or near the ENP that would require impacts to natural resources in the area are subject to extensive public scrutiny and regulatory review. Any new or expanded facilities within the ENP would require NPS approval and would need to address both local impacts to resources as well as potential effects on regional restoration efforts. Opportunities to use existing infrastructure and/or provide additional suitable connections to ENP facilities while being consistent with the resource protection requirements of the plan were evaluated as part of the feasibility assessment and master plan for ROGG.

Entrance drive to ENP Shark Valley Visitor Use Area, looking north towards U.S.41

General Management Plan and Final Environmental Impact Statement; Big Cypress National Preserve; Collier, Monroe, and Dade Counties, Florida; 1991

The NPS prepared the 1991 GMP/EIS to guide management activities and decisions for managing natural and cultural resources, guiding visitor use, and development of new or enhanced improvements within the Preserve. The GMP/EIS covers the original boundaries of the Preserve, which comprises the majority of the acreage of the current Preserve. The GMP/EIS compared four alternatives to determine the best approach for the general management of the Big Cypress National Preserve for a period of 10 to 15 years. The GMP/EIS identified specific actions for establishing an interpretive program for the Preserve, the types and extent of hunting regulations, ORV access, natural and cultural resource management activities, coordination with native Americans residing in and using the Preserve, and oil and gas exploration. Except for some relatively small privately held in-holdings especially around Ochopee, the central portion of the ROGG Study Area is almost wholly contained within the Big Cypress National Preserve.

Within the ROGG Study Area, the preferred alternative included the enhancements to visitor use and education, requirements for hunting access, establishment of ORV access points and trails, improvements for other recreational activities, restrictions for oil and gas exploration, natural and cultural resource management, and general development improvements. Visitor use benefits of the management plan included a new interpretive program that incorporates expanded educational and visitor orientation materials at trails and wayside parks along U.S. 41, a defined canoe trail at Turner River, improvements and formalization of campgrounds and backcountry shelters, and concessionaire visitor services. Hunting regulations for different management units were established, although hunting was maintained throughout most of the Preserve, including walk-in hunting in the vicinity of U.S. 41. The GMP identified 37 ORV access points throughout the Preserve as well as general ORV regulations, but identified the need for a separate ORV management plan.

Natural resource benefits included hydrologic restoration of wetlands, the specified use of prescribed fire, and special listed species management actions. Prehistoric and archeological sites were mandated to be protected if found to be eligible for listing on the National Register of Historic Places, while NPS would work closely with resident Miccosukee and Seminole tribes to address historical and current cultural uses of the Preserve. The GMP restricted oil and gas exploration to 10 percent of the Preserve at any one time. General development activities within the ROGG Study Area included enhancements for the headquarters facilities at Ochopee, improvements to the Oasis Visitor Center, and improvements to Loop Road.

Relevance to ROGG: Aspects of the Big Cypress National Preserve GMP with particular relevance to the feasibility assessment and master plan for ROGG include:

- **Resource Protection** – The Preserve GMP provides a strong management mandate for protection of natural and cultural resources as a primary component of Preserve operation. The GMP provides objectives to minimize impacts to natural and cultural resources as part of the expansion to existing facilities or new facilities in or near the Preserve. As such, potential impacts to these resources for improvement projects are subject to extensive public scrutiny and regulatory review. Any new or expanded facilities within the Preserve for ROGG would require NPS approval and would need to address local impacts to resources, including wetlands, hydrology, and listed species. For future ROGG facilities determined to be feasible that would require impacts to wetlands or listed species within or near the Preserve, mitigation options that enhance hydrological or habitat management goals specified in the GMP and other Preserve documents could support initiatives undertaken in the Preserve. The GMP identifies the need for restrictions on human use of portions of the Preserve used extensively by Florida panthers, which could further limit the types and opportunities for improvements in those areas. Opportunities to use existing infrastructure and/or provide additional suitable connections to Preserve facilities consistent with the resource protection requirements of the GMP were evaluated as part of the feasibility assessment and master plan for ROGG.

- **Destinations** – Facilities identified in the GMP, including the Ochopee Headquarters and visitor center facilities and the Oasis Visitor Center, would provide significant destination locations for ROGG users. Additional facilities such as Kirby Storter Roadside Park and other wayside parks would provide additional rest stops or minor destinations for ROGG trail users. The majority of these areas include parking facilities sufficient for supporting new trailhead facilities for ROGG users. These facilities also provide interpretive and orientation materials and information for Preserve visitors. These materials could be incorporated into ROGG interpretive and wayfinding requirements or be expanded upon by the interpretive program for ROGG. Segments of ROGG would also assist in appropriately distributing visitor use around the destination locations.

- **Cultural Uses** – The GMP includes management criteria for cultural uses within the Preserve, including protection measures for culturally significant sites and the usual and customary uses for Miccosukee and Seminole Tribes of Florida. Two ceremonial sites are noted as occurring within the Preserve: Corn Dance site 216 and Corn Dance Island 116. The NPS is working with the tribes to protect the privacy and sanctity of these areas. As part of the Superintendent's Compendium that provides specific regulations within the Preserve, a ½-mile buffer around the two is required. These buffers are closed to the public and no new uses will be allowed. In addition, the NPS also coordinates with members of the tribes to allow usual and customary uses such as hunting, fishing and trapping, as well as to accommodate residences for tribal members within the Preserve. Routing options for ROGG included assessments for consistency with the ceremonial site buffers. Future ROGG facilities would need to incorporate design criteria that maintain access for cultural uses as well as access control for trail users in and near cultural use and/or tribal member residences.

- **Hunting and ORV Access** – Hunting is a continuing use within the Preserve with active public participation. The GMP recognized ORV use as a transportation and recreation activity appropriate for the Preserve subject to certain regulations and controls that would be more fully evaluated in an ORV Management Plan. The GMP identified the ORV access points that occurred or would be developed within the ROGG Study Area; pedestrian access by hunters is more widely distributed. Within the ROGG Study Area, hunters and ORV users often park on the shoulders of roads in the Preserve and then walk in to hunting zones or drive their ORVs onto established trails. Future ROGG facilities would need to accommodate the parking needs for hunters and ORV users as well as design considerations for allowing access to the Preserve across ROGG trails. Portions of the ROGG that can feasibly occur outside of existing roadway ROWs within habitats used for hunting may require seasonal closure during hunting season or require coordination and/or changes to hunting permit regulations within the vicinity of the facility to limit potential conflicts between hunters and trail users. Portions of ROGG trails that cross ORV trails will require design considerations to allow for continued ORV access as well as notification for

trail users of the overlapping uses. Design options or alignments of ROGG that limit hunting or ORV access will likely receive extensive public scrutiny.

- **Trail and Campgrounds Connections** – A number of hiking trails, a canoe trail, and campgrounds are identified within the GMP and provide potential connection opportunities and/or minor destinations for ROGG. The approximately 1,300 mile long Florida National Scenic Trail begins in the Preserve at an intersection with U.S. 41 near the Oasis Visitor Center and provides hiking access within the Preserve. Other variably sized trails extend from wayside parks, the Oasis and Headquarters properties, and other locations and would provide additional experiences for ROGG users. The Turner River canoe trail can be accessed from a small park on U.S. 41 within the ROGG Study Area. This park provides a limited number of parking spaces and restroom that could be incorporated into a minor trail facility for ROGG users. The GMP formalized several campgrounds, including the Midway, Monument Lake, and Burns Lake campgrounds that occur along U.S. 41 in the ROGG Study Area. All three of these campgrounds include open, previously altered lands that could be used for trailhead facilities for ROGG as well as locations that could be a beginning point for users to access ROGG. The feasibility assessment of ROGG included evaluations of potential connections to existing trail and campground facilities.

- **Oil and Gas Exploration** – Oil and gas exploration and extraction are ongoing activities within the Preserve, but subject to requirements of the GMP. The GMP places limitations on the amount of the Preserve that would be subject to mineral exploration at any one time as well as limitations on exploration in important resource areas. Operations for oil and gas exploration include large truck use on U.S. 41 and north/south roads in the Preserve to well fields. Future ROGG facilities that would cross roadways used by oil and gas exploration/extraction vehicles will require design criteria and user notifications to minimize potential conflicts between trail users and truck traffic. In addition, visitor access control from the ROGG would need to be considered to limit encroachment of trail users into active exploration areas. An EA is in process to evaluate improvements to the power line service along U.S. 41 for active extraction facilities. Improvements such as poles and/or pads that would be required for this EA were evaluated for consistency and/or accommodation for potential ROGG facilities.

- **Fire Management** – The GMP specifies fire management as a significant management tool for vegetation communities, including those in the ROGG Study Area. Prescribed fires would be used to reduce fuel loads and manage wildlife habitat, while wildfire protection measures would be used for non-prescribed fires. Options to incorporate structural fire resistant materials in the design for ROGG facilities as well as design and routing options that accommodate access for Preserve managers to conduct prescribed fires and fight wildfires was considered as part of the ROGG feasibility assessment and master plan.

Big Cypress National Preserve – Addition: Final General Management Plan/Wilderness Study/Offroad Vehicle Management Plan/ Environmental Impact Statement; 2010

The NPS added the 147,000 acre "Addition" to the Preserve in 1988, but the Addition was not included in the planning process for the 1991 General Management Plan. The NPS began the development of the GMP for the Addition in 1999 and gathered extensive public input over the planning period for the GMP. The Final GMP for the Addition established a preferred alternative that incorporated the extensive civic engagement to protect natural and cultural resources while providing a diversity of recreational opportunities consistent with the intent of the enabling legislation for the Preserve. In addition to general management guidance, the GMP included an assessment of areas within the Addition that would qualify for wilderness status and an ORV management plan for the Addition. The GMP provides a framework for decisions by the NPS relative to the protection of Addition resources, visitor access and facilities, and long-term management of the Preserve. The ROGG Study Area includes a portion of the Addition, including areas that were subject to management recommendations in the GMP along U.S. 41 and S.R. 29.

The preferred alternative for management of the Addition included a diverse array of front and back country recreational opportunities, interpretive opportunities along road corridors, ORV access opportunities, and passive recreational facilities and opportunities, although most of these were to occur outside of the ROGG Study Area. The majority of the planned facilities, including ORV trails, wilderness areas, and primitive backcountry options were designated near I-75 in the northeast portion of the Preserve. Within the ROGG Study Area, no additional ORV trails or access points were identified in the preferred alternative. The GMP identified the need to amend the Preserve's Commercial Services Plan to include the Addition, including options to provide a range of commercial services, including boat tours south of U.S. 41, within portions of the Addition in the ROGG Study Area. Existing facilities within the Addition at the intersection of U.S. 41 and S.R. 29 would continue to support commercial services and/ or partner organizations such as the Sheriff's Office that would operate at this location, including enhancements that would support visitor service needs. The NPS Fire Operations Center would be maintained at the Copeland (S.R. 29) location and expanded as necessary for other NPS operational needs.

Relevance to ROGG: Aspects of the Big Cypress National Preserve Addition Plan with particular relevance to the feasibility assessment and master plan for ROGG include:

- **Commercial Facilities** – The commercial facilities at the intersection of U.S. 41 and S.R./C.R. 29 provide a destination for future ROGG users as well as developed lands potentially suitable for trailhead facilities. The commercial facilities include the Everglades Area Chamber of Commerce Welcome Center that has a small store and restrooms open to the public as well as parking areas for visitors to the Welcome Center. Coupled with the availability of potable water and parking facilities, the broad lawn between the building and U.S. 41 provides an opportunity for a future ROGG trailhead as it occurs on a filled area with limited to no wetlands or other natural or cultural resource restrictions. This area also provides opportunities for future trail connections along C.R. 29 south to Everglades City. Opportunities to utilize the developed parcel in the Addition at this intersection for a trailhead, connections to potential future trail facilities along S.R./C.R. 29, and the previously altered conditions of the area were considered as part of the feasibility assessment and master plan for ROGG.

- **Security** – The commercial facilities include a station for the Collier County Sheriff. This station provides an enhanced security presence at the intersection as well as a response area for security along nearby future portions of ROGG. Facilities for ROGG that would be determined to be feasible within the parcel would need to allow access for the Sherriff to the station.

Miami-Dade County Parks And Open Space System Master Plan – A 50-Year, Unifying Vision For A Livable, Sustainable Miami-Dade County; 2007

The Miami-Dade County Parks and Open Space System Master Plan is a 50-year unifying vision for a livable, sustainable Miami-Dade County. An integral part of that vision is the development of a seamless system of greenways, pedestrian trails and water trails. This vision builds upon the corridors described in the North Dade Greenways Master Plan and South Dade Greenway Network Master Plan and further links these into a holistic, seamless system. The identified system weaves through new parks, ties into bike lanes, and channels people into natural resource areas. The Master Plan envisions an interconnected system that provides transportation alternatives and reduces traffic congestion; creates new recreational opportunities; increases property values; protects natural resources; encourages tourism and business development; and strengthens connections to adjacent counties.

Significant elements of the "Great Greenways, Trails and Water Trails Vision" include:

- Consistent, upgraded trail connections throughout the entire System
- Water Access points that are conducive to small craft launching with parking and neighborhood access
- A Greenways and Water Trails Signage/Graphics/ Marker System that establishes an identity for the System; informs users and passers-by about trail names, access points, locations and distances; and reduces conflicts by informing both trail users and motorists about trail crossings
- Providing opportunities for users to have shelter from the sun
- Safe, well-marked roadway crossings throughout the System to ensure connectivity across major roads
- Picnic shelters, rest areas, drinking water stations, map kiosks and other amenities throughout the System to enhance the quality of users' experiences
- Increased levels of trail maintenance and law enforcement to help ensure the quality of the greenways and water trails user experience
- Increased user participation and volunteerism in trail improvements and maintenance

Relevance to ROGG: Aspects of the Miami-Dade County Parks and Open Space System Master Plan with particular relevance to the feasibility assessment and master plan for ROGG include:

- **Greenway Vision** – This Master Plan establishes a vision for connections between and among parks, natural areas, and open spaces to enhance public access, user experience, and educational opportunities for the resources and recreation system within the County. This vision includes goals to establish seamless integration of a network of trail systems to connect neighborhoods, parks and destinations as well as to incorporate multi-modal connections ranging from transit to bicycle trails to pedestrian walking trails in the County greenway system. This vision included a potential trail within the general ROGG Study Area as well as connections from this trail along U.S. 41 to the Western Greenway at Krome Avenue. The feasibility assessment and master plan for ROGG included considerations for consistency with the vision outlined in the plan as well as potential connection points to facilitate the envisioned County-wide network.

South Florida Water Management District (SFWMD) Recreation Management And Partnership Plan: Land Stewardship Division; 2011

SFWMD's Recreation Management Partnership Plan provides guidance for managing lands in the 16 county region that extends from Orlando to Key West, FL under its jurisdiction. The plan highlights state statues that mandate SFWMD to provide compatible public access and use of SFWMD lands, which is directly supported by the SFWMD's Public Recreation Access and Use Policy. Florida Statues Section 373.1391(1)(a), states that lands titled to the water management districts shall be managed and maintained to the extent practicable to ensure a balance between public access, general public recreational purposes, and restoration and protection of their natural state and condition. SFWMD policy allows for compatible nature-based recreation activities, including hiking, birding, wildlife viewing, biking, canoeing, hunting, fishing, equestrian use, boating, and camping. Most of the 1,800 miles of canals, levees and right-of-ways with the jurisdiction of the SFWMD are available for public recreational use consistent with the description above. The Recreation Management and Partnership Plan establishes a series of objectives for SFWMD, including working with the state Office of Greenways and Trails on trails designated by that office.

Relevance to ROGG: Aspects of the SFWMD Recreation Management and Partnership Plan with particular relevance to the feasibility assessment and master plan for ROGG include:

- **Recreation Access** – Recreation management of SFWMD lands seeks to balance access to consumptive and non-consumptive activities as well as provide connectivity to other public lands through greenway partnerships. Since the Office of Greenway and Trails has identified ROGG as a priority greenway route since 2004, options to facilitate ROGG through coordination with and use of lands managed by the SFWMD may provide opportunities to enhance regional greenway networks through the implementation of ROGG. Direct implications for ROGG includes the use of ROGG facilities to meet the plan objectives for SFWMD to provide outdoor recreation activities for both hiking and biking (non-consumptive use) and fishing and hunting (consumptive uses).

Everglades National Park – Draft General Management Plan / East Everglades Wilderness Study / Environmental Impact Statement (GMP); 2013

The last comprehensive planning effort for ENP consisted of a GMP completed in 1979, but the NPS is now in the process of preparing a new GMP for the ENP. Since the time of the original GMP, the context for the use and protection of the ENP has changed due to the initiation of regional restoration efforts associated with the CERP, the approval and acquisition of the East Everglades Addition that expanded the park boundary by more than 109,000 acres, and changes in the recreation needs of surrounding populations and visitors to the parks. In addition, the Draft GMP identifies management activities to address projected sea level rise of one to two feet over the next 50 years. The Draft GMP presents and analyzes four alternatives plans to managing ENP for the next twenty years and beyond. The NPS Preferred Alternative proposes consolidation of commercial airboat concessions in the park and designates approximately 90,000 acres of the East Everglades Addition as either wilderness or potential wilderness.

The Draft GMP documents that annual visitor numbers to the ENP have averaged slightly more than one million for the last twenty years with an unreported use in the range of 300,000 to 450,000 annually. Annually, more than 85,000 visitors come for backcountry camping within the ENP. Shark Valley and the Royal Palm entrances have exhibited the fastest increases in the number of visitors, while other entrances have seen declines in the number of visitors. There are large fluctuations in the number of visitors on a monthly basis with as many as 150,000 in February and March and only 30,000 in September. Visits have declined by about 25% in the aftermath of tropical storms Katrina and Wilma. Seventy-five percent of visitors are from outside Florida or the United States (20% international) or are seasonal residents. Canadians, Germans, French, Dutch and British nationals account for approximately 80% of the international visitors to ENP. Twenty-five percent of visitors stay a day or longer in the ENP area, while 11% stay three days or longer. Twenty percent of visitors said visiting ENP was their primary reason for their trip to south Florida.

The standards identified by the ENP for recreational experiences include encountering no more than four groups per day (when more than one mile from a trailhead) in the backcountry of the park during peak season (winter months). At Shark Valley, the standard identified by the ENP is 400 to 500 people within the facility at one time at peak times, including those along the loop road and in the parking/restroom areas. Strategies outlined by the GMP to achieve these standards and goals include:

- Establish new trail opportunities to better distribute use
- Provide alternative recreation opportunities and direct visitors to those locations
- Initiate alternative transit and/or shuttle to Shark Valley option (at least during peak season)
- Implement slower speed zone near roosts
- Educate about low impact practices
- Add appropriate education/regulations signs
- Provide real-time parking and access opportunities information

Relevance to ROGG: Details of the NPS Preferred Alternative in the Draft GMP with particular relevance to the feasibility assessment and master plan for ROGG include:

- **Destination** – The Shark Valley Visitor Use Area is a destination for potential ROGG users for environmental education and outdoor passive recreation opportunities. Currently, most visitors access this area by car via U.S. 41 as alternative access options are limited. The GMP identifies establishing new trail opportunities and alternative access options, such as transit or shuttles, to better distribute visitor use and accommodate seasonal visitation rates and assist in meeting the strategies outlined in the GMP for new trail opportunities to better distribute visitor use in non-wilderness areas. Although outside of the main ROGG Study Area, the Draft GMP identifies improvements at the Everglades City entrance to the ENP, including a new modest-sized visitor center (Marjory Stoneman Douglas Visitor Center) and canoe/kayak ramp and launch, which would potentially be a long-term destination for a spur from ROGG. Opportunities to use ROGG facilities to expand the trail options and provide more distributed access to the facility were evaluated as part of the feasibility assessment and master plan study. Similarly, options for transit service accommodated or facilitated by ROGG facilities were evaluated.

- **Seasonal Visitation Rates** - Visitation for the park is significantly variable over the course of each year. During peak periods, the high traffic loads and parking requirements can overwhelm the existing parking facilities, resulting in parking in non-designated areas and limited access for later arriving visitors, especially at the Shark Valley Visitor Use Area. Crowded facilities and limited access can compromise visitor experience and decrease opportunities for environmental education for those wishing to attend the park. Trail facilities for ROGG may enhance pedestrian access to the ENP. Opportunities to spread out visitor use and provide additional access options, albeit from longer distances, are options evaluated for ROGG.

- **Airboat Facility Consolidation** – The plan includes the consolidation of commercial airboat operations in the eastern portion of U.S. 41 to one location at the current Gator Park facility and the closure of other facilities to public access. This consolidated facility would become a destination location for ROGG, although access to the facility would need to occur consistent with regional hydrological restoration objectives and improvements. As such, access to the facility was considered as part of the ROGG feasibility assessment and master plan study.

- **Environmental Education Improvements** – The plan identifies objectives to expand education and recreation opportunities (hiking, bicycling, wildlife viewing and learning about Everglades restoration and history) along U.S. 41 and the eastern boundary of the ENP in cooperation with public and private entities

involved in the Tamiami Trail Next Steps modification projects. This could include a series of visitor information kiosks and turnouts provided along U.S. 41 and an overview of natural and cultural resources and restoration. The visitor orientation and environmental education components were evaluated as activities that could be incorporated into and/or facilitated by ROGG facilities, including as part of trailheads and as part of an overall wayfinding program within ROGG.

- **Water Access** – The ENP Draft GMP includes a proposal to provide canoe and kayak launches along U.S. 41 at either the L-67 levee extension access at the western edge of the East Addition or at Gator Park. These facilities would provide additional destination stops for ROGG and enhance the types of recreation activities that could be accessed from ROGG. Opportunities to connect to future canoe/kayak launches and establish compatible trail stops at the facilities were evaluated as part of the feasibility assessment and master plan for ROGG.

- **Wilderness Designations** - An east-west strip (1,320 ft. wide) along the boundary of ENP along U.S. 41 is excluded from wilderness consideration. Although primarily to allow for modifications to U.S. 41 for improved water delivery to Shark River Slough, the lack of a wilderness designation provides more flexibility for improvements necessary to address visitor use issues consistent with the GMP as well. Options to use ROGG to address access issues consistent with the GMP requirements for both wilderness and non-wilderness areas within the ENP were evaluated as part of the feasibility assessment and master plan study.

- **Agency/Tribal Coordination** – The draft GMP calls for continued coordination with other agencies and the Miccosukee Tribe to determine feasibility of sharing resources and facilities to meet park and tribe goals. The Miccosukee Village facilities occur west of the Shark Valley Visitor Area and include extensive parking areas for visitors to the Village. Options to accommodate potential connections between the Miccosukee Village and the Shark Valley Visitor Use area were evaluated for ROGG.

Transportation Studies

Federal Lands Alternative Transportation Systems Study; 2001

The FHWA and FTA undertook an assessment of the transportation needs for all federal lands, including those of the NPS, the Bureau of Land Management, and the USFWS. At the time the document was completed in 2001, the study estimated that approximately $678 million would be needed for alternative transportation systems, defined as transit, on federal lands by 2010. The study outlined TEA-21 and the Transit in Parks Act and justified investment in transit on federal lands as a mitigation measure against traffic, noise, and pollution that severely compromise the visitor experience.

The study listed existing systems in parks and put forth recommendations and estimated costs for transit systems for each. In ENP, visitation is listed as 1,000,000 visitors per year with tram and boat tours documented as the alternative transportation options available. The study recommended improvements to the existing options available but did not recommend a new type of system or additional specific options for alternative transportation for ENP. This study is very broad and provides no specifics on the needs in ENP, nor does it document needs in Big Cypress National Preserve or the state parks in the ROGG Study Area.

Relevance to ROGG: Details of the Federal Lands Alternative Transportation Systems Study with particular relevance to the feasibility assessment and master plan for ROGG include:

- **Transit Planning Guidelines** – The document includes no specific recommendations about alternative transportation options for the federal parks within the ROGG Study Area, but does provide a framework for calculating costs for conceptual transit facilities within public lands. This important framework is captured in Appendix C of the report and provides a list of parameters that impact costs for transit, including assumed transit operating speed, service headway, hours of operation, operating costs for vehicles, capital cost for vehicles and associated facilities, and requirements for vehicle maintenance facilities for the study. For each parameter, it provides potential assumptions that were used in calculating costs. Although these were assumptions for the study, they provide a potential framework for evaluating potential transit services that would be part of or supplement ROGG.

- **Transit Importance** – The document highlights issues such as traffic, noise, and pollution that can compromise visitor experience and opportunities transit presents for addressing these issues for park operations. As visitation has increased in general for federal parks, the desire for the public to experience the parks has also grown. This has led to compromised experiences due significantly to the number of vehicles that need to be accommodated as well as to the number of visitors in total. The results of this study do establish the importance of investment in transit for park lands to mitigate issues on visitor experience and potential impacts to natural and cultural resources. This condition is consistent with the operation at Shark Valley during the peak season, as lines of cars can wait for long periods of time for available parking spaces. Options to incorporate transit in ROGG, including existing destinations and locations throughout the length of the ROGG, were evaluated as part of the feasibility assessment and master plan.

Miami-Dade MPO Bicycle Facilities Plan; 2001

This Bicycle Facilities Plan pre-dates the current Bicycle and Pedestrian Plan from 2009 as the guiding document for bicycle facilities in the County. The plan builds on the 1997 Bicycle Plan through a re-assessment of bicycle facility needs, identification and prioritization of bicycle facility projects, and development of a funding plan. The MPO used a quantitative bicycle level of service analysis coupled with a needs analysis to prioritize areas for improved bicycle facilities. All references to facilities along U.S. 41 in the recommendations section are categorized as unfunded and some are also listed as a low priority due to right-of-way constraints.

Relevance to ROGG: Details of the Miami-Dade MPO Bicycle Facilities Plan with particular relevance to the feasibility assessment and master plan for ROGG include:

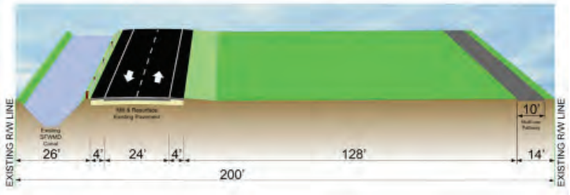
- **Plan Consistency** – This plan includes a route identified as part of the Bicycle Network along U.S. 41/ SW 8th Ave. extending from downtown Miami to two miles west of Krome Ave. (NW 157th Ave.) with an E or F Level of Service and a Low Latent Demand Score for the segment west from SW 122th Ave.

U.S. 41 PD&E Study: Project Development Summary Report; 2008

The Project Development Summary Report for the U.S. 41 PD&E Study documents FDOT's Project Development and Environment Study to assess the widening and reconstruction of U.S. 41 between Collier Boulevard (C.R. 951) and San Marco Drive (C.R. 92). This portion of U.S. 41 connects the urbanized setting of Naples to Collier-Seminole State Park. The report provides recommendations to widen U.S. 41 to a six-lane divided suburban road east to Joseph Lane, convert to a four-lane suburban road from Joseph Lane to 6 L's Road, and to remain as a two-lane road from 6 L's Road to San Marco Drive. The report includes a recommendation to resurface the portion of the road that would remain as a two-lane facility. The study also recommends traffic signals at four currently un-signalized intersections.

Relevance to ROGG: Details of the U.S. 41 PD&E Study Project Development Summary Report with particular relevance to the feasibility assessment and master plan for ROGG include:

- **Off-Road Facilities** - Segment 4 (from 6 L's Road to C.R. 92/ San Marco Road), Alterative 4C is the recommended plan and includes a ten foot multi-use facility on the south side of the roadway and adjacent to the existing ROW. This includes a separation of 128 feet from the edge of pavement of U.S. 41. The pathway is recommended to extend to Collier-Seminole State Park and connect to existing trails within the park. This facility could be incorporated into the ROGG trail.



Two-lane Typical Section From 6 L's Road to C.R. 92 (San Marco Road), Alternative 4C

Miami-Dade MPO Bicycle And Pedestrian Plan Update; 2009

The Miami-Dade MPO prepared the Bicycle and Pedestrian Plan Update to provide a framework for making Miami-Dade County a model region for cycling and pedestrian activity where the activity is convenient and useful transportation and recreation for a variety of user groups. The purpose of the plan included a variety of elements, including defining goals and objectives for bicycle and pedestrian development in the County, incorporation of planning efforts for pedestrian and bicycling in the County Long-Range Transportation Plan, and guidance for various agencies for bicycle/pedestrian facilities. The Plan includes an existing conditions analysis, needs assessment, and recommendations for the region.

The Plan does not mention U.S. 41 or ROGG in the text, but several maps denote the portion of the highway near Krome Avenue. U.S. 41 is listed as a road with a paved shoulder along some segments that are appropriate for cycling. The document does not include references to ROGG. Several maps accompany the Plan. First, the existing On-Road Bicycle Facilities Map categorizes U.S. 41 as having a paved shoulder and counts it among the total 96 miles of paved shoulders in the region's bicycle facilities inventory. In the Off-Road Bicycle Facilities Map, U.S. 41 is also designated as having an unpaved trail. Despite these designations, the bicycle level of service along U.S. 41 is categorized as very poor. The Plan categorizes each road in the region according to level of need for bicycle infrastructure. U.S. 41 is categorized as having "Very Low Need" for on-road bicycle facilities and "Moderate Need" for off-road.

Relevance to ROGG:
Details of the Miami-Dade MPO Bicycle and Pedestrian Plan Update with particular relevance to the feasibility assessment and master plan for ROGG include:

- **Transit/Bicycle Access Integration** - Recommendations for connections between transit facilities and bicycle/pedestrian facilities were presented in the plan to address tourists and recreational cyclists who may prefer exploration via bicycle rather than automobile as well as to provide additional options for residents to access new areas with a bicycle. These recommendations included amenity components, such as providing lockers at transit facilities, as well as programmatic components for transit authorities such as improve access in transit vehicles for bicycles. The feasibility assessment and master plan for ROGG included evaluations of these recommendations for areas where trail facilities and transit overlapped.
- **Evaluation Criteria** – The plan provides evaluation criteria for prioritizing projects within the County consistent with goals established in the plan. These criteria range from safety and level of service provided by a project to measures for connectivity and cost feasibility. The report includes a calculation assessment similar to roadway Level of Service calculations for bicycle use, which is a contributing factor for the evaluation criteria. Although several of the criteria are more urban in focus, the methodology used provides a potential model for evaluation criteria for ROGG segments, including using stakeholder groups to identify and weight the criteria.
- **Funding Sources** – The plan provides an overview of funding sources that were available at the time of publication for bicycle and pedestrian improvements, including traditional and non-traditional sources as well as grant funding. Traditional sources identified include the Transportation Equity Act for the 21st Century (TEA-21) and the Recreational Trail Program funds, while non-traditional funding sources identified included Adopt-a-Trail programs, land trusts, and State Water management funds. Grant funding options included REI Environmental Grants and private foundations. The funding sources identified in the plan provide a foundation for additional research for funding sources for the feasibility assessment and master plan for ROGG.
- **Design Options** – The plan identifies design components for a variety of categories that are pertinent to the feasibility assessment and master plan for ROGG, including safety and security, engineering improvements, and education and enforcement strategies. The section for safety and security includes recommendations for addressing the physical design of the facilities for elements such as lane widths and ADA accessible pathways as well as the safety and security principles that assist in behavioral uses of the trails. Engineering improvement recommendations include physical measures and/or traffic control devices that improve the function of proposed facilities. Education and enforcement strategies include enforcement of traffic rules for both vehicular and bicycling/pedestrian users, police patrols on bicycles for increased safety and security, and Variable Message Signs along roadways to educate motorists.

De-Designation Of The Tamiami Trail National Scenic Byway; 2009

This document summarizes the events leading up to the de-designation of the Tamiami Trail (U.S. 41) as a National Scenic Byway and outlining lessons learned. The original National Scenic Byway designation was applied for in 1998 and received in 2000. Collier MPO voted for de-designation in 2005, although the FDOT worked hard to advocate for keeping the designation. The roadway was de-designated in 2008. The document also noted that in 2008-2009, Florida had the highest National Scenic Byways funding of any state. The de-designation of the roadway was the first de-designation in Florida and for the National Scenic Byways Program.

Relevance to ROGG: Details of the De-Designation of the Tamiami Trail National Scenic Byway with particular relevance to the feasibility assessment and master plan for ROGG include:

- **Public Support** – This document noted a lack of grassroots support for the ongoing operations of the facility as a designated Scenic Byway as well as misconceptions concerning the federal requirements for designation as leading causes for the de-designation of the corridor as a National Scenic Byway. Perceptions were that the designation would limit access for hunters, require lowered speed limits, and increased level of traffic into Everglades City. These are similar issues that the various stakeholders have provided as comments on at public events for ROGG.

ETDM Summary Report; Project #12596 – River Of Grass Greenway; Planning Screen – Published On 01/29/2010

ETDM Summary Report; Project #12596 – River Of Grass Greenway; Planning Screen – Published On 04/19/2010

ETDM Summary Report; Project #12596 – River Of Grass Greenway; Programming Screen – Published On 03/11/2011

The Efficient Transportation Decision Making (ETDM) Process and the Environmental Screening Tool (EST) facilitate collaboration among regulatory and resource agencies, transportation planners, and affected communities within Florida so that these groups may review and comment on major transportation projects. An Environmental Technical Advisory Team (ETAT) comprised of representatives from planning, regulatory, and resource agencies review the projects in the Planning and Programming Phases to identify potential adverse effects and provide recommendations for mitigating or avoiding those effects. The three phases in the ETDM process include Planning, Programming, and Project Development. The Planning Screen document summarizes the initial screening of the ROGG project completed by the ETAT, provides details concerning agency comments, and provides additional documentation of activities related to the planning phase for the project. The Programming Screen initiates the State Environmental Impact Report (SEIR) for state-funded projects or the NEPA process for federally-funded projects. A portion of the western side of the ROGG Study Area has undergone several EST screenings. These documents review the Phase I of ROGG that extends from San Marco Road (mile marker 28.4) to S.R. 29 (mile marker 44.2).

1. Planning Screen – Published On 01/29/2010

The Planning Screen provided an overview of the proposed project, a summary of ETAT's review of potential effects from the proposed project, and detailed explanations for the effect determinations provided by the reviewing agencies for each category reviewed. Agency responses were received from the EPA, National Marine Fisheries Service (NMFS), FDEP, Natural Resources Conservation Service (NRCS), USACE, USFWS, FFWCC, and the FHWA. Agency comments noted that mobility and social features would be enhanced by the ROGG as the ROGG was identified in several planning documents in Collier County. The agencies determined that there would not be an effect on three categories: farmlands, infrastructure and navigation. The agencies also

determined that effects on air quality, contaminated sites, aesthetics, economic, land use, and relocation elements would be minimal, while effects on floodplains would be moderate. The agencies determined that substantial effects would occur to eight categories: coastal and marine, special designations, water quality and quantity, wetlands, wildlife and habitat, historical and archaeological sites, recreation areas, and Section 4(f) potential. The FHWA determined that secondary and cumulative effects would be moderate due to the potential for road widening activities resulting from potential additional traffic associated with ROGG trail users.

2. Planning Screen – Published On 04/19/2010

The updated Planning Screen provided an update for the proposed project including the participation of the NPS in the planning phase, a summary of ETAT's review of potential effects from the proposed project, and detailed explanations for the effect determinations provided by the reviewing agencies for each category reviewed. Agency responses were received from EPA, NMFS, FDEP, NRCS, USACE, USFWS, FHWA, FFWCC, Florida Department of State SHPO, FDOT District 1, and the Florida Department of Community Affairs. The evaluation of effects on various categories resulted in the same categorization as the initial planning screen, except for the reclassification of the land use category from minimal to moderate. The agencies maintained the determination that substantial effects would occur to eight categories: coastal and marine, special designations, water quality and quantity, wetlands, wildlife and habitat, historical and archeological sites, recreation areas, and Section 4(f) potential.

3. Programming Screen – Published On 03/11/2011

The Programming Screen contains additional clarification about the anticipated cost of the project and additional funding sources for the planning and design of the system, including through an NPS grant. Transportation plan consistency is addressed and this report updates the Screening with information about how ROGG is consistent with Collier County's 2020 Growth Management Plan and that it will be included in the Collier MPO 2035 LRTP. Agency responses were received from NMFS, FDEP, NRCS, USACE, USFWS, FFWCC, FHWA, Florida Department of State SHPO, FDOT District 1, the Florida Department of Community Affairs, the Miccosukee Tribe of Indians of Florida, and the Seminole Tribe of Florida. The status of six features was reclassified during the Programming Screening. Effects to farmlands, infrastructure, and navigation changed from none to minimal. Effects on water quality and quantity changed from substantial to moderate, and effects on historical and archeological sites changed from substantial to a potential dispute (programming). Economic effects changed from minimal to enhanced.

Relevance to ROGG: Details of the three ETDM screens for Phase 1 of the ROGG with particular relevance to the feasibility assessment and master plan for the overall ROGG include:

- **Recognized Greenway** – These reports document that the reviewed portion of the ROGG is included on pathways planning maps for the State of Florida Office of Greenways and Trails (highest priority level), North Dade Greenways Master Plan, the CERP Master Recreation Plan, Collier County Comprehensive Pathways Plan, and has been incorporated into the Collier MPO 2030 Long Range Transportation Plan. The reports (including the 03/11/11 Programming Screen) also noted that the FDEP Office of Greenways and Trails "supports the proposed project and has determined that the trail can be built to minimize environmental impacts while maintaining consistency with regional restoration efforts." The inclusion of ROGG on these plans provides avenues of future potential funding for improvements as well as an acknowledgement of the need and purpose for the ROGG.

- **Potential Impacts** – The agencies noted that the project would likely result in impacts to natural resources, including Essential Fish Habitat (EFH) habitats, wetlands, and listed species. The NMFS reviewer noted that there were 26 estuarine creek crossings and that bridging and/or fill activities would affect NMFS resources. Agencies noted that the site occurred an area with extensive wetlands and would likely result in wetland impacts, although the USACE reviewer did note that the focus should be on minimizing wetland impacts as avoidance of all impacts would be problematic. The USACE did note that the installation of culverts and/or additional bridges under U.S. 41 would likely be effective in mitigating potential impacts. Where wetlands were required, agencies noted that impacts to low-quality wetlands would be more appropriate than to high quality wetland systems. Agencies noted that several listed species were known to occur within the vicinity of the ROGG and that potential impacts to these species would need to be addressed through permitting and mitigation, especially potential impacts to the Florida panther as the proposed alignment extended through the Florida panther Primary Zone. The screens noted that future PD&E studies would require a Biological Assessment to address potential impacts to listed species from the ROGG. Scaling these comments to the entire length of ROGG, potential impacts to EFH, wetlands, and listed species resulting from proposed improvements will require consultation and/or coordination with the NMFS, USACE, USFWS, and other state or federal regulatory agencies through various permitting processes. Evaluations of resource impact minimization options, potential mitigation activities, and the costs and timeframes for permitting processes was included in the feasibility assessment for ROGG.

- **Design Recommendations** – Agencies provided design recommendations to minimize potential impacts to resources, including recommendations for proposed route alternatives, compatibility with regional restoration efforts, and stormwater treatment. Recommendations for route alternatives included placing ROGG on existing filled areas such as the road shoulder or disturbed maintained ROW edges of U.S. 41 to minimize impacts, and minimizing or eliminating improvements within public park lands outside of the U.S. 41 ROW. The FHWA noted that route alternatives that included trails that funneled to existing narrow bridges without additional separation from traffic would likely not be feasible due to safety considerations. Recommendations for compatibility with regional restoration efforts included designing trail facilities to aid sheetflow from the Picayune Strand restoration to pass both the trail and U.S. 41.

  Recommendations were provided for stormwater treatment and management including complying with regulations for the Big Cypress Area of Critical State Concern. These regulations require management of surface runoff quantity and quality (consistent with OFW standards), and drainage facilities that do not discharge directly to coastal waters. Scaling these comments to the entire length of the ROGG, opportunities to use existing infrastructure that has previously been filled would minimize impacts to the ROGG, although expansions to existing bridges would likely be needed to provide facilities wide enough for trail passage. The ROGG is required to be compatible with regional restoration efforts and should incorporate features to improve hydrology. Finally, opportunities to use the ROGG facilities to treat stormwater runoff both from the ROGG facilities and other untreated areas would be beneficial.
- **Cultural Requirements** – Agency comments noted that the ROGG could result in potential impacts to traditional cultural properties for the tribes, but would likely not have significant impacts to known archaeological and historical resources. The Miccosukee Tribe of Indians of Florida flagged this segment of ROGG as a potential dispute due to potential impacts to traditional cultural properties, including two camps and tribally owned lands. The tribe required consultation prior to advancing elements of the ROGG. Other comments noted a full Cultural Resource Assessment Survey (CRAS) had not yet been completed for the corridor and would be required prior to implementation of the ROGG. As part of the CRAS, determinations concerning the eligibility for the Tamiami Road and Canal and Collier-Seminole State Park for potential listing with the NRHP would need to be conducted. Considerations for the feasibility assessment and master plan for ROGG include the consultation requirements with both the Miccosukee and Seminole Tribes, completion of a CRAS for the entire length, and Section 106 Consultation if NRHP resources are identified within the corridor.

- **Required Regulatory Documents** – The Programming Screen included a substantial list of documentation that would be required as part of the PD&E process and/or as part of other permitting and consultation coordination. The FHWA noted that an EIS would likely be required for the ROGG. As part of future PD&E documents, the following reports would likely be required as part of the initial scoping meetings: Contamination Screening Evaluation Report; Floodplain Assessment; Navigation Study, Bridge Questionnaire, and USCG Bridge Permit; Water Quality Impact Evaluation and ERP; Wetlands Evaluation Report; Endangered Species Biological Assessment; and Section 4(f) Determination of Applicability. Additional federal, state, or local permits would be required, especially if work is required within adjacent public lands. Considerations for the feasibility assessment and master plan for ROGG include the extensive permitting and regulatory requirements for the site that will be required for any future improvements.

Florida Department Of Transportation AADT Report; 2011

FDOT provides the AADT counts for major corridors in the state on a regular basis, including for U.S. 41. Counts are provided for each year extending back to 1996. Though AADT has fluctuated, the trend in AADT is generally flat over the past 15 years. In 1996, AADT was 5,200, while it was 5,500 in 2011. Though these numbers indicate low traffic volumes overall, they do not account for differences in traffic volumes over the course of the year or during the day. Traffic varies seasonally and is higher in the winter months when more visitors are in the area. Traffic also varies by hour of the day, although the use of U.S. 41 more for recreational traffic than for commuting limits some of the daily variations seen in more urban settings. Peak hour traffic is generally low for rural areas and the percentage of traffic traveling in the peak direction is also different from the typical factors seen in urban areas with a strong commuting pattern. The level of truck traffic as a percent of the total remained generally consistent over the survey period, with some fluctuation.

Relevance to ROGG: Details of the FDOT AADT Report with particular relevance to the feasibility assessment and master plan for ROGG include:

- **Traffic Volumes** – Based on the information in the report, U.S. 41 is a relatively low volume rural roadway with seasonal variations in traffic volumes that vary with visitation rates at the parks in the corridor. Generally, the volumes present on the road would not support widening of the road or other improvements that would warrant the concurrent construction of ROGG. This information also suggests that the configuration and design of the roadway as well as vehicle characteristics such as speed and/or vehicle type have more influence on pedestrians and bicyclists in the corridor than traffic volume.

- **Vehicle Mix** – The relatively high percentage of trucks compared to the total traffic volume affects pedestrian and bicyclist experiences within the corridor. Opportunities to provide facilities for pedestrians and bicyclists that are separate from the road lanes can assist in mitigating effects of a disproportionate number of large vehicles, which was considered as part of the feasibility assessment and master plan for ROGG.

Figure 2. Historic Average Daily Traffic Counts Along U.S. 41

Collier MPO Comprehensive Pathways Plan; 2012

The Collier MPO created a Comprehensive Pathways Plan in 2012 to provide a framework for a road-based network of bicycle and pedestrian facilities for the County. The Plan also included an assessment of prioritized system needs, and program and policy recommendations to guide project selection. The plan identifies goals, existing conditions analyses, recommendations, and immediate next steps for implementing the system. A detailed table of recommended improvements and cost estimates is included for both bicycle and pedestrian improvements, including projects along U.S. 41 (see **Figure 3**).

The priority needs text and maps note that the paved shoulders available on U.S. 41 east of S.R. 29 are suitable for cycling and no additional bicycle facility need is listed for U.S. 41. The entire length of U.S. 41 in Collier County, however, is designated as lacking pedestrian sidewalk or shared-use path improvements. Another recommendation near U.S. 41 is the designation of San Marco Road as an important connector between bicycle facilities, presumably between Marco Island and U.S. 41, which is assumed to have a paved shoulder for cycling. These prioritized needs are listed, but no timeline for implementation is included in the plan.

The Collier MPO Plan specifically discusses the River of Grass Greenway. Following is the Plan's description of ROGG:

> *"The River of Grass Greenway (ROGG) is proposed to run parallel to Tamiami Trail (US. 41), the ROGG will be a hard-surfaced 12-14 foot wide corridor (separated from the highway) suitable for a range of non-motorized recreation activities such as bicycling, walking, bird-watching, photography, fishing, and general enjoyment of the greater Everglades natural area. ROGG will extend from Krome Avenue (at the eastern edge of Everglades National Park near Miami) to the Naples area, a distance of approximately 75 miles. Over 90% of the pathway will go through national and state parks, and will include spurs to nearby historic and cultural centers including Everglades City and the Miccosukee Indian Village. Parks include Everglades National Park, Big Cypress National Preserve, Ten Thousand Islands National Wildlife Refuge, Fakahatchee Strand Preserve State Park, Collier-Seminole State Park, and Picayune Strand State Forest." [sic]*

The Plan states that the MPO has typically not prioritized greenways in the past, in favor of making on-road improvements to the network. The Plan recommends consideration of a separate program and funding stream for greenway planning and lists this item as an immediate next step; however, the Plan does not include an implementation plan or specific funding recommendations for this type of program.

Relevance to ROGG: Details of the Collier MPO Comprehensive Pathways Plan with particular relevance to the feasibility assessment and master plan for ROGG include:

- **Identified Needs** – The plan documents a need for improved bicycle and pedestrian facilities within the ROGG Study Area. One need consisted of improvements to add paved shoulders for bicycle use from S.R. 29 to Turner River Road on U.S. 41. Pedestrian needs identified in the corridor included paved shoulders on C.R. 29 from U.S. 41 to Everglades City and paved shoulders on U.S. 41 throughout the

Figure 3. Collier MPO Comprehensive Pathways Plan Prioritized Need

Segment	Length	Priority	Project	Total Cost	TIP Funding
U.S. 41 East between S.R. 29 and Turner River Road	6.67 miles	Low	Paved shoulder, two sides & one side	$753,561	Env 2012/13 DEM $291,593 2013/14 $150,934
U.S. 41 East between Collier Boulevard and Mondago Lane	0.46 miles	High	Paved shoulder, one side	$30,823	CST 2012/2013 CIGP $3,180,888 LFP $8,005,019

Bicycle Priority Needs on U.S. 41

Segment	Length	Priority	Project	Total Cost	TIP Funding
U.S. 41 East between Collier Blvd and Duda Rd	3.62 miles	High	one side and two sides	$771,434	--
U.S. 41 East between Duda Rd and County Boundary	53.13 miles	Low	SW, two sides	$12,182,658	Rural – paved shoulder (most existing) may suffice

Pedestrian Priority Needs on U.S. 41

corridor to the County line. Proposed ROGG facilities would assist in meeting these needs.

- **Regional Connections** – The plan identifies current and needed regional network connections that could become additional access points or potential connections for ROGG. Although needed improvements are not yet funded or programmed, the identification of the needed improvements provides a long-term planning horizon for potential future improvements, which should be considered as part of a long-term implementation plan for ROGG. Future improvements for pedestrian and bicycle use identified in the plan, such as the paved shoulder installation on San Marco Road, provide potential connection points that were considered as part of the ROGG feasibility assessment and master plan.

- **Prioritization Approach** – The plan provides criteria and a scoring approach for prioritizing improvements. The criteria were established by a stakeholder working group as part of the plan development. Although several of the criteria are more urban in focus, the methodology used provides a potential model for evaluation criteria for ROGG segments.

- **Partnerships** – The plan acknowledges ROGG as a promising greenway project for potential implementation and recommends consideration for ROGG for funding. The MPO does not currently have a Greenways and Trails program. However, the plan identifies the need to establish a separate program to focus additional attention on these facilities. The plan notes the ROGG as a need and recommends that it should be considered for funding along with the other described greenways. Continued coordination with the MPO whether through a Greenways and Trails program or other funding program may provide a long-term partner for completion of the ROGG within Collier County.

Environmental Cultural Resource Documents

Central And Southern Florida Project Comprehensive Review Study Final Integrated Feasibility Report And Programmatic Environmental Impact Statement; 1999

The C&SF Project is a network of canals, levees, control structures, and water storage areas located in central and south Florida that was established for numerous reasons, including flood control, water reserves for urban and agricultural land uses, recreation, and navigation. Projects completed under the C&SF Project include the construction of levees around Lake Okeechobee, construction of levees to create Water Conservation Areas, the installation of drainage systems in the Everglades Agricultural Area and the lower east coast, and the channelization of the Kissimmee River. The C&SF Project has been in place for over 50 years and has resulted in extensive unforeseen environmental impacts to south Florida ecosystems. Environmental impacts attributed to the C&SF Project include a regional loss in function and resiliency of wetlands, reduced water storage capacity, altered natural marshes that have been impounded or drained, and an increase in the spread of exotic species and polluted water facilitated by the extensive canal and levee system.

The C&SF Comprehensive Review Study, or Restudy, was approved to review the status of the existing C&SF Project and make recommendations on how the C&SF Project could be modified to restore south Florida ecosystems while continuing to meet flood abatement and water supply. The study details the pre-drainage condition for the natural systems that once persisted in the 18,000 square mile study area, the existing conditions, anticipated future conditions in a "without plan" scenario, the recommended plan, and an implementation strategy. The Restudy also provides necessary information on how to comply with environmental requirements and public involvement. The recommended Comprehensive Plan includes an explicit list of construction and operational features, pilot projects, real estate considerations, adaptive assessment and monitoring methodologies, fish and wildlife mitigation, new feasibility studies, future improvements to the plan, and cost estimates and sharing. The USACE approved this document and Congress incorporated it into the Water Resources Development Act of 2000 to provide the framework that guides future modifications to the C&SF Project.

Components of the C&SF Project and/or restoration projects identified in the Restudy occur throughout the ROGG Study Area. The expansive WCA3 occurs on the north side of U.S. 41 in the eastern portion of the study area. Levees constructed as part of the C&SF Project bound the southern, eastern and western edges of the WCA3 within the ROGG Study Area, including the L-28, L-29, and L-31. Several canals, including the L-67A and L-67C, occur adjacent to the levees. The Restudy identified the need for modifications to these canals and levees to improve water flow into the Shark Valley Slough. Roads and canals from a failed historical subdivision occur north of the western portion of the ROGG Study Area. CERP identified restoration activities as part of the Picayune Strand Restoration Project to degrade these roads and fill the canals to improve sheetflow and hydrology.

Relevance to ROGG: Details of the CERP with particular relevance to the feasibility assessment and master plan for ROGG include:

- **Regional Hydrological Restoration** – CERP is the primary driver for regional hydrological restoration efforts, which will establish the prevailing physical conditions, improvements and infrastructure that must be accommodated by ROGG. Any aspect of ROGG that would compromise the fundamental objectives or implementation of regional hydrological restoration efforts are considered infeasible for this study. The post-restoration configurations and conditions for infrastructure, water levels, and/or flows underlie the feasibility evaluations of routing alternatives and design options for ROGG. The water levels and flow requirements for post-restoration systems set the baseline for the design of trail surface elevations and stormwater treatment drainage requirements.

- **Infrastructure Availability** – Infrastructure from the C&SF Project, including levees (L-28, L-29, and L-31), canals, and water control structures, occur within the ROGG Study Area and were evaluated for feasibility as alternative routes for the ROGG. However, much or all of several of these levees have been identified for removal as part of the regional hydrological restoration efforts for CERP. CERP states that most or all of the L-28 and L-29 levees are identified for removal, although the near term phasing (next 10+ years) associated with CEPP focuses on the removal of only portions of the L-29 levee between the Blue Shanty flow way to the L-67 canal. As a consequence, the levees may remain in place for some limited period of time until other CERP projects upstream from the levees are completed. Therefore, the potential for the use of the levees as a temporary route for ROGG needs to be balanced with the possibility that the use of the levees as pedestrian and bicycle trails becomes so popular that it could undermine their removal as a part of the restoration plan.

- **Trail Crossings of Structures** – Water control structures are in place in several locations to manage water discharges within canals in the ROGG Study Area. Many of the structures include sufficient space to allow for vehicles to cross the structure, although this space is not always sufficient for both a vehicle and pedestrian to cross at the same time. Where ROGG can feasibly cross structures, potential routing options for ROGG must accommodate operations and security and allow for maintenance vehicle and pedestrian crossings. Modifications to some of these structures are anticipated as part of CEPP and CERP projects, which will provide opportunities to enhance the crossings during structural enhancements. Potential structure crossings were evaluated as part of the feasibility assessment and master plan for ROGG.

Final Recreational Off-Road Vehicle Management Plan Supplemental Environmental Impact Statement (EIS), Big Cypress National Preserve. Collier, Miami-Dade, And Monroe Counties, Florida; 2000

The NPS developed the Recreational ORV Management Plan to provide guidance on the management of ORV use within the 582,000 acres in the original boundaries of the Big Cypress National Preserve. This plan was required by the GMP for the Preserve as well as a 1995 litigation settlement negotiated between the Florida Biodiversity Project and several agencies and bureaus. The preferred alternative considered resource protection mandates of the NPS while providing reasonable recreational access. The document included an analysis of the effects of the preferred alternative on natural resources and visitor experience and found that implementing the preferred alternative would result in substantial beneficial effects to surface water flow, soils, and vegetation, which would limit ORVs to designated roads and trails and reduce the spatial extent of the Preserve affected by ORVs. The visitor experience for ORV users would be affected by limitations on access and by the need to conform with new rules and permit requirements. The document also noted that many visitors who do not use ORVs would perceive a benefit from reduced impacts to the scenic quality of the Preserve. In the ROGG Study Area, the ORV Management Plan identified trail access points and the need for orientation and education about the ORV trails. The Plan designated four main access points on or near U.S. 41, including the Burns Lake, Skillet Strand (north and south of U.S. 41), Monroe Station (north and south of U.S. 41), and Jetport. In addition, four access points were designated along Loop Road, including Sig Walker, Pace's Dike, Red Bird Lane, and Boundary Line. The Plan identified improvements for these access points primarily consisting of limited parking for ORV users, bulletin boards for information, and backcountry access permit stations, although some facilities would also include bathrooms and trash receptacles. The Plan also included provisions

for educating ORV users about access points, permit requirements, and resource requirements of the Preserve.

Relevance to ROGG: Details of the ORV Management Plan Supplemental EIS with particular relevance to the feasibility assessment and master plan for ROGG include:

- **ORV Access** – The use of ORVs has been and is a significant recreational activity within the Preserve. These vehicles allow access to hunting and camping locations, and provide a unique way to experience the natural resources of the Preserve. These vehicles typically move quickly along trails and introduce vehicle noise to surroundings. For portions of ROGG that would occur in the vicinity of ORV trails and access points, educational and informational signs that notify potential ROGG users of the ORV use in vicinity would be needed to reduce potential conflicts. Conversely, notifications would be needed for ORV users and trails for areas where the trails would cross ROGG. In locations where ROGG crosses an ORV trail, the ROGG facilities will need to accommodate the passage of the various ORV vehicles.
- **Trailheads** – The access points designated for ORV use provide opportunities for rest stops and/or trailheads for the ROGG. Because the access points are primarily for ORV use and parking, use of the area as an initiation point for ROGG trail users with the concomitant parking for non-ORV user vehicles may lead to potential pressures on parking. Considerations for the access points that can accommodate ROGG parking as well as ORV parking was considered as part of the feasibility assessment and master plan for ROGG.
- **Public Involvement** – Although ORV users are not the largest group of users within the park, they are very active in advocating for the ORV use in public meetings, through regulatory processes, and other forums. A significant subset of ORV user group have been recreating with ORVs in the lands comprising the Preserve since prior to the formation of the Preserve and were also part of the initial coalition of groups that help get the Preserve established. As such, improvements for ROGG that would result in actual or perceived modifications to ORV access would receive extensive public scrutiny, which may provide limitations on timing, funding, or feasibility of installation of those facilities.

Biological Opinion For The Final Recreational Off-Road Vehicle Management Plan And Supplemental Environmental Impact Statement: Big Cypress National Preserve; Permit No. 4-1-00-F-550; 2000

This Biological Opinion (BO) was issued by the USFWS on July 14, 2000 in conjunction with the ORV Management Plan completed for the Big Cypress National Preserve. Determinations made by the USFWS for the ORV plan included a "no effect" determination for West Indian manatee and eastern indigo snake; a "may affect, but is not likely to adversely affect" determination for the red-cockaded woodpecker, wood stork, Everglade snail kite, Cape Sable seaside sparrow, and bald eagle; and a "may affect, likely to adversely affect" determination for the Florida panther. The BO provided detailed documentation about Florida panthers in the vicinity of the Preserve, including documentation that the Preserve contained the home range for 38% of the known Florida panther population at the time of publication. In addition, documentation of the anticipated effects was provided for the other species for which effect determinations were made. Based on the analyses included in the BO, the USFWS made a determination that the ORV Plan would not likely jeopardize the Florida panther. Consistent with the conditions of this BO, NPS reduced trails in Bear Island and initiated research and monitoring in Bear Island and other areas to assure that ORV use is compatible with panther use.

Relevance to ROGG: Details of the ORV Management Plan Biological Opinion with particular relevance to the feasibility assessment and master plan for ROGG include:

- **Species Involved** – The ORV Plan BO included effect designations for Florida panther, Cape Sable seaside sparrow, eastern indigo snake, West Indian manatee, wood stork, bald eagle, red-cockaded woodpecker, and Everglade snail kite. For all or parts of ROGG determined to be feasible, final design and engineering will more specifically determine the impact to these or other state listed species. Improvements for ROGG would likely require consultation and coordination for all or a subset of these species with the USFWS, even if similar determinations ultimately result in determinations of "may affect, not likely to adversely affect."
- **Florida Panther** – The BO included a summary of the permitting history and mitigation requirements for a variety of projects for which impacts to Florida panthers were anticipated or proposed. The majority of these projects required the acquisition of habitat and/or purchase of panther habitat units from a certified mitigation bank to address potential impacts caused by the project. These mitigation measures were considered as part of the feasibility assessment and master plan for ROGG.
- **Public Involvement** – Potential impacts to listed species resulting from construction projects can be subject to extensive public review and comment as part of coordination and consultation efforts required for various permits and reviews. In the past, regulatory review of potential environmental impacts has resulted in extensive public input. Potential improvements associated with ROGG that will require adverse effects to the populations of listed species in the area will be subject to extensive public scrutiny.

Scenic Corridor Visitor Safety Highway Improvements Environmental Assessment; 2001

The NPS prepared this EA to assess the feasibility of the improvement or establishment of ten interpretive stations (turnouts) along U.S. 41, Turner River Road, and Loop Road within Big Cypress National Preserve. These stations were identified to improve safety, decrease accidents, and improve visitor experience on U.S. 41 that is otherwise compromised by the lack of adequate turnouts, high traffic speeds, and park visitor tendencies to pull off the road in undesignated areas. Seven of the identified interpretive stations, including the Preserve headquarters, Dona Drive, HP Williams Picnic Area, Turner River canoe access, Burns Lake campground, Kirby Storter Park, and Monument campground, occur along U.S. 41. Two of the proposed stations occur along Loop Road (Gator Hook and Sweetwater Strand), while the Turner River Trailhead occurs on Turner River Road. Elements such as bulletin cases for safety and interpretive information, deceleration and acceleration lands at parking areas, controlled parking facilities, stormwater facilities, elevated boardwalks, and restrooms were typically included for each site. The EA noted that wetland impacts would result from site developments including new kiosks, acceleration/deceleration lanes along U.S. 41, parking facilities, restrooms, boardwalks, and viewing platforms. The EA concluded that the Preferred Alternative would provide safer access for visitors to experience the Big Cypress National Preserve due to safer turnouts, improved interpretive opportunities, and a reduced number of traffic accidents.

Relevance to ROGG: Details of the Scenic Corridor Visitor Safety Highway Improvements Environmental Assessment with particular relevance to the feasibility assessment and master plan for ROGG include:

- **Pull-Off Parking** – Current visitor practices include visitation not only to defined parking facilities associated with wayside parks, Oasis Visitor Center, and the Welcome Center, but also opportunistic parking in the maintained ROW of U.S. 41 to view resources of the Preserve. Similarly, hunters and other residents often park on the sides of the road to access hunting or recreational areas in the Preserve. Through years of use, some areas have become informal pullout locations. These informal pullout locations typically are inadequately sized and/or occur in areas with limitations on sight lines. This EA included public comments that noted a continued desire for this practice of engaging in undefined parking along the U.S. 41 maintained ROW. This practice distributes visitors throughout the Preserve, but does expose visitors to potential conflicts with traffic on U.S. 41. In addition, pull-off parking in the maintained ROW has the potential to be restricted or in conflict with trail facilities that would be placed in the maintained ROW as part of ROGG. Trail facilities for ROGG that would constrain pull-off parking would likely be subject to extensive public scrutiny during public review processes.
- **Turn Lanes** – The EA included alternatives that included turn lanes at the formal wayside parks to improve vehicular access. These turn lanes would provide opportunities for vehicles to be out of the main lane of traffic for deceleration or acceleration and improve safe turns into and out of facilities. ROGG facilities that would be placed on the maintained ROW would need to accommodate the additional width of the turn lanes for the road section.
- **Trail Amenities/Trailheads** – The turnout areas provide opportunities for trailheads and/or trail rest stop amenities that would supplement ROGG. The parking facilities at these turnouts could provide short-term parking for ROGG users, while restrooms and boardwalks at the turnouts could limit their need facilities in other portions of the ROGG. The ROGG could build upon the materials available at the turnouts for an expanded interpretive program.

Historic American Buildings Survey: Monroe Station; 2007

The building at Monroe Station was added to the NRHP in 2000 due to its history as a way station along U.S. 41 and the exploration and visitation patterns that it supported. In 2007, the NPS conducted a building survey that documented the history of the building as well as the historical context in which it occurred. This report summarized the history of construction, original and subsequent occupants, original architecture, alterations and additions, and the historical context that the building served as a police station and stop along the Tamiami Trail. The report notes that the building is a rare example of vernacular roadside architecture from the dawn of American highway construction.

Relevance to ROGG: Details of the Historic American Buildings Survey for Monroe Station with particular relevance to the feasibility assessment and master plan for ROGG include:

- **Historical Cultural Resource** – The Monroe Station building is an example of a cultural resource representative of the historical uses and activities on U.S. 41. As such, it is an opportunity for interpretation as well as a potential constraint to future improvements in the area. The listing of the building on the NRPH requires that modifications to the building undergo Section 106 coordination with SHPO to evaluate potential adverse effects. The survey for Monroe Station serves as an example of the level of detail that may be needed for improvements in and around potential cultural resources along ROGG.

- **Wayside Park** – The wayside park character of the building and adjacent parking facilities provides opportunities for future trailhead and parking connections for ROGG consistent with ORV access trailhead improvements. Opportunities to incorporate the building and/or the setting of the facility in the trailhead plan were evaluated as part of the feasibility assessment and master plan for ROGG.

Documentation And Evaluation Of Coopertown (8Da6767) And The Airboat Association Of Florida (8Da6768) And An Assessment Of Effects Of Modifications To Tamiami Trail: Next Steps Draft Environmental Impact Statement, Miami-Dade County; 2009

During July 2009, New South Associates conducted a study in Miami-Dade County to support the Tamiami Trail Modifications "Next Steps" EIS and comply with Section 106 of the National Historic Preservation Act. The EIS was related to the construction of additional bridging on the U.S. 41 to increase flow of water between the Everglades north and south of the highway. An architectural history survey was conducted and re-evaluation was performed on two properties previously recorded in the project area: Coopertown Restaurant and Airboat Rides (8DA6767) and the Airboat Association of Florida (8DA6768). Both of these properties have been determined eligible for listing in the National Register of Historic Places. Additionally, the Airboat Association of Florida property was evaluated to determine if remains over 50 years old were present, although no such remains were discovered. A third location, the Miccosukee Osceola Camp, was also proposed for recording and assessment of structures and for evaluation as a possible TCP, but access to the property was not granted.

This report included a discussion of proposed design alternatives and a consideration of their respective effects on the historic resources at Coopertown and at the Airboat Association property as well as on U.S. 41 (8DA6510) and Shark River Slough National Register Archaeological District. Because access to Osceola Camp was denied, it is unknown whether this location contains structures over 50 years old that should be recorded and evaluated. The EIS determined that only Coopertown would experience direct adverse effects from all of the proposed alternatives associated with the U.S. 41 road raising and bridge construction work. The preferred alternative included the construction of a 1.75-mile bridge in front of Coopertown, which would require access ramps and other infrastructure to reach the property.

Relevance to ROGG: Details of the Evaluation of Coopertown and Airboat Association of Florida with particular relevance to the feasibility assessment and master plan for ROGG include:

- **Cultural Resource Assessments** – The Airboat Association and Coopertown Restaurant represent historical complexes for the tourism trade along U.S. 41. Similar to Monroe Station, improvements to properties like these subject to listing on the NRPH would require Section 106 coordination with SHPO to evaluate potential adverse effects. The survey for these facilities serves as an example of the level of detail that may be needed for improvements in and around potential cultural resources that would be required for ROGG.

- **U.S. 41 Historical Designation** – This assessment noted that U.S. 41 was eligible for listing on the NRPH since the facility was constructed more than 50 years ago. The analysis of effects on cultural resources in the document noted that addressing the hydrological impact caused by U.S. 41 through the Tamiami Trail Next Steps project could not be completed without affecting the highway. For ROGG, the designation of U.S. 41 as potentially eligible for listing on the NRPH would need to be addressed through appropriate consultation with SHPO for improvements that may be required on historical road facilities, although some improvements, such as improvements for hydrological conveyance, may be acceptable pending the consultation.

Environmental Assessment For The Loop Road Improvements, Big Cypress National Preserve, Florida; 2010

The NPS proposed to rehabilitate and repair damage along 16.53 miles of Loop Road to improve safe access for visitors and improve drainage under the roadway. Loop Road is the main scenic drive through Big Cypress National Preserve that provides access to the Loop Road Education Center and is used by thousands of visitors each year. The proposed project included rehabilitation of five miles of paved portions of the road and 11.53 miles of unpaved portions of the road by raising the road surface elevation, replacing old culverts, and installing new culverts to facilitate water flow under the roadbed. This rehabilitation was necessary in part due to damage from Hurricane Wilma in 2005 that resulted in degradation of the roadway. In some locations, road degradation included erosion of the road shoulders and a potential safety hazard for users. Resource topics included in the EA included water quality, hydrology, wetlands, wildlife, special status species, cultural landscape, and visitor use, recreational resources, and transportation. No major impacts were anticipated as a result of the project. NPS found that the preferred alternative would have no adverse effect on the historic character of Loop Road, which was concurred with by SHPO.

Relevance to ROGG: Details of the Loop Road Improvements Environmental Assessment with particular relevance to the feasibility assessment and master plan for ROGG include:

- **Routing Alternative** – Loop Road serves as an alignment alternative for the ROGG feasibility assessment and master plan as it provides an alternate route separate from U.S. 41. The road ROW is sufficient for the existing facilities, but is not sufficient for additional widening that would be required to provide a separated trail facility next to the road. The use of this route alternative for ROGG would require ROGG trail user access control in the residential portions of Loop Road to limit potential impacts to private landholders. If incorporated into ROGG, additional trailheads or rest stops would be required along portions of the road due to the length from Monroe Station at the western terminus to the eastern terminus at U.S. 41 near the Miccosukee Village. The NPS has planned several future ORV access points along the Loop Road that may provide joint facilities for ROGG.

- **Loop Road Surfacing** – Portions of the eastern end of the road that provides access to residential houses has been paved, while the remainder of the facility is surfaced with aggregate. Public comments provided in the EA noted a desire to maintain the historical character of Loop Road, including maintaining the non-paved surface. The proposed improvements for the EA provided stabilized road surface sufficient for some bicycling uses. Additional minor changes that enhance the surface through the removal of larger aggregate chunks would assist in improving the surface for bicycling. The feasibility assessment and master plan for ROGG included an evaluation of potential road surfaces that would sustain bicycle use within the context of the public comments concerning surfacing conditions provided in the EA.

- **Hydrological Restoration** – Simular to U.S. 41, the Loop Road restricts the natural sheetflow of the region. The Preferred Alternative included the installation of culverts distribute water under the roadway. Additional opportunities to add culverts or bridges in areas where sheetflow enhancements are needed may provide mitigation for potential wetland impacts in the ROGG.

Tamiami Trail Modifications: Next Steps/ Environmental Impact Statement – Everglades National Park, Florida; 2011

In response to Congressional direction, the NPS prepared the Tamiami Trail Modifications: Next Steps EIS to evaluate additional bridging modifications to U.S. 41 to more fully restore hydrology in the ENP and Northeast Shark River Slough. These evaluations expanded upon the one mile bridge identified in Mod Waters and was required to be compatible with CERP. These evaluations included several assumptions, including providing access to commercial airboat operators and Native American camps located along U.S. 41 and a 0.5 mile buffer between all bridge approaches and Native American Indian camps located within the project area. The NPS determined that an alternative with 5.5 miles of bridging (Alternative 6e) most closely met the objectives of the project, while preserving important historic, cultural, and natural resources within ENP.

Within the ROGG Study Area, the preferred alternative consisted of the construction of six bridges ranging in length from 0.4 mile to 2.6 miles and elevating the remainder of the roadway to allow for higher water elevations in the L-29 canal. This alternative also included bridge down ramps to service the Everglades Safari and Coopertown sites. The primary long-term recreational impact identified within the EIS was the removal of bank fishing in areas with new bridges. The EIS did assess the feasibility for adding a bike trail to the proposed bridges and elevated roadways. However, the Preferred Alternative did not include a separate bike trail on the bridges or road, but maintain five-foot wide shoulders to provide on-road bicycle facilities due in part to the anticipated costs ($6 million per mile for bridges and $600,000 per mile for the road). The EIS noted that an analysis of impacts from a bike trail would be required if the bike trail was added to the final design of the project.

Relevance to ROGG: Details of the Tamiami Trail Next Steps EIS with particular relevance to the feasibility assessment and master plan for ROGG include:

- **Section Limitations** – The construction of bridges and elevation of the roadway within the eastern portion of the ROGG Study Area will limit the potential for trail facilities to be placed on existing infrastructure. The elevated roadway sections include two 12-foot wide travel lanes with a five-foot paved shoulder and an additional 6.5 foot wide grassed shoulder on each side of the roadway. The shoulders would be bordered by a guardrail. Sections for the bridges were anticipated to be 44 feet between parapet faces, which would allow for two 12-foot wide travel lanes and 10-foot shoulders. The design of the bridges included in the EIS did not include a separate bike trail facility. The shoulder widths identified in the EIS as well as the guardrail location would preclude the construction of a separated bike trail facility within the proposed sections. However, the wide shoulders would accommodate an on-street bike lane, although this lane could be interrupted by emergency pull-offs.

Routing options for ROGG within the improved U.S. 41 resulting from this EIS would require on-street trail configurations or modifications to the existing design to add a separated bike facility. For cost effectiveness, incorporation of a separate bike trail would need to be included prior to the final design of construction plans for bridges. The feasibility assessment and master plan for ROGG included evaluations of on-street, add-on separated bike trails, and trail facilities that were incorporated into revised designs for the bridges and roadway.

U.S. 41 (S.R. 90) Tamiami Trail Project Development And Environment (PD&E) Study: Environmental Determination; 2011

This Type 2 Categorical Exclusion study evaluated potential impacts for the proposed shoulder widening and guardrail installation along a 32.3 mile portion of U.S. 41 extending from S.R. 29 in Collier County to the Collier County/Miami-Dade County line. The focus of the shoulder work was to extend the paved shoulder on each side by two feet for a total of a four foot paved shoulder. Guardrails would also be replaced on bridge structures and approaches. These improvements were proposed within the existing ROW. The document included an assessment of social, cultural, physical, and environmental impacts. Also included were details from public hearings and other public outreach conducted as part of the assessment. The work authorized under this PD&E was completed in spring and summer of 2013.

Relevance to ROGG: Details of the U.S. 41 Tamiami Trail PD&E Study Environmental Determination with particular relevance to the feasibility assessment and master plan for ROGG include:

- **Cultural Resources** – A CRAS was completed along the 32 mile corridor that found seven previously recorded resources and 46 newly recorded resources within the U.S. 41 ROW. All 46 newly recorded resources were found to be not eligible for listing on the NRHP. A CRAS will likely be required for any additional improvements associated with future ROGG facilities.

Environmental Assessment; Designated Orv Trailheads And Turn Lanes; Big Cypress National Preserve, Florida; 2012

The NPS completed this EA for the Big Cypress National Preserve to assess the feasibility of trailheads and turn lane construction at access points designated in the previous ORV Management Plan. The Preferred Alternative covered improvements at eight of the 15 access points originally identified in the ORV Management Plan, including Skillet Strand (north and south), and Monroe Station South access points on U.S. 41 and Sig Walker, Pace's Dike, and Boundary Line access points on the Loop Road. Except for Skillet Strand South, all of these access points previously existed in at least some rudimentary form. Trailhead improvements included stabilized parking surfaces for automobiles and vehicles with trailers, single vault toilets, trash receptacles, interpretive and orientation signs, and backcountry permit stations.

In addition to the trailheads, the EA addressed the installation of turn lanes for five key intersections with U.S. 41: Turner River Road, Burns Road, Skillet Strand trailheads, Monroe Station South trailhead, and the entrance to the Oasis Visitor Center. These turn lanes were designed to FDOT standards and proposed to address safe access to the facilities. Benefits of the Preferred Alternative included safe vehicle access, improved ORV and passenger parking, improved passive recreation amenities, and improved traffic movement. Adverse impacts addressed for the Preferred Alternative included impacts to wetlands, floodplain, and Florida panther habitat.

This EA included consultation with the USFWS that resulted in a BO for impacts to federally listed species that would result from the proposed project. This BO, included in a memorandum with Service Consultation Code: 2012-I-0139, included a "no effect" determination for West Indian manatee, American crocodile, and eastern indigo snake; a "may affect, not likely to adversely affect" determination for the wood stork; and a "may affect, likely to adversely affect" determination for the Florida panther. As per the Terms and Conditions of this BO, NPS would purchase 258 Panther Habitat Units and 10.62 kg of short-hydroperiod and 7.89 kg of long-hydroperiod wood stork forage biomass from a Service-approved mitigation bank as part of the mitigation to offset impacts to these species.

Relevance to ROGG: Details of the Designated ORV Trailheads and Turn Lanes EA with particular relevance to the feasibility assessment and master plan for ROGG include:

- **Access Point Facilities** – The ORV access points include the construction of parking areas and other amenities that would benefit ROGG trail users. Opportunities to connect ROGG to these facilities and incorporate them into the trailheads and rest stops for ROGG would limit the need for additional facilities in other areas of the Preserve. In addition, the footprint for new ROGG facilities would be smaller and limited to the trail itself for more areas, which would lessen the potential impacts that could result from ROGG for new trailhead facilities. This needs to be balanced with the requirements of parking vehicles with trailers that are using the access points for ORV access, although the parking for ORVs will be separate from vehicular parking at these access points. Still, operational considerations for maintaining ORV trailer parking is a consideration when joint use of the access points between ORVs and ROGG would occur.

- **Road Improvements** – The turn lane improvements would enhance the safety of access for vehicles into several facilities along U.S. 41. Potential trail alignments for ROGG on the road shoulder would need to accommodate the expanded lane widths of these turn lanes. In addition, the design of the intersection of ROGG trails with the roadways served by these turn lanes needs to include sight lines and other visual clues for the vehicles in the turn lanes and ROGG trail users that an intersection is approaching. If trails for ROGG are required to cross a section of roadway with a turn lane, options to move the trail/road intersection away from the turn lane or to cross the turn lane consistent with FDOT standards and guidelines would need to be explored for ROGG.

- **Listed Species Permitting** – The listed species addressed in this EA would likely be similar to those that would need to be addressed for ROGG. The majority of the facilities proposed in the EA occur adjacent to U.S. 41 and/or Loop Road within similar habitat types to the ROGG Study Area. The USFWS determined that mitigation was required for potential

impacts to wood storks and Florida panthers for this EA, which would likely be a similar requirement for ROGG. Mitigation for these impacts consisted of the purchase of credits for Florida panther habitat and wood stork forage biomass. Mitigation for potential impacts resulting from ROGG would likely include purchase of credits from a mitigation bank.

Draft Integrated Project Implementation Report And Environmental Impact Statement: Central Everglades Planning Project; 2013

The purpose of CEPP is to advance restoration efforts in the central portions of the Everglades, including routing more freshwater (approximately two-thirds of the estimated flow estimated to be provided by CERP) into the ENP through improvements to a variety of elements of the C&SF Project as described in Section 2.1 - Context. Components of the CEPP that occur within the ROGG Study Area include removal of a portion of the L-29 levee, removal of portions of the Old Tamiami Trail, levee modifications in the southwest corner of WCA 3B including the construction of the new Blue Shanty levee, and recreation elements. The Draft PIR/EIS provided an implementation timeline of approximately 14 years, although it also noted that this timeline is dependent on the completion of other CERP and non-CERP projects with full implementation likely extending more than 20 years. The Draft PIR/EIS provided a phasing approach for implementing the CEPP components, with the components that occur in the ROGG Study Area generally being shown as later phases. Upon finalization, the PIR/EIS will be submitted to Congress for funding.

Relevance to ROGG: Details of the CEPP PIR/EIS with particular relevance to the feasibility assessment and master plan for ROGG include:

- **Levee Modifications for WCA 3B** – Based on the current draft plan, CEPP includes several modifications to the levee system in the southern portion of WCA3 to improve sheetflow into the ENP. Approximately 4.3 miles of the L-29 levee along U.S. 41 will be removed to allow sheetflow under the 2.6 mile bridge identified in the Tamiami Trails Next Steps project. A new levee known as the Blue Shanty levee would be installed at the eastern end of the L-29 removal and extend from U.S. 41 to the L-67A levee. The L-67C will be removed between the Blue Shanty levee and U.S. 41. The levee removal for the L-29 removes potential infrastructure that could be available for ROGG. However, the connection of the Blue Shanty levee to the L-67A levee maintains a longer connection of infrastructure that could be connected to potential ROGG facilities. The removal of the 4.3 mile long segment of the L-29 removes a portion of existing infrastructure that could be used for ROGG. Coupled with the bridge design selected in Tamiami Trail Next Steps, the removal of the levee causes a gap in existing infrastructure available and/or programmed improvements other than on-road bicycle lanes that would maintain direct access along the U.S. 41 corridor for this 4.3 mile segment.

  The Blue Shanty levee and L-67C provide a potential route separate from U.S. 41 around this gap, but this potential route would be significantly longer than a direct connection. In addition, the use of this longer route for a separate loop route would still be limited by the lack of existing infrastructure or programmed improvements on U.S. 41 between the two levees. The feasibility assessment and master plan for ROGG included evaluations for potential routing alternatives and improvements that would provide direct connections along U.S. 41 and/or provide a potential loop trail connection between the Blue Shanty levee and L-67C levee.

- **Recreation Elements** – The recreation plan for CEPP includes several maintained, enhanced, or new improvements within the ROGG Study Area. On the north side of U.S. 41 at the S-333 structure for the L-67 canal, the plan designates that the existing boat ramp would be relocated to maintain access to WCA3A and WCA3B and additional improvements, including a restroom, shelter, and trailhead parking facilities, would be provided for connections to “blueways and greenways”. Pedestrian access from the L-29 levee will be re-routed along north along the L-67A levee to the new Blue Shanty levee and return to the L-29 levee. The existing parking area at the S-334 site near the eastern terminus of the ROGG Study Area will be maintained and a kayak launch and shelter will be added. The parking and restroom facilities at the S-334 and S-333N sites provide opportunities for trailheads for the ROGG. The removal of the L-29 levee limits a direct east/west trail on a levee within the area, although the recreation plan maintains pedestrian access on the remaining portions of the L-29 levee.

  In addition, the recreation plan identifies an alternative, albeit longer, pedestrian trail connection option that extends along the Blue Shanty flow way and the L-67A levee. This pedestrian access provides a connection point for recreation access to the northern portions of the CEPP study area and other regional greenway systems. The recreation plan for CEPP identifies trails on the new Blue Shanty levee and the portions of the L-29 and L-67A that would remain after the CEPP projects are completed that could be integrated into or connected to ROGG. The parking areas and improvements identified in the plan would potentially be available for trailhead facilities for ROGG.

- **Old Tamiami Trail Removal** – Approximately six miles of the Old Tamiami Trail between the ENP Tram Road and the L-67 Extension Levee are identified for removal as part of CEPP, which is the majority of the trail east of the Miccosukee Village. The Old Tamiami Trail provides an existing piece of infrastructure with a paved surface that could be available for use by ROGG. The banks of the facility are dominated by shrubs, including exotic invasive species, which limits views into the adjacent habitats, but provides shade for people using the old roadbed. For ROGG, the Old Tamiami Trail provides an existing piece of infrastructure that could be available temporarily for trail use, although this would need to be done consistent with and in a manner that does not compromise hydrological restoration goals.

Literature Review Summary

The Literature Review included the review of a broad set of documents relevant to the planning and design of ROGG. All potential uses would need to be consistent with and in a manner that does not compromise restoration goals. Other significant findings from these guiding documents include:

The **South Florida Water Management District (SFWMD) Public Use Rule** (2006) allows for public access and use of many lands adjacent to the ROGG Study Area for outdoor recreation activities including the use of bicycles within levee right-of-ways, along maintenance berms and on levee tops. Direct implications for ROGG include the potential use of SFWMD levees, levee berms and/or levee right-of-ways for the use of hiking, biking or other outdoor recreation uses.

Recreation management of SFWMD lands by the **SFWMD Recreation Management and Partnership Plan** (2011) seeks to balance access to consumptive and non-consumptive activities as well as provide connectivity to other public lands through greenway partnerships. The ROGG is a priority greenway route by the FDEP’s Office of Greenways and Trails (OGT). This designation, in coordination with lands managed by the SFWMD may provide opportunities to enhance regional greenway networks through the implementation of ROGG and meet the plan objectives for SFWMD to provide outdoor recreation activities for both hiking and biking (non-consumptive use) and fishing and hunting (consumptive uses).

The **ETDM Summary Report; Project #12596 – River Of Grass Greenway; Planning Screen & Program Screen** reports document that the reviewed portion of the ROGG (ROGG West) is included on pathways planning maps for the State of Florida OGT (highest priority level), North Dade Greenways Master Plan, the CERP Master Recreation Plan, Collier County Comprehensive Pathways Plan, and has been incorporated into the Collier MPO 2030 Long Range Transportation Plan. The inclusion of ROGG on these plans provides avenues of future potential funding for improvements as well as an acknowledgment of the need and purpose for the ROGG.

The **Draft Integrated Project Implementation Report And Environmental Impact Statement: Central Everglades Planning Project (CEPP)** includes planned improvements for the Blue Shanty levee and L-67C provide a potential route separate from U.S. 41 around an identified gap in direct trail connections along U.S. 41 due to the proposed removed of 4.3 miles of the L-29 Levee. In addition, the recreation plan for CEPP includes several maintained, enhanced, or new improvements within the ROGG Study Area such as enhanced pedestrian connections access along the Blue Shanty and L-67A levee with connections to recreation areas in the northern regions of the CEPP study area. The CEPP proposal also includes the removal of approximately six miles of the Old Tamiami Trail east of the Miccosukee Village area. This represents removal of existing infrastructure that could be available temporarily for trail use.

2.4 COMPARABLES

"A first-rate trails system can only be created by people."

– President's Commission on American Outdoors, 1987

Introduction

The first three sections of the Research and Analysis chapter focused on the context, existing conditions, and review of studies, reports, and regulatory documents for the ROGG Study Area. This section provides analysis of comparable projects that have successfully addressed similar issues or situations as those identified for ROGG. To that end, the purpose of this section was to review best practices used in the design and implementation of comparable greenway projects and assess lessons learned that can be applied to ROGG.

Three elements comprise this section: 1) Comparable Descriptions, 2) Best Practices, and 3) Lessons Learned. The Comparable Descriptions element describes successful projects from around the world within seven categories of trails or trail elements similar to conditions found within the Study Area. The Best Practices element identifies principles and criteria for planning, constructing, and operating trail systems as well as best practices for design, construction, and maintenance identified in the project examples. The Lessons Learned element summarizes findings concerning trail planning and development relative to the Comparable Descriptions and Best Practices for consideration of the ROGG.

2.4.1 Comparable Descriptions

The ROGG Study Area is an ecologically and culturally unique area of the world. While there is no single greenway project that replicates the exact conditions and constraints of the ROGG Study Area, there are a variety of projects around the world that offer successful solutions to issues relevant to the feasibility study and master plan for the ROGG. Comparable greenway projects within the following categories were reviewed as part of the feasibility study and master plan process because of similarities to conditions observed in the ROGG Study Area. The seven categories referenced below include comparables from projects that represent iconic or inspirational trails to projects that are exemplary of relatively localized issues such as low impact trails. The following are the seven categories researched:

1. Inspirational/ iconic trails
2. Trails of significant scale
3. Trails within two-lane highway right-of-way
4. Trails located on retrofitted highway bridges (culverts and large length bridges)
5. Trails associated with levee rights-of way, water control structures, and canals
6. Trails in environmentally sensitive landscapes, including wetlands
7. Heritage trails

For each category, a brief description is provided followed by one to three specific project example summaries. Following the project summaries, descriptions of the anticipated ROGG user groups are provided.

Inspirational / Iconic Trails

While there are many inspirational destinations throughout the world, there are few that are connected or traversed by functioning long distance trails that cater specifically to the unique travel needs and desires of bicyclists and pedestrians. Some of those locations and countries that have taken advantage of this emerging form of eco-tourism have developed networks of trails that link users to stunning natural landscapes and significant cultural sites, thereby incorporating the journey into the experience of the sites. Three inspirational and iconic greenways located in the Czech Republic, Canada, and along the Danube River in Central Europe are profiled.

Prague to Vienna Greenway

Within the Czech Republic, a long distance greenway trail known as the Prague to Vienna Greenway links together two of Europe's most celebrated and historic cities: Prague in the Czech Republic and Vienna in Austria. The greenway consists of a 250-mile long network of hiking and biking trails through the Moravian and Bohemian regions of the republic. Travelers can walk or bike between historic towns and villages, visit castles, medieval churches and monasteries, discover old Jewish settlements, and soak in some of the most picturesque countrysides in all of Europe. The greenway stretches along the Vltava River Valley in Southern Bohemia and the Dyje River Valley in Southern Moravia.

Greenways are valued portions of the civil and social infrastructure within the Czech Republic. They are thought of as routes, trails or natural corridors used in harmony with their ecological function. Moreover, they foster the preservation of natural and cultural heritage, provide options for safe transportation, recreation and tourism, and encourage a healthier lifestyle.

The Prague to Vienna Greenway is a project of the Greenways-Zelene Stezky organization, which is a member of the Environmental Partnership for Sustainable Development (Nadace Partnerstvi) in Brno, Czech Republic. The objective of the organization is to restore and preserve the natural and cultural heritage of the region and develop sustainable tourism. In 2001, local civic groups, cultural associations, small business owners, and town and village governments joined together to form the Prague-Vienna Greenways Association. More than 30 members now cooperate on local projects,

Prague to Vienna Greenway

Prague to Vienna Greenway natural trail surface

Trans Canada Trail

organization of events, and sustainable tourism. Local businesses seek and are conferred "certified" status so that as a visitor travels along the greenway, they encounter certified hotels, pubs, restaurants, bike shops and other businesses that cater to greenway tourists.

The Prague to Vienna Greenway enables visitors to journey along centuries-old salt, silver and amber trade routes to discover interesting off-the-beaten path places, many of which had been closed for 40 years behind the Iron Curtain of the Cold War. Visitors have the capacity to access historic castles and villages and are afforded opportunities to view architectural monuments, some of which have been declared World Heritage Sites by UNESCO. The Greenway provides access to locales where trail users can taste Moravian wines and Czech beer and attend concerts and festivals.

Relevance to ROGG: The opportunity to observe and experience natural beauty, connect to social and tourist opportunities, and experience the unique setting along long distance travel are similar attributes of the Prague to Vienna Greenway and the ROGG. In addition, the Prague to Vienna Greenway provides a unique example of a greenway system that provides infrastructure used more than just for recreation uses.

Trans Canada Trail

The Trans Canada Trail is the world's longest network of recreational trails that, when fully connected, will stretch 14,000 miles from the Atlantic to the Pacific to the Arctic oceans. More than 10,400 miles of trail were usable in 2012, making it approximately 73% complete. Two hundred forty gaps totaling 3,900 miles remain to be connected to achieve a fully integrated and connected trail. The Trans Canada Trail planning team hopes to close these gaps before the trail's 25th anniversary and Canada's 150th anniversary in 2017 to reach this objective.

The concept of the Trans Canada Trail was created during the nation's 125th anniversary celebration in 1992. The network of trails comprised of more than 400 community trails varies significantly, ranging from wilderness routes to urban greenways that extend through the heart of Canada's largest cities. The Trail makes use of footpaths and hiking trails, abandoned rail corridors, levees, utility corridors, and urban pathways. The Trail supports a wide variety of users, including hikers, bicyclists, equestrians, cross country skiers, and other sanctioned users.

Map of Trans Canada Trail (red and blue line indicate route)

Cyclists on the Trans Canada Trail

The Trans Canada Trail is being developed through the support of two oversight organizations: A Charitable Organization and a Foundation. The Charitable Organization is responsible for overseeing the development and construction of the Trans Canada Trail by working in partnership with territorial and provincial trail organizations and more than 400 local trail groups, municipalities, and conservation authorities that manage and maintain local trails. The Charitable Organization also grants funds to partner organizations, making it possible for them to develop trails that showcase distinct features. The Charitable Organization promotes and markets the Trail and communicates progress in construction of the system. The Foundation, which was incorporated as a non-profit corporation in October 2010, is responsible for raising funds to support the advancement of the Trans Canada Trail. The Foundation has launched a national campaign to raise the $150 million needed to complete the Trail by 2017.

Relevance to ROGG: Even short tourist opportunities along segments of the national greenway offer significant access to a wide variety of natural features and cultural landscapes, similar to opportunities present in the ROGG Study Area. The coordination for the Trans Canada Trail between multiple jurisdictions and interest groups provides an example for ROGG of cooperative efforts to complete a unique and inspirational trail system.

Danube River Trail

What is possibly the most spectacular of all long distance greenways in the world, the Danube River Trail extends through Germany, Austria, Slovakia, Hungary, Croatia, Serbia, Romania, Bulgaria and the Ukraine. Also referred to as the Danube Cycle Path, this trail encompasses a total distance of approximately 1,790 miles, ranging from the Black Forest community of Donaueschingen, Germany to the Black Sea. The cycle path is part of the EuroVelo Route EV6 and winds its way through a diverse landscape, including mountainous terrain, famous towns and cities, nature reserves, monasteries, and unique geologic features. The trail links some of Europe's finest and historic cities, including Budapest, Bratislava and Vienna.

Much of the route for the cycle track follows a system of levees that extend parallel to the river and offer flood protection and water management. There is no formal organization that manages and maintains the cycle path. Each of the nine countries that the trail touches maintains the pathway to a different standard. A non-profit group, Danube-Cycle-Path, provides information about the most developed and accessible stretches of the pathway in Germany, Austria, Slovakia and Hungary. Services offered to tourists include bicycle rentals, lodging and restaurants that cater to cycle tourists.

Relevance to ROGG: Components of the Danube River Trail that are particularly comparable to ROGG include long-distance trail connections, travel through picturesque and/or unique settings, use of levee systems for trail networks, and connections to services for tourism.

Trails of Significant Scale

Trail systems of similar lengths to the ROGG occur in various locations in the world, both as part of larger trail networks and as individual trails connecting specific locations. These trail systems provide opportunities for an array of cyclists and hikers as well as point-to-point connections between towns and villages. These systems can occur adjacent to roadways or on separate facilities on levees or abandoned rail corridors. Two greenways with lengths similar to ROGG located in the Netherlands and Idaho are profiled.

LF5 Trail – Netherlands

Cycling in the Netherlands is a popular method of transportation with over 38% of all trips in Amsterdam made by bicycles, compared to about 1% in the United States. With over 30 years of bicycle-friendly policies implemented across the country, trail development has grown beyond a daily benefit of residents' lives into a major tourism draw for the country. In order to facilitate a trail network capable of drawing foreign tourists, unique experiences and a seamless integration of cycling into infrastructure is needed.

Trail Loops within the Netherlands

Map of long-distance trails throughout the Netherlands (http://holland.cyclingaroundtheworld.nl/Wheretogo/WhereToGo-LongDistance.html)

With over 300 posted routes by the Dutch Automobile Association, the Netherlands offers a vast array of user experiences for cyclists and hikers. Most routes connect to form loops, with the upper range of distance between 125 and 250 miles. The LF5 Trail is a segment of the overall trail network that travels 50 miles along the lowlands of the Netherlands, connecting visitors to each town and village's visitor center. The trail travels on dikes and along roadways throughout the lowlands.

Relevance to ROGG: Components of the LF5 Trail relevant to ROGG include successful implementation of trails on levees and dikes and connections to other regional trail systems for increased user experiences and trail loops. These trail loops provide users unique natural experiences, while also creating a system of tourism and recreation focused opportunities. This approach for recreational tourism based on trails is similar to the efforts of the FDEP Office of Greenways and Trails.

Trail of the Coeur d'Alenes

Located in the scenic Silver Valley areas of Idaho, the Trail of the Coeur d'Alenes stretches over 71 miles in length. The Trail of the Coeur d'Alenes is a rail-to-trail project which offers three distinct user experiences; prairie to lake setting (downhill); river to lake setting (flat) and Silver Valley (uphill). These unique experiences divide the trail into manageable sections.

Rich in history of exploration and Native American culture, the Trail of the Coeur d'Alenes builds on what use to be a fur trading route and later a railroad which connected gold and silver boom towns. Overdevelopment of mining facilities eventually led to environmental deterioration of the Coeur d'Alene Lake and drainage area by 1990s. A successful lawsuit by the Coeur d'Alene Tribal Council led to the formation of a 21 square mile Superfund site, the nation's second largest, and included a $30 million clean-up fund for the rail corridor. In 2000, rail ties and up to eight feet of contaminated rail-bed was removed from the corridor, with development of the trail to cap the remaining pollutants completed in 2003. Similar to the much of the ROGG corridor, the Trail of the Coeur d'Alenes was born out of one of the largest restoration efforts in the country, and provides a solution for the continued exploration of a scenic landscape.

Managed by the Idaho Department of Parks and Recreation, the Trail of the Coeur d'Alenes requires daily management activities by several jurisdictions with law enforcement provided by both municipal and County jurisdictions. A 14.5-mile segment is managed by the Coeur d'Alene Indians who also represent three of the six seats on the Trail Commission.

Relevance to ROGG: Components of the Trail relevant to ROGG include successful implementation of a trail within a large scale environmental restoration effort, coordination of development, implementation and management of the trail with a Native American group, coordination across multiple jurisdictions, and unique experiences in different sections of the trail.

Trails within Two-Lane Highway Rights of Way

Along the 75-mile length of the ROGG Study Area, it will be necessary for trail route and alignment to extend parallel to sections of the U.S. 41 corridor. Multiple options for traversing the U.S. 41 corridor are available, ranging from bike lanes to separate facilities within the non-maintained portions of the road ROW. Trails separated from traffic flow by structural buffers or physical separation can improve safe use of the trail and enhance user experience by removing traffic concerns. For portions of the corridor, trail route and alignments may require using existing bridges to support trail structures. One of the most prominent trails with a number of segments similar to these conditions is the East Coast Greenway.

East Coast Greenway

Though approximately 29% of the East Coast Greenway (ECG) is now off-road and automobile traffic-free, the majority of this landmark greenway relies upon on-road routes and linkages. Stretching from the U.S. and Canadian border in Maine to Key West, FL, and made up of over 100 independent trails, the East Coast Greenway was launched in 1991 by a group of ten bicycling advocates. The initial route was entirely on-road facilities until 1996 when the first 56 miles of off-road trail opened in multiple areas in the Northeast and Mid-Atlantic areas. A number of the areas with off-road facilities are located within existing highway rights-of-way, as shown with the image of a segment of the ECG in Rhode Island.

The ECG has developed route selection guidelines and interim on-road route guidelines and procedures. Though neither set of guidelines established a distance requirement for facility separation or a minimal standards for on-road bike lanes, the guidelines do establish the need for directness of the route, safety and comfort of users. The Route Selection Guidelines establish criteria

Walkers on the Danube River Trail

Cyclists travling on the Danube River Trail

A cyclist on the LF5 Trail located on a dike, Netherlands - Photo Credit : Jane Hudall

Trail of the Coeur d'Alene

Amenities along the Trail of the Coeur d'Alene

East Coast Greenway in Rhode Island with spatial separation from nearby roadway (Photo courtsey of the East Coast Greenway)

for permanent routes and interim on-road routes to maintain continous route connections. These criteria include recommendations for surfacing, width, and location. Application of these criteria is intended to facilitate the placement of the trail that is physically or spatially separated from nearby roadways or highways, but still within publicly accessible lands or easements, where possible.

Relevance to ROGG: Elements of the ECG that pertain to the planning and design of ROGG include the establishment of criteria for on-road and off-road trail facilities with the goal to separate the trail facilities from roadways, emphasis on a continuous route, and criteria for directness of route, safety and comfort of users.

Seminole Trail

The Seminole Tribe of Florida in Hendry County received a $3.7 million Transportation Investment Generating Economic Recovery (TIGER) grant in 2011 to fund a 2.25 mile roadway improvement project on the tribe's Big Cypress Reservation in Hendry County, FL. The existing roadway was a narrow 20 foot route with worn, unpaved shoulders. The project was designed to enhance safety and accessibility for tribe members, improving a designated hurricane evacuation route and enhancing access to commercial and tourist destinations on the reservation.

Relevance to ROGG: The Seminole Trail is intended to increase mobility for pedestrians and bicyclists to the commercial and tourist destinations within the reservation, similar to conditions found along the ROGG Study Area. The project also identifies trail widths and surfacing for a south Florida trail project adjacent to an existing roadway, which provides input on trail widths that could be used for ROGG.

Trails Located on Retrofitted Highway Bridges

The restoration of the Everglades includes the construction of multiple new bridges ranging in length from 0.38 mile to 2.6 miles to replace the existing U.S. 41 roadway, thereby allowing water to flow more freely under the road. The first bridge constructed as part of this program was 1.0 mile in length and did not include a separate trail facility. Bridges in other parts of the country have been retrofitted to accommodate a trail facility parallel to the roadway through various means. These have included: the reconfiguration of the width of the roadway on the bridge, the construction of a separate and adjacent bridge structure for the trail,

Case Study: St. Georges Bridge

The St. Georges Bridge carries the South Dupont Highway/ U.S. 13 across the Chesapeake and Delaware Canal (C & D), which connects the Chesapeake Bay with the Delaware River. From 1942 until 2008, the bridge was dedicated to four lanes of automobile traffic, which provided two lanes in each direction.

In 2005, the Delaware Department of Transportation and the USACE, commissioned a study to evaluate the feasibility and cost of a number of options for installing a bicycle and pedestrian path that would be cantilevered on the outside of the then-existing four lane road bed. The recommended option would have placed a bidirectional bicycle and pedestrian path on the western side of the bridge, preserving the four lanes of traffic that existed at the time. The plan was not implemented. However, the goal of accommodating cyclists on the St. Georges Bridge was not abandoned.

When the USACE decided the bridge would be repaired, instead of permanently closed, they worked with local bicycle advocacy organizations and the Delaware Department of Transportation to create bike lanes on the bridge. When the bridge reopened, there was one bike lane in each direction, replacing one vehicle travel lane on each side of the bridge. No additional width was added to the bridge, and there is no physical barrier between the bike lanes and the motor vehicle lanes, though there is a wide buffer. The bridge is extremely popular with recreational cyclists, despite its high elevation (133 feet over the C & D at its highest point) and length of 2.5 miles.

Future Canal Trail Connection

The St. Georges Bridge will provide an important link across the canal for the future Michael Castle Trail, a 16-mile trail along the C & D Canal's north bank. The multi-purpose trail will feature facilities for cyclists, pedestrians, and equestrians. Planned amenities include trail markers, restrooms, parking, information kiosks, picnic areas, and repaired piers for fishing. The design also incorporates solar-powered restroom facilities with composting toilets, pervious asphalt, and trail furniture built of recycled materials. After eight years of planning and development, the nine-mile first Phase is currently under construction.

Design

The road bed is paved and striped to create one 8.5-foot bike lane in each direction. The bike lanes are separated from traffic by a four-foot buffer and contained on the outer edge of the bridge by a 54-inch railing on the approach and a taller protective fence on the bridge itself. Bike lane buffers contain orange tubular markers that break away when struck by a vehicle. Since the project was part of a larger resurfacing project, the cost to re-stripe was minimal.

Connections

The St. Georges Bridge is the only bridge across the canal with dedicated bicycle lanes. The Reedy Point Bridge to the east has wide shoulders, but no designated lanes. These two bridges create an ideal recreational loop for cyclists. The bridge also connects to bicycle routes east to Fort Dupont State Park, Augustine Wildlife Area, and the Silver Run Wildlife Area to the southeast. To the west, the bridge provides a link to Lums Pond State Park, the largest freshwater lake in the state. The bridge provides a critical north-south connection for recreational riders traveling south from the cities of Newark and New Castle

St. Georges Bridge with space and physical separator

and the addition of a cantilevered trail structure on the margin of the bridge. Trail alignment options for ROGG considered the use of the new bridges as part of the ROGG system. Two profiles are provided: one of a successful bridge retro-fit trail project and one set of trail design standards. A case study of a retrofitted bridge in Delaware is also highlighted.

Missouri River Bridge Attachment

The Missouri River Pedestrian/Bike Bridge is a new structure attached to the northbound side of the Highway 54 Missouri River Bridge that is dedicated exclusively for bicycle and pedestrian access. With the attachment, pedestrians and bicyclists are now able to easily and safely cross the Missouri River Bridge.

The new bridge attachment is eight feet wide, fully ADA accessible, and includes two lookout points with a spectacular views of the Missouri State Capitol and the Jefferson City riverfront. The undercarriage of the bridge illustrates its construction methods, using steel ribs to support a steel superstructure. The total cost of the Missouri River Pedestrian Bridge was $6.7 million, $5.6 million of which came from the federal Bicycle/Pedestrian Enhancements program. The remaining $1.1 million was funded jointly by the Missouri Department of Natural Resources, Jefferson City, and the Missouri State Parks Foundation. A partnership between these entities and the Missouri Department of Transportation allowed this project to become a reality.

Relevance to ROGG: Components of the Missouri River Pedestrian Bridge relevant to ROGG include successful implementation of adding a trail structure to an existing bridge and partnerships for funding the improvement.

Minnesota Department of Transportation – Bikeway Facility Design Manual

The Minnesota Department of Transportation included a chapter about bridges and grade separations in its Bikeway Facility Design Manual. Though many bike facilities are being built in the Twin Cities, the guide is meant for cycling facilities across the state, in urban and rural settings.

The manual discusses three main methods for accommodating bicycles on a bridge:

- A separate, shared-use path on one side of the bridge is best if the bridge path will connect with a shared-use path at both ends, there is sufficient width on the bridge on the side of the path, and the path can be physically separated from motor vehicle traffic
- Wide curb lanes or bicycle lanes on the bridge are best when a shared-use path has transitioned into bicycle lanes at one or both ends of the bridge, restriping can create sufficient width, and there is a separate sidewalk to accommodate pedestrians
- An existing sidewalk can be used if it is wide enough for both cyclists and pedestrians (at least eight feet), but it is not usually recommended, especially when the sidewalk is raised and no railing exists

The manual offers a number of best practices, including the following:

- Expansion joints can be made “bicycle-safe” by installing them as close to a 90 degree angle as possible to the direction of movement on the trail
- When assessing bridge conditions for bicycle compatibility, the facility should be considered under wet conditions since many metals used in bridges become dangerously slick when wet
- A minimum cross slope of 1% is necessary for drainage, but no more than 2% is recommended to accommodate path users with mobility impairments
- A separate, off-road facility is best when vehicular traffic on the bridge is high-speed and high-volume
- The width of the bicycle facility on the bridge should be the same width as the on-road facility on the approach, with an additional two feet added to accommodate the shy distance from the bridge’s railing or barrier
- Three types of railings are allowed for use on bicycle facilities: the first is designed for motor vehicles, the second for bicycles and pedestrians, and the third for both. If traffic exceeds 45 mph, a railing designed for motor vehicles is required between the bicycle lane and motor vehicle lane. If less than 40 mph, the railing can be of the type designed for both motor vehicles and bicycles. This railing must be a minimum of 4.5 feet high.

Relevance to ROGG: Components of the Minnesota Bikeway Facility Design Manual relevant to ROGG include application of the three main methods for accommodating bicycles on bridges in addition to the identification of criteria that could be used for establishing railing, slope, width and materials for ROGG.

Trails Associated with Levee Rights-of-Ways, Water Control Structures, and Canals

There are miles of existing earthen levee systems located within the ROGG Study Area that were built many years ago as part of regional drainage and water control

Case Study: New Orleans Levee-Top Trail

The New Orleans Levee-Top Trail is a shared-use path extending for 25 miles west from Audubon Park in New Orleans to Destrehan Plantation in St. Charles Parish. The trail is constructed along the levee of the east bank of the Mississippi River and is part of the larger 3,000 mile Mississippi River Trail. Locally, the Levee-Top Trail is known as the Mississippi Levee Trail. The trail is heavily used by a wide range of cyclists, including commuters and college students, as well as both recreational riders and long-distance cyclists out for training rides. Pedestrians, dog walkers, and roller-bladers also use the path.

I The goal for many regional planners and advocates is to pave the levee trail for the entirety of the distance between Baton Rouge and New Orleans. Through the design of the trail, the USACE worked very closely with the Louisiana Department of Transportation and parishes and municipalities that had studied or constructed paved paths on top of the levee. n the early 1990s, the local parishes worked with the USACE to design and construct the trail, converting the existing clam shell and crushed limestone paths on top of the levees into a paved bikeway. Many stakeholders anticipated economic benefits from tourism that would result from having a separated bike trail over 100 miles long in the region. The USACE continues to work with private companies and landowners along the levee to ensure access.

Design

The levee trail is paved with asphalt and is ten feet wide. Design and construction was conducted in conjunction with the levee districts and the USACE to ensure safety, compliance with levee design standards, and coordination with ongoing levee maintenance as a result of Hurricane Katrina (for new sections of the trail).

The levee path is generally on the top of the levee. One exception is on the New Orleans portion of the trail where limitations on access to the levee occurs because the trail traverses the USACE headquarters. In this area, the trail is bordered by a fence on both sides and runs along the toe of the levee between the levee and the railroad tracks.

Amenities

The trail has sign posts and trash receptacles every few miles, but no major amenities outside of the parks that it intersect. A few benches are available along the trail, but the trail does not have lighting.

Connections

The trail begins in Audubon Park, which houses the New Orleans Zoo and borders both Tulane University and Loyola University and then travels through residential neighborhoods in East Carrollton and through the western suburb of Metairie. The trail passes through numerous parks and open spaces, including Jefferson Park, Colonial Golf Course, and Morgan Playground, before extending past the Louis Armstrong Airport. St. Charles Cemetery and Jefferson Memorial Gardens are two additional open spaces along the trail. The Oschner Hospital is located adjacent to the trail, and employees often utilize the trail for recreation. The trail ends at Dehestran Plantation, a 224 year old plantation that is the oldest documented in the lower Mississippi. Along the way, the trail passes numerous commercial establishments and small businesses in Orleans Parish as well as in Jefferson and St. Charles parishes.

Crossings

There are approximately 30 maintenance road crossings along the levee trail between Audubon Park and Destrehan Plantation. The at-grade crossings are typically unpaved with minimal traffic since the crossings only lead to single industrial businesses on the river or maintenance facilities.

Cyclists on the New Orleans Levee-Top Trail

Missouri River Bridge under construction

Lake Okeechobee Scenic Trail user and USACE maintenance vehicle

Lake Okeechobee Scenic Trail (on top of USACE-managed levee system)

alterations and continue to be operated by the SFWMD. Although regional restoration plans for the Everglades have targeted portions or all of these levees for removal, the ones that remain as part of the seepage control, flood control, or other water management activities may provide platforms for trail connections separate from the U.S. 41 roadway. One option for ROGG is to use portions of the existing system of levees to support trail development. Throughout the country, there are many examples of trails that are constructed on top of levee systems.

The ROGG Study Area includes several water control structures in the ROGG East segment that are used to manage water levels in canals and the WCAs, several of which provide public access to the associated levees from U.S. 41. The main purpose for these structures is water management, which requires access by managing agencies to maintain and operate the structure. However, public access is also allowed over several of these structures in the ROGG Study Area, including access from U.S. 41 over the S-333 and S-334 structures in the L-29 Canal. This public access occurs via the existing 12-foot wide maintenance access road. This access can include both pass-through public use to access the adjacent levees and/or site-based access for fishing at or near the structure. Pass-through use includes vehicles, bikers and hikers that currently cross these structures to gain access to existing boat ramps or passive use along levees.

Site-based access by fisherman often occurs at the structures as the flows passing through the structures provide high quality locations for fishing. These flows can be turbulent and dangerous upstream from the structures during most conditions, while downstream flows can also be significant during high water conditions. Providing public access over water control structures increases the potential vandalism, which can have significant ramifications if equipment is damaged before or during high water conditions. Safety features such as fencing or physical barriers provide some protection against vandalism, but may limit fishing access. For ROGG, crossing water control structures and/or canals is needed to establish a fully connected trail or greenway system. Brief profiles of two trails located on levee systems with passage over or around water control structures located in the Florida and Kentucky are provided as well as a detailed case study of a levee trail in Louisiana.

Lake Okeechobee Scenic Trail, FL

One does not have to travel very far from the ROGG Study Area in south Florida to find one of the nation's most successful trail projects built on a USACE-managed levee system. The Lake Okeechobee Scenic Trail (LOST) is a 110-mile multi-use trail system that was built on top of levees and across USACE-managed water control structures. Originally developed by the U.S. Department of Agricultural and U.S. Forest Service as a segment of the Florida National Scenic Trail (FNST), the trail was a natural surface hiking route atop the 35-foot high Herbert Hoover Dike surrounding Lake Okeechobee. In the mid-1990s, FDOT and representatives of USACE, FDEP and SFWMD, hosted a series of public meetings to discuss improving the trail surface to make it suitable for multiple types of recreation uses and outlined each agencies role in implementation. SFWMD coordinated with FDOT to assure safe circumnavigation of several water control structures and continued access to the dike.

The final trail configuration consisted of a 10 to 12-foot wide, paved and partially gravel levee system trail for walking, hiking, biking, skating and horseback riding adjacent to the paved trail surface. The trail is also used by USACE for maintenance and monitoring of water control structures and the dike. Multiple, simultaneous use of levee trails can be compatible with coordination between agency and user groups.

Relevance to ROGG: Components of the LOST relevant to ROGG includes the successful implementation of a levee trail in Florida with many of the same managing entities involved in the trail development as would be needed for ROGG. In addition, it represents an example of the use of paved trail surfaces for a levee trail and operations and maintenance that are compatible with a paved trail surface on a levee.

LOST provides examples of ways in which trail access across water control structures can be accommodated. Including both on structure and off-structure crossings, the LOST demonstrates that structure crossings can be completed for structures managed by the USACE that are critical to a regional scale water management projects. This includes trail crossings that accommodate operation and maintenance protocol and safety measures for the structures and waterbodies. The LOST provides an example of safety features such as fencing and physical barriers, to separate pedestrian routes from structures.

Ohio River Levee Trail, KY

In the late 1990s the USACE began a multi-year effort to redevelop the levee system that protects the city of Louisville and surrounding communities from seasonal

Ohio River Levee Trail, Louisville, KY, located on top of a USACE levee

Steel bridge crossing of the New River Canal along the Lake Okeechobee Scenic Trail

Water Control Structure S-333 along the L-29 Canal with existing vehicle and pedistrian access

flooding from the Ohio River. About a year later, the City launched an initiative to build a 100-mile greenway around the city. These two projects came together as a successful implementation project for both as part of a 12.9-mile greenway, linking the city's Riverwalk to the Ohio Greenway.

The levee greenway was developed as a 10 to 12-foot wide asphalt trail located on top of the redeveloped and strengthened levee. What makes this trail unique is the placement of the supporting trail amenities, such as seating and lighting along the route at the top of the levee, however, similar to the Lake Okeechobee Scenic Trail, no canopy trees were located on or in the levee right-of-way due to potential damage from roots to the levee itself. The trail's asphalt surface has served as an access route for USACE monitoring and maintenance access to the levee.

Relevance to ROGG: Components of the Ohio River Levee Trail relevant to ROGG include successful implementation of a levee trail with paved trail surfaces with minimum user amenities and operations and maintenance compatible with a paved trail surface on a levee.

A number of water control structures occur in the eastern portion of the ROGG Study Area that are used to manage water levels in canals and the WCAs. Access to operational elements of the structures is critical as part of water management operations. Water conditions upstream of the structures can be turbulent and dangerous, although downstream flows can also be significant during high water conditions. These same flows can provide high quality fish habitat, and attract fisherman at or near the structure. Water control structures can also be susceptible to vandalism, which has significant ramifications if equipment is damaged before or during high water conditions. For ROGG, crossing water control structures and/or canals is needed to establish a fully connected trail or greenway system. Connections across control structures operated and managed by the USACE have been allowed in numerous places - a brief profile of two comparable examples follow:

Trails in Environmentally Sensitive Landscapes, Including Wetlands

Trails are frequently located in areas which provide public access to scenic landscapes and/or areas which have constrained access by other modes of transportation, such as National Parks, wetlands and stream corridors.

Sections of the Bear Creek Trail being installed on-site

Located in an environmentally sensitive area, Bear Creek Trail uses innovative construction techniques

Though there are thousands of miles of trails that have been constructed in environmentally-constrained landscapes throughout the US, none employ all the techniques that the ROGG would need as one single comparable. Profiles for five trails that occur within environmentally sensitive landscapes are provided, including trails in Colorado, the Grand Canyon, a NWR in Washington, a floodplain trail in Texas, and a National Seashore trail in Massachusetts.

Bear Creek Trail, Morrison, CO

In the town of Morrison, Colorado, innovative design and engineering methods were used to build a 10-foot paved trail in an environmentally sensitive landscape that is characterized by steep slopes, river crossings and narrow route opportunities. There was not enough land between existing roadways and Bear Creek to support full development of a 10 - 12 foot wide trail without significant impacts to wetlands. So the design team built cantilevered trail segments and portions of the trail on concrete piles that enable the creek to flow unimpeded and with minimum impact to the surrounding wetlands. Sections of the trail were manufactured off-site and lifted into place as prefabricated twin-tee concrete spans. These spans were later fitted with a surface and railing was added to facilitate safe travel and use.

Relevance to ROGG: Components of the Bear Creek Trail relevant to ROGG include successful implementation of a cantilevered trail to an existing bridge to maintain water flow and construction methods that limited wetland impacts.

Grand Canyon Greenway, AZ

One of the concerns about trail development in the ROGG Study Area is its potential impact on sensitive landscapes comprised of wetlands and other natural resources. There are examples of trails being developed within sensitive landscapes to reduce expected human impacts on natural resources and serve as a catalyst for environmental restoration, such as the Grand Canyon Greenway in Arizona.

The 72-mile Grand Canyon Greenway system was planned, designed and constructed to reduce human impact on the high desert landscape of the Canyon South Rim. Annual visitation to the South Rim tops four million and impact to the natural resources was evident. The Greenway provided a paved, 8 to 10-foot wide multi-use trail, extending for more than 10 miles along the South Rim. The Greenway also spurred environmental restoration of disturbed landscapes, serving to eradicate social trails. The Greenway was part of a multi-modal transportation system that transports millions of visitors throughout the Park.

Relevance to ROGG: The relevance to ROGG includes the extensive use of a trail system in a National Park, and the ability to direct visitors to a specific, managed corridor. This trail system also connects with a multi-modal transit system that uses mass transit to transport trail users to and from specified destinations.

Grand Canyon Greenway, AZ

Environmental restoration along the Grand Canyon Greenway, AZ

Multi-modal transportation connectivity along the Grand Canyon Greenway, AZ

Cyclist on the Nisqually Estuary Boardwalk Trail

Nisqually Estuary Boardwalk Trail crossing the Nisqually National Wildlife Refuge

Buffalo Bayou Trail near Addicks Dam for Baker Reservoir (image courtesy of Robert Boyd)

Nisqually Estuary Boardwalk Trail, WA

The Nisqually NWR in Washington provides an example of an effective boardwalk trail across a long distance of water and wetlands. The ten-foot wide Estuary Boardwalk Trail features an observation tower and overlooks specifically designed for wildlife viewing. This has made the Trail very popular with tourists anxious to gain access to the unique waters and wetlands of the Refuge.

Relevance to ROGG: The manner in which this trail was designed and constructed offers an excellent model for the ROGG. The hallmark of this boardwalk trail is the way in which it spans the tidal estuary, providing access while at the same time protecting the environment that visitors want to experience first-hand. Portions of the four mile long boardwalk trail also support a variety of uses, including bicycle travel.

Buffalo Bayou Trail, TX

Buffalo Bayou is a 53-mile long waterway through Houston, Texas that flows east towards the Houston Ship Channel and into Galveston Bay. In 1986, an appointed task force published the Buffalo Bayou Master Plan, redefining a once open-air sewer into a vibrant and valuable park space with opportunities for canoeing, hiking, biking and events. Since the development of the Master Plan, a non-profit partnership named Buffalo Bayou Partnership was formed to champion the vision. The Partnership raised over $45 million from private donors to implement projects such as the $15 million Buffalo Bayou Promenade.

Crossing an area of the bayou that includes a tangled web of freeways and street bridges, the promenade has become a popular attraction and has changed the way citizens see their waterways. Furthermore, the vision includes expanding this promenade and connecting it to a future link of the Buffalo Bayou Greenway stretching over 20 miles.

A significant challenge for the planning and design of the Buffalo Bayou Promenade was the imminent threat from flash flooding, which can cause the Bayou to rise from sea level to over 35 feet in depth in a matter of hours. To counter this threat, the Promenade was designed using amenities and features that can withstand periodic submersion by muddy flood water and impacts from floating debris. Hydrants are located along the Promenade to allow maintenance crews to wash off deposited silt from the hard surfaces and other trail amenities before the debris dries. These or other similar innovative design techniques provide examples of ways to address concerns of periodic flooding within the ROGG.

Relevance to ROGG: Components of the Buffalo Bayou trail relevant to ROGG include successful implementation of methods to address changing water conditions, maintenance of impacts after flooding events, and resilient design for hurricanes in and near wetland and flowing water systems.

Cape Cod National Seashore Trail System

The Cape Cod National Seashore contains a network of trails across a variety of environmentally constrained landscapes. There are rail-trails, canal trails, trails through marshland, and trails through sand dunes. A goal for the ROGG to construct hard surface multi-use trails was successfully accomplished at Cape Cod National Seashore.

Relevance to ROGG: The Cape Cod trail system is relevant to ROGG because it makes use of various boardwalks to span wetlands and marshlands. The trail system also links tourists to visitor centers and other historic landscapes of the seashore.

Heritage Trails

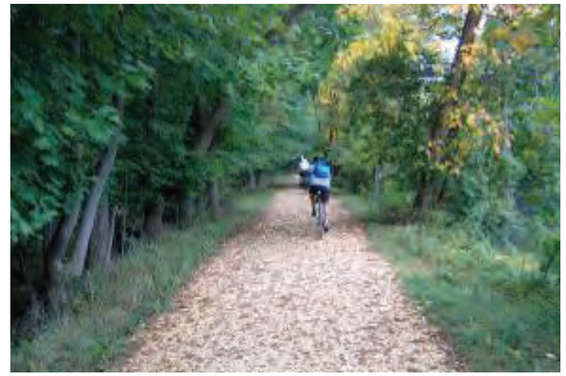
Multi-use trails offer the opportunity for interpretation of natural and cultural heritage. Heritage trails normally include interpretive signage and programs that are used to celebrate the unique history of a landscape or region.

Delaware and Raritan Canal Greenway, New Jersey

The 77-mile Delaware and Raritan Canal State Park supports a wide variety of recreational corridors for hiking and bicycling as well as canoeing, fishing and wildlife observation. The linear park supports heritage tourism through extensive educational signage and wayfinding systems. The canal trail is a 10 – 12 foot wide unpaved trail that extends for from Trenton to New Frenchtown, New Jersey, a distance of more than 77-miles. The gravel trail surface is reminiscent of historic canal towpaths in the region and supports a variety of trail users, including cyclists, hikers and equestrians. One of the greatest highlights of this trail is a number of interpretive information kiosks and signs that educate trail users of the route's historical past and connect users to nearby historic destinations. Several of the interpretative kiosks educate visitors on the functions of the adjacent canals and spillways that acted as an interconnected flood prevention system.

Relevance to ROGG: Elements that are relevant to the ROGG include the incorporation of educational signage about the function of the canal, spillways and towpath. This could be applied to educational opportunities of the CERP and other restoration efforts of the Everglades.

Interpretive kiosk along the Delaware and Raritan Canal Greenway



Unpaved Delware and Raritan Canal Greenway

Cape Cod National Seashore Trail through marshlands

Example of a levee trail in Marion County, FL

2.4.2 Best Practices

Overview

One of the objectives of the Comparables section was to identify best practices from selected projects for consideration by the design team and stakeholders involved in the feasibility study and master plan. Best practices were identified for project goals and feasibility criteria; the design, construction and maintenance of several trail types with potential for use on ROGG; trail amenities and materials; and criteria for construction phasing.

Best Practices

Inspirational/ Iconic Trails

World-class trails not only serve the needs of the surrounding community, but also act as tourism destinations for entire regions. Combined with the natural scenic landscape and climate of south Florida, the Everglades area currently draws millions of tourists annually. Ultimate success requires looking beyond the ROGG Study Area to ensure that the ROGG is an important piece of an interconnected trail system that connects these natural resource oriented destinations.

Trails of Significant Scale

Planning for a 75+ mile greenway requires a broad understanding of regional ecological and transportation systems as well as implementation strategies that take advantage of landscape-scale amenities and recognizes the magnitude of complexities associated with security, operations and maintenance. This requires cooperation among multiple jurisdictions and shared responsibilities to control costs over the long-term.

Trails Within Two-Lane Highway Right-of-Ways

The ideal greenway provides a high level of safety and a strong sense of comfort. In most cases this is difficult to achieve when planning for a trail adjacent to a highway. Physical or spatial separation typically can accomplish a higher level of comfort for trail users. Planning a greenway of significant length requires a hierarchical approach that includes numerous on-road scenarios, options adjacent to roadways, and trail easements on private lands.

Trails on Retrofitted Highway Bridges

Bridges often prove to be the most complicated to design and expensive to construct portions of shared-use trails. The potential to construct or reconstruct bridges is typically limited since they only undergo renovations every few decades. Some cities have been successful in prioritizing bicycle and pedestrian access during routine maintenance schedules of the bridges or redesigning the existing roadbed of a bridge to incorporate bicycle and pedestrian facilities.

Beyond their often-constrained widths, some bridge features make it difficult to accommodate bikeways. These include bridge widths that are narrower than the approach roadway (especially when combined with steep grades), open grated metal decks, low railings or parapets, and finger-type expansion joints or other joints that cause steering difficulties for cyclists. Width can often be added during reconstruction by filling open grating with lightweight concrete, modifying railings, and installation of steel plates or elastomer filler to solve expansion joint issues.

For federally-funded projects, planners and bicycle advocates can refer to Federal legislation that mandates the inclusion of bicycle and pedestrian facilities on bridges where the on-road facilities already exist. Section 23 USC 237(e) states:

> *"In any case where a highway bridge deck being replaced or rehabilitated with Federal financial participation is located on a highway on which bicycles are permitted to operate at each end of such bridge, and the Secretary determines that the safe accommodation of bicycles can be provided at reasonable cost as part of such replacement or rehabilitation, then such bridge shall be so replaced or rehabilitated as to provide such safe accommodations."*

Going further than these stated requirements, a USDOT Policy Statement on Bicycle and Pedestrian Accommodation Regulations released in 2010 encouraged Departments of Transportations to design and build beyond the minimum standards for bicycle and pedestrian structures. The Policy Statement indicated that when constructing or reconstructing bridges, it is more effective to build beyond the existing demand by anticipating an increase in demand, than to retrofit an old facility to accommodate demand.

Trails Associated with Levee Rights-of-way, Water Control Structures and Canals

Trails on levees and water control structures have a number of constraints, especially relating to placement of amenities and parking. However, they can also be quick to construct and often become popular community resources. For levee-top trail construction, the levee may need to be widened to accommodate the higher runoff from a paved surface. Typically, paved levee trails are made by plowing out the existing gravel trail and dirt to a depth of 10 to12-inches. Six inches of stone is then added and five inches of asphalt are placed at the surface to provide a smooth substrate. Construction of a trail on a levee typically requires crossings over canals and/or water control structures that require a thoughtful accommodation of all potential users' needs. Of particular concern when designing levee and water control structure/canal crossing trails are the following:

- Maintaining structural integrity of the levee is of primary importance to USACE and SFWMD
- Placement of bridges over water control structures or canals cannot impede water flow or operations of the structure
- Minimizing construction impacts on existing levees is essential, requiring the use of lighter and smaller machinery
- Stormwater runoff from paved surfaces needs to be addressed to minimize erosion of levees
- Ramps and/or stairs up to the levee trail and the trail grade need to meet compliance with ADA standards
- Width of the trail may be highly constrained at the top of the levee, but may not be as constrained on benches at the base of the levee slope
- Implementation of lighting and other amenities may be constrained
- Parking on/near levee can be limited
- Proposed pipe crossings must allow for clearance for cyclists, pedestrians and maintenance vehicles
- Tree placement on the landside near the toe of the levee may not be feasible due to bank maintenance needs
- Fencing must allow for mowing and easy access for maintenance crews
- Access by managing agencies to control structures and other sensitive equipment is essential for safe operation
- Control structure crossings should be placed downstream of the control structure to minimize dangerous water conditions if someone were to fall in at the crossing
- Maintenance access is a critical consideration and may require specialized equipment for paved trails different than that required for non-paved trails on levees

Trails in Environmentally Sensitive Landscapes, Including Wetlands

Development of trails and greenways in environmentally sensitive landscapes require careful planning of routes in addition to thoughtful design solutions and context sensitive construction methods. Materials should be comprised of materials that do not affect long-term health of the adjacent resources and preferably assembled off-site prior to being placed into final position. Planning and design should include careful consideration of impacts to the contextual surroundings, and consider sustainable practices or materials, such as the reuse of asphalt or sub-base materials, high performance materials that will last in the harsh climate of south Florida, and the labor, distance and impact that construction activities will have on the surroundings.

Bicycle and pedestrian trails typically have smaller impacts on wetlands than roadways due to their narrower widths. In addition, there can be benefits to allowing the more personal experience of these users in sensitive natural areas. Appropriate access to these sensitive areas can promote stewardship and foster appreciation for their values. Comparable trails investigated for this study provided several guiding principles for evaluating the feasibility of trails in wetlands, including the following elements:.

Wetland Trails Planning and Design Best Practices

- Avoid building in wetlands, or use existing structures or pathways where possible
- Where impacts are required, focus impacts on disturbed wetland systems
- Seek to provide views from the edges or plan for overlooks for visual access without physical impacts
- Provide design solutions that protects natural flow of water

Wetland Trails Construction Best Practices

- Use equipment with smallest footprint possible
- Build in sections while working from above (if decking/creating boardwalk) or from the boardwalk
- Limit construction to periods when the least impact is more likely - within the driest portions of the year (October through April), and outside breeding season and migratory season of sensitive wildlife
- Use pre-cast or prefabricated materials that allow for installation with minimal contact with the wetland

Heritage/ Tourism Trails

Trails which strive to meet heritage standards or serve as tourist draws for regions typically include a high level of design, though not necessarily a high level of construction costs. Heritage trails can help regions share in the stories and history that make an area unique. In order to achieve this, a comprehensive package of signs and wayfinding, complete with interpretative kiosks, along with connectivity to destinations is important.

Trail Features and Amenities

Successful trails and greenways have amenities and context-sensitive features. Without such amenities as parking, access to water, or air for tires, projected use of a trail may never be achieved. When planning a trail the scale of ROGG, identifying the amenities and trail features that a wide array of potential users may need is vital. Following are best practices for trail features and amenities.

Trailheads

A series of full service trailheads would be needed along the ROGG. For a trail corridor 75-miles long, a minimum of five full service trailheads would be needed to be placed on a spacing approximately 10 to 12-miles apart. Existing facilities, such as identified destinations along the corridor, could meet many of the services and amenities needed for a trailhead. A full service trailhead should provide the following services:

- Parking for at least 20 automobiles
- Drinking fountains (potable water)
- Trash receptacles (recycling if possible)
- Picnic shelters
- Group and individual seating areas
- Air station
- Cellular or wireline emergency call boxes
- Wayfinding signage system
- Vending machines (optional)
- Toilets (optional)
- Showers (optional)
- Bike Racks (minimum 3)
- Picnic Tables (minimum 3)

Rest Areas

In addition to trailheads, rest areas should also be developed throughout the ROGG Study Area. Rest areas would not need to provide automobile parking, but could include storm shelters or picnic shelters, bench seating, trash receptacles and, potentially, emergency call boxes. At least one rest area should be located between trailheads.

Shelters

The construction of sturdy storm shelters is an important feature for the ROGG, due to the realities of long distance travel in an isolated and exposed corridor. Shelters should be constructed to blend with the native environment, through indigenous architecture and use of local materials, and include adequate lighting for evening use. Shelters should shield users from the intense Florida sunshine, but also be capable of withstanding hurricane force winds.

Observation Platforms

The landscape along the length of the ROGG Study Area is very flat, which could make traversing long stretches relatively monotonous. Observation platforms and viewing areas, elevated above the surrounding landscape would provide opportunities to better appreciate the landscape context and view wildlife or scenery.

Signage and Wayfinding

Trail signage is an important element of future ROGG development. There are four sign types that have been considered: regulatory (to meet federal standards), identity (signifying that you are on the ROGG), wayfinding (letting you know where you are and where you want to go) and interpretive (enabling a user to understand something unique about the landscape or attraction).

Low Impact Trail Materials

For the ROGG Study Area, concern over the impact of trails on the environment requires an assessment of the potential for constructing a system that is multi-use, accessible, and capable of supporting transportation travel. Future trail development must adhere to AASHTO standards, which defines a minimum width, hard-surfaced trail tread of 10 feet, with a preferred width of 12 feet. In order to lessen the impact associated with the federally-prescribed trail tread standards, construction of the ROGG must include the use of construction materials that have the least impacts on the environment.

Given the fact that much of the future ROGG system would be constructed within publicly-owned lands dedicated to conservation, pervious surface design

Example of a full service trailhead with amenities


Information kiosk example


Image of a typical rest area (Miami-Dade County Trail Design Guidelines and Standards)

would be expected to be evaluated as the standard for all construction. This construction technique could be applied to the construction of levee trails and roadside trails in particular. Elevated trail treads will be necessary at various locations where deep marsh, wetland sloughs, canals and rivers must be traversed. Where trails are not constructed adjacent to the road or on top of existing levees, they could be constructed as boardwalks or bridges across open water or wetlands. Elevated trails would need railings for trail user safety. The minimum height of the top rail for bicycle travel is 42-inches from the travel surface. Floating trail treads are a third option for consideration and could be a series of trail treads constructed on pontoons or some other system that floats on water. As with boardwalks and bridges, safety railings would be needed for these trail types.

Future Trail Development

Greenways of similar scale rarely are constructed as a single project. Typically, a phased approach is developed that may take years or even decades to complete after routing alternatives and funding are defined. Similarly, ROGG would likely not be developed as one continuous project along its entire length. Trail development for ROGG would likely be constructed in phases, requiring planners, designers and sponsors to plan for trail development as a series of segmented projects that may not be initially connected or linked end-to-end. The following criteria have been developed to guide the establishment of a phased approach for future facility development.

Potential Criteria for Defining Trail Segments/ Phases for Construction

1. Strong end-to-end origin/destination
2. Length of travel meets a specific user's needs and expectations
3. Connects to local, regional, statewide or national trails
4. Connects to local attractions such as parks, employment or tourist destination
5. Meets federal, state and local design criteria for trail development
6. Available ROW for trail development
7. Ability to secure permits for trail development
8. Cost of trail construction

Using this criteria, segments of the future ROGG trail development can be categorized in one of three classifications:

a) Ready for immediate development,
b) Capable of near term development,
c) Challenging for future trail development

As a multi-jurisdictional Study Area, extending across multiple federal, state and local jurisdictions, discussions on operations and management were initiated as part of the feasibility study and master plan process.

Issues for operations and management addressed in Chapter 4 of the feasibility study and master plan include:

- Roles and responsibilities of jurisdictional partners
- Guiding principles governing operation and management of the trail
- Operation and management functions
- Description of facilities to be managed and maintained
- Access and use policies
- Trail facility management policies
- Land management policies
- Water management policies
- Safety and security of trail users
- Risk management and liability
- Administrative costs for operations and management
- Labor and equipment needs for operations and management
- Anticipated costs and funding for operations and management

The ROGG User

Users of long distance trails similar to the ROGG are a unique blend of cyclists and pedestrians. Long distance trails that are primarily linear in nature with strong end points promote a type of use that is different from local and regional trails. Below is a list of trail user types most likely to use ROGG based on research of comparable long distance trails.

Out and Back or Half Back:
Halfbackers are trail users that ride linear greenways roughly half the total distance and then retrace their route to their point of origin. For the ROGG, this may be the most popular user of the corridor due to its end points in Miami and Naples. Halfbackers are typically cyclists who are looking for a health and wellness opportunity. For these users, the intent is a vigorous ride as part of a normal fitness routine.

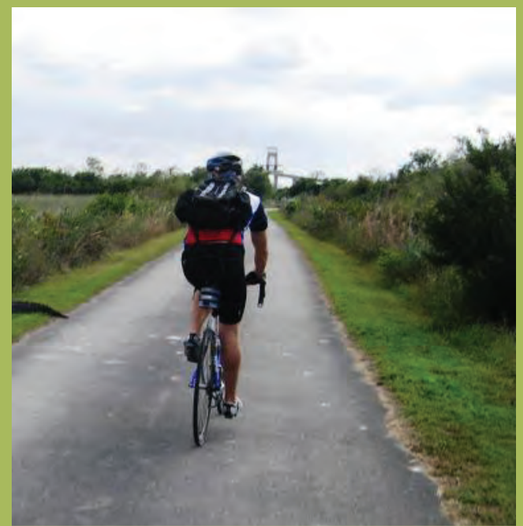
Explorer:
Greenway users that arrive by car and stop at trail heads or other current destinations, such as visitor centers, along the route are classified as "explorers." This user has typically not made use of a greenway as a primary focus of their travel within the corridor, but will use short segments of the trail system during their brief stay.

Tourist:
It is anticipated that the ROGG would grow in popularity and would attract tour groups to south Florida. A variety of different rides and walks could be established to accommodate these tourists. As one example, a three-day tour could consist of 20 to 30 miles of cycling combined with interpretive stops and lunch breaks. Themed tours could be developed to attract a variety of interested users, from lovers of nature to cycle enthusiasts looking for the next great adventure ride.

Looper:
Loopers are trail users that typically reside at the trail end points or at population centers along long distance greenways. Loopers are cyclists and pedestrians that make use of portions of a long distance trail corridor as part of a circuit ride or walk. This means that the greenway is connected to a network of local or regional trails and that the use of the greenway is part of daily or weekly loop rides and walks.

Through User:
Trail users that travel from end-to-end on a long distance greenway are called "through users." This user would be expected to be the minority trail user for the ROGG. Nevertheless, the number of these users could be fairly high because a) the project corridor is flat and accessible, b) the south Florida landscape and climate could support 75-80 mile rides and c) the population centers in Miami and Naples could support through users. Relatively fit through users could ride the entire end-to-end route in five to seven hours. Tour hikers could accomplish the walk across the corridor in three to five days.

Internal Users:
The ROGG already has a population of users working and living within the corridor that would make use of the greenway on a daily basis, though this would likely be limited since population centers are located at the terminus of the corridor. The range of use would be strongly associated with existing population centers, popular destinations and employment centers. Internal users could also come from the service and utility sectors, such as employees of the SFWMD, NPS, or USACE whose jobs take them into the corridor.



Cyclist on Tram Trail at Shark Valley Visitor Use Area - Photo by Ginny Nadolny

2.4.3 Lessons Learned

From the comparable projects and summary of best practices that are relevant to long distance trails, the following "lessons learned" were identified as relevant to conditions similar to those found within the ROGG Study Area. As lessons learned, these summaries form recommendations that are to be considered in the planning and design of the ROGG. These lessons learned do not necessarily constitute a criteria for feasibility.

Location of Trail Facilities

Greenway trail facilities are best located on existing infrastructure where available, such as levee tops, shared trail and maintenance roadways, and roadside trails adjacent to U.S. 41. Off-road trails need to preserve natural waterflow. In limited circumstances where other locations are not available, bicycle lanes within the existing roadway corridor can be planned in order to ensure full route connections for the trail alignment.

Trail Corridor Width

The minimum width for the ROGG is determined by the operation and management requirements of the particular trail tread as well as the environmental and cultural constraints present. For ROGG a corridor that is at least 30 feet wide would provide for a 10 to 12-foot wide trail tread with six to 10 feet on either side for furnishings, operations and management.

Separation of Trail and Roadway

Trails separated from roadways typically provide an improved user experience. Options to separate ROGG from U.S. 41 should be pursued throughout the corridor. The minimum width between the edge of road shoulder and the edge of trail should be five feet consistent with FDOT standards.

Build Loop Trails

To the extent practical, the ROGG system should connect to a series of loop trails built across the corridor. Loop trails are typically of varying length and type, although trail crossings over U.S. 41 will need to be considered for safety concerns.

Water Trails

Defined as a hard-surface multi-use trail supporting transportation and recreation, the ROGG should also connect to water-based access opportunities in the surface waters of the Everglades, Big Cypress, Fakahatchee and myriad waterways that are found throughout the corridor. Connections to a system of canoe and kayak trails is recommended to enhance the project. Opportunities to provide connectivity to existing and proposed water trails should be utilized.

Modifications to Existing Roadway Bridges

Modifying the superstructure of existing roadway bridges to facilitate trail development can be difficult to accomplish where the structure of the bridge is not designed to accommodate expansion. Where bridges cannot be expanded, restriping or other alterations within the existing structure may accommodate a trail connection, but not maintain the desired separation between vehicles and trail users. Though this technique has been utilized throughout the country, consideration for use for the ROGG should be only as an alternative option.

Connectivity to Destinations

Connectivity to destinations is important to consider along the entire route of ROGG. This includes destinations offering experiences with cultural and environmental resources and educations as well as trail user amenities such as food, water, transit and lodging. Connectivity is best when it is consistently utilized across multiple jurisdictions, such as various public lands, counties and tribal areas.

Trail Tread Width

Trail tread width should be no less than 10 feet, in accordance with AASHTO and FDOT standards. As a multi-use trail, ROGG is recommended to have a tread width of at least 12-feet. However, a 14-foot trail tread would provide an improved user experience. Trail tread width must be balanced with environmental impact. Given that the trail tread would be a hard surface, a wider trail would create greater natural resource impacts.

Design guidance for the width of a multi-use or shared-use path based on successful comparables that it should range from 10 to 15-feet in width depending on factors such as volume of users and mix of expected use. FHWA and Florida Greenbook standards call for 15-foot wide bike/pedestrian trails or a 10-foot wide bike trail if the facility is adjacent to a separate pedestrian facility. Where the trail crosses wetland systems, the trail tread should be the minimum width. A clear zone on either side of the trail must be maintained in accordance with AASHTO and must be at least two-feet from the edge of the trail. A minimum operations and management zone is recommended to extend at least five-feet from the edge of trail.

Trail Surface Materials

Similar projects across the nation and around the world have employed porous pavement, wood boardwalks, plastic lumber made from recycled waste, geogrid membranes or pre-cast concrete segments stretched across wetlands. The controlling factor is AASHTO standards and the preference for paved or hardened trail surfaces.

Trail Furnishings

Trail furnishings and amenities should be designed and constructed to reflect the south Florida and Everglades landscape context. Hardwoods can be the dominant feature of furnishings and furniture as this material is readily available and typically has a life-span of 10 to 20 years. For materials that are planned to withstand fire hazards, concrete products should be considered. Materials selected would need to withstand the hydrological and wind-load forces of south Florida.

Signage and Wayfinding

A comprehensive system of signage and wayfinding is best throughout the corridor. A full complement of signs includes regulatory, directional, interpretive and identitysigns, which should all follow the Miami-Dade County 2009 Sign Implementation Manual for wayfinding signs, as well as the Manual for Unified Traffic Control Devices (MUTCD) standards.

Goals for ROGG Planning and Design

There are four primary goals that should be considered in the future development of the ROGG: safety, connectivity, diversity of experience, and efficiency of travel.

Safety of Users

Safety of trail users is paramount to a successful project. To promote and ensure the safety of future trail users, the ROGG should strive to separate trail users from motor vehicle travel whenever and wherever possible.

Connectivity

The hallmark of the ROGG is its ability to connect users to the unique landscapes and attractions of the corridor. Supporting end-to-end travel along the entire 75 to 80-mile corridor is certainly a goal, but it is also equally important to provide quality connections to popular destinations throughout the corridor. Additionally, the ROGG should link users to other local, regional, statewide and national trails to promote a choice in travel and experience.

Diversity of Experience

The ROGG would offer users a wealth of travel and visitor experiences. The project should take full advantage of the Everglades landscape and the south Florida climate to allow users a diverse range of experiences including educational experiences of CERP activities. These opportunities should be made available for users who vary in their capabilities and intensity and for the array of landscapes, cultural attractions and duration of visits.

Efficiency of Travel

To the greatest extent practical, the ROGG should follow the U.S. 41 corridor. This serves to promote efficient travel through the corridor and allows trail users to experience the diversity of landscapes and cultural attractions that exist in the corridor. The speed of travel through the corridor may vary for different user groups.

2.5 SUMMARY

"Trails in the 21st Century will be built through creative partnerships, relying heavily on citizen initiation, while combining the resources of nonprofit organizations, pubic agencies, foundations and private corporations."

– 12th National Trails Symposium, 1994

Introduction

The region being studied as part of the ROGG Study Area is a complex environmental, social and cultural region that has a long history of human use and occupation, including dramatic changes in the last 50 to 100 years. It is this unique environment that over one million visitors come to the region to experience each year. Building on the allure of a long-distance hiking and biking experience for a variety of users, the ROGG is envisioned to bring awareness to the Greater Everglades ecosystem, including the ongoing ecological restoration in the region.

The concept of the ROGG comes at a time when there are growing concerns about the environmental impacts of providing vehicle-only access to our National Parks. Multi-use trails and alternative transportation access have proven to be effective means at reducing natural resource impacts, while still encouraging access to sensitive natural areas. Well-planned, multi-use trails such as the ROGG allow access to natural areas, promote economic growth, provide pathways for alternative modes of transportation and enhance opportunities for improved fitness.

This review and analysis of context and conditions does not occur in isolation from the extensive array of previous regional guiding documents and other influencing documents, research of existing conditions, and documentation and analysis of other successful greenways across the world. The subsequent chapters of this report document determination of feasibility and implementation strategies for those segments found feasible. The follow is a summary of the research and analysis chapter.

Corridor Context

History, Development and Alterations

Florida's Everglades were one of the final frontiers for European settlers in the United States as the subtropical climate, hydrology, and conflicts with indigenous populations limited extensive settlement until late in the 19th century. Beginning in the 1880s, large-scale drainage projects were implemented to lower natural water levels and drain the vast Central and South Florida wetlands. The populations of Miami and other existing south Florida cities rapidly increased as did nature-based tourism. As populations increased on both coasts, the concept of and need for a roadway connecting the coasts through the Everglades became a regional goal. This was realized in 1928 with the construction of the Tamiami Trail. While an engineering feat, the Tamiami Trail had the effect of damming the flow of water into the Everglades and Florida Bay despite later additions of bridges and culverts to assist in movement of hydrological flow.

Beginning in the 1970s, several initiatives began to address the deterioration of the south Florida ecosystem caused by the C&SF Project. As part of the 1989 federal Everglades Expansion Act, the Mod Waters project was identified to modify the C&SF Project to improve water deliveries to the ENP. In 1992, Congress authorized the Water Resources Development Act that included approval to re-evaluate the C&SF Project performance, provide improvements to restore south Florida ecosystems and provide other water resource needs. In addition, the State of Florida enacted the Everglades Forever Act in 1994 to address water quality issues. Elements of the restoration efforts relevant to the feasibility assessment of ROGG include the removal and/or modification of existing infrastructure that would not be available for future trail options, the necessity for ROGG to be consistent with regional restoration efforts, and opportunities to incorporate ROGG elements on future bridges.

Conservation

In the midst of the drainage and development activities, protection and conservation of the natural systems of the Everglades and Big Cypress also occurred. Substantial public conservation lands within the ROGG Study Area affected feasibility assessments for potential alignment selection, considerations for public and regulatory coordination, the identification of destinations and amenities that could be co-located, connections to existing infrastructure, and post-construction operation options.

Native Americans

In addition to conservation and restoration efforts, the ROGG Study Area includes reservation trust lands for the Miccosukee Tribe and several significant cultural sites, including those used for the Corn Dance ceremonies. Relevant elements of the Seminole and Miccosukee historical period considered in the feasibility assessment include considerations for tribal trust lands, the Battle of Turner River battlefield from the Seminole Wars, historical monuments from tribal and government interactions, and avoidance of significant ceremonial sites for the tribe.

Climate

Climate characteristics are an important aspect of evaluating a outdoor facility for use by humans. The ROGG Study Area occurs in south Florida at the interface between subtropical and temperate climate conditions within the climate classification of Tropical Savannah. The region exhibits two distinct seasons based on rainfall and temperatures. Significant elements of climate relevant to the design and operations for ROGG considered for the feasibility assessment include afternoon thunderstorms, tropical storms, and intense sunlight and high summer temperatures.

Hydrology

Hydrology implication are a primary consideration for this study. The ROGG Study Area occurs within the Everglades and Big Cypress Swamp watersheds, both of which have been subjected to extensive hydrological alterations. Regional hydrology is one of the most significant elements affecting the character and ecology of the ROGG Study Area and a primary consideration for the design and implementation of ROGG. Any aspects of ROGG that would compromise the fundamental objectives or implementation of regional hydrological restoration efforts are considered infeasible for this study. The post-restoration future conditions for infrastructure, water levels, and/or flows were considered the baseline condition for feasibility evaluations of routing alternatives and design options for ROGG. Other elements with specific relevance to ROGG include maintaining or enhancing existing sheetflow, incorporating water related recreation opportunities, and opportunities to restore historical patterns of tidal exchange.

Vegetative Communities

The ROGG Study Area contains unique landscapes for the region. A vital component to the preservation of these vegetation communities is to consider potential influences, including routing alternatives in the vicinity of rare vegetation communities and areas requiring intensive management, previously altered sites, and the need for additional shade features due to limited available tree canopy, access to water features, design and management considerations to address shrub management and tidal communities, regulatory requirements for wetlands, and vegetation that could be incorporated into a landscape palette for the ROGG.

Listed and Exotic Species

The presence of listed species influenced the analysis for the ROGG through evaluations of routing alternatives that could affect Florida panther habitat within the Panther Focus Area and Critical Habitat for other listed wildlife species, opportunities to incorporate design elements that could minimize impacts to Florida panthers such as enhancement to the Roadway Animal Detection System, accommodations to minimize wildlife use of trail facilities that would be adverse for wildlife or trail users, and permitting requirements for future ROGG facilities relative to listed species.

Exotic invasive species influenced the analysis for the ROGG through evaluations of opportunities to route the trail through exotic invasive vegetation areas to remove those species and limit impacts to higher quality natural systems, the use of exotic species removal to mitigate for other natural resource impacts, and design options to minimize the introduction of exotic species as a result of ROGG through design, implementation, and long-term operations.

Ecological Process

In south Florida, ecological processes with the strongest influences on the ecology of the region include fire, hydrology, wind, tidal influences, sea level rise, and succession. Specific influences on analysis for the ROGG relative to ecological processes included accommodating fire management through incorporation of fire-resistant materials and maintenance of access by appropriate trail design, reviewing ROGG compatibility with regional hydrological restoration projects, incorporating design options to address wind effects, assessing effects of sea level rise, and managing succession.

Natural Resource Regulatory Context

Impacts to natural resources in the ROGG Study Area would require authorization from several agencies having jurisdiction over wetlands and water bodies and protected wildlife and plant species. The review and authorization for proposed impacts would be coordinated through a variety of regulatory mechanisms, ranging from NEPA coordination to application and approval of various environmental permits. Construction of the ROGG may require coordination with the USACE, USFWS, EPA, SHPO, SFWMD, FDEP, FFWCC and MDRER to address natural resource issues.

Public and Tribal Lands

Lands held in public and tribal ownership within the ROGG Study Area affected feasibility assessments for routing options and regulatory review as well as opportunities for long-term partnerships for operation and maintenance. Specific influences on analyses for the ROGG included an assessment of potential partnerships, regulatory review from facilities that would occur in these ownerships, and requirements associated with tribal holdings.

Transportation

Considerations for vehicular traffic relevant to ROGG include the influence of the volume of traffic using U.S. 41 as well as the speed of traffic for trail experience and safety, the potential location of the trail relative to traffic lanes, modifications to road design or speed limits that would be subject to intense public scrutiny, limited availability of defined parking facilities, and accommodations for temporary parking in the ROW on future ROGG uses.

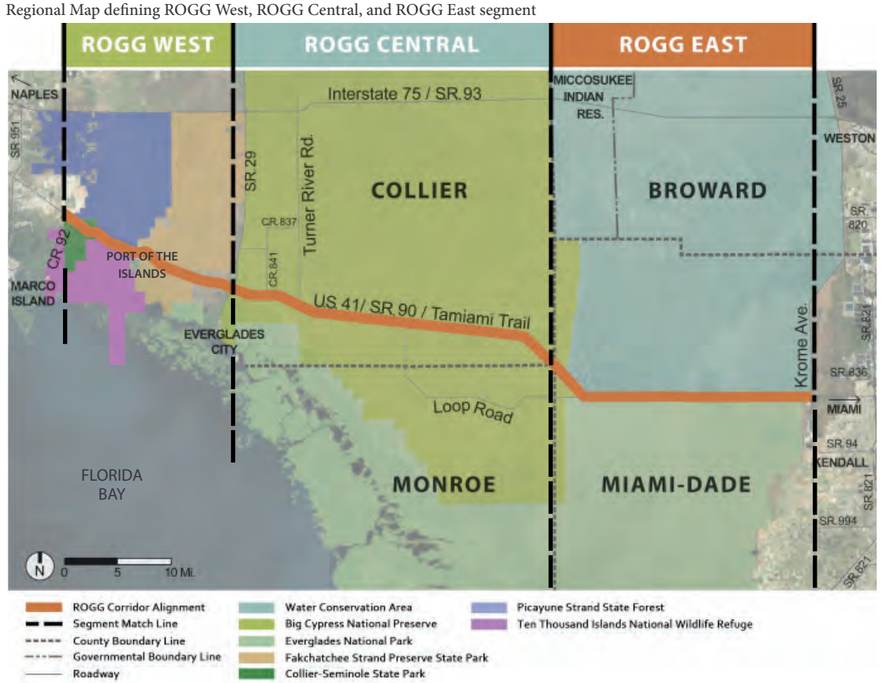
Considerations for non-vehicular transportation within the ROGG Study Area included evaluations of current and future facilities on existing and proposed bridges for U.S. 41, options for transit connections, and accommodations or facilities to separate vehicular and non-vehicular users.

Corridor Existing Conditions

The Corridor Existing Conditions section documented a snapshot in time for the conditions and features occurring within the ROGG Study Area and the planning implications of those conditions and features for the routing, connections, and configuration of the ROGG.

Selection of this particular segment of U.S. 41 for ROGG was made because it is the southern-most east to west transportation corridor that connects both sides of the Florida peninsula and is the main visitor travel corridor traveling connecting directly to six federal and state public lands.

Regional Map defining ROGG West, ROGG Central, and ROGG East segment



Over the span of 76 miles, the ROGG Study Area provides a diverse collection of landscape types and conditions which offer a variation in experiences. In addition, man-made barriers helped define segments that were studied and documented in further detail. In the case of the ROGG Study Area three distinct segments were defined using geographical borders and man-made features. Following are descriptions of each opportunities and constraints for each segment:

ROGG West

Observation tower along Marsh Trail in Ten Island Islands NWR

The ROGG West segment of the Study Area exhibits an abundance of existing destinations and activities for future trail users to enjoy. Existing conditions are favorable for the implementation of an alternate mode of transportation, which would allow for large influxes of visitors to access destinations while also managing access to the natural wonders of the landscape between the destinations.

The biggest opportunity observed for ROGG West was an abundance of existing facilities that could serve as trailheads with minimum improvements needed. Additional opportunities include providing connections into three communities (Naples, San Marco and Everglades City) and connections to existing trails and boardwalks at Collier-Seminole State Park, Ten Thousand Islands NWR and Fakahatchee Strand Preserve State Park.

Constraints along the ROGG West segment consist primarily of three items; bridges, wetlands and Florida panther habitat. A total of 36 bridges exist along the ROGG West segment. These bridges have an average width of 32 feet, which does not allow for an appropriate bike lane of five feet per FDOT standards for roadway with posted speed limits of 45 mph. The second major constraint is existing wetlands. The south side of the ROW contains most of the designated ROW, but the majority of that designated ROW is characterized as wetlands. The third major constraint is the location of the corridor within the Panther Focus Area. While not considered Critical Habitat under the terms of the ESA, the USFWS has designated the Panther Focus Area as part of the core habitat for Florida panthers within the state. Construction within the Panther Focus Area is allowed, but mitigation is required for impacts to habitats identified in guidelines by the USFWS. This mitigation can add substantial costs to the implementation of any project requiring impacts to both uplands and wetlands within the area. Though these constraints present a number of challenging situations, the ROGG has the ability to remain flexible in routing and design with a number of innovative solutions.

ROGG Central

Boardwalk at Kriby S. Storter Roadside Park in the Big Cypress National Preserve

Spanning the longest length of the three segments, ROGG Central offers a number of opportunities and constraints which makes this area unique. This portion of the Study Area is dominated by the presence of the Big Cypress National Preserve for the entire length of the segment.

Opportunities within ROGG Central are primarily focused on providing additional access to existing facilities. Within this 32-mile segment, eight existing destinations can serve as trailheads and provide existing parking, restrooms, boardwalks and educational opportunities for trail users. Access to existing trails such as the Fire Prairie Trail and the Florida National Scenic Trail provide connectivity to a state-wide network and allows users to experience the landscape away from U.S. 41. Access also includes water routes with launch points at three existing facilities. When connected by ROGG these existing facilities would allow users to explore deep within the Preserve and provide unique opportunities to experience the Everglades region. Many of the constraints for ROGG Central are similar to those of ROGG West and include; bridges, wetlands, Florida panther habitat, Critical Habitat for manatees and the presence of Radar Animal Detection System (RADS). Although there are fewer existing bridges within this segment, the design of the bridges are similar to those in ROGG West, which do not accommodate bike lanes or separated facilities.

The presence of a Radar Animal Detection System (RADS) in the Turner River area presents a feature that the development of ROGG itself may actually benefit. RADS are currently being tested in this area to increase awareness of wildlife activity along U.S. 41. However, due to the proximity of detection devices to the highway's shoulders, many of the system components suffer from errors caused by vehicles parking along the roadway or from vandalism. By locating the devices on the outside of the trail, the devices could be located further from vehicle traffic and in a manner which limits opportunities for errors.

This segment also includes cultural resource features that would need to be accommodated by future ROGG facilities. These include Native American ceremonial sites and historic places designated on the U.S. National Register of Historic Places. A CRAS will most likely be needed to identify properties and assess effects.

ROGG East

Gator Park Airboats tourist destination in Everglade National Park

Contained entirely within Miami-Dade County, the ROGG East segment experiences the highest volume of visitors of all the segments due to the proximity of the Shark Valley entrance to ENP, Miccosukee Indian Village, and nine private attractions near the Miami metropolitan area. Miami-Dade also has the largest existing transit network that can be connected directly to the ROGG, providing options for residents to take transit to the eastern terminus of ROGG or potentially farther west to Shark Valley and the Miccosukee Indian Village.

Shark Valley is currently one of the fastest growing visitor use areas of all ENP entrance points, while it is also the most constrained for expanding to meet these increased needs. A new visitor center and restroom facility is under construction at Shark Valley. The facility frequently experiences parking lot capacity issues during the peak visitation season. Development of the ROGG and coordination of transit could help relieve some of the vehicle traffic congestion issues at Shark Valley, while the addition of other opportunities along the ROGG East segment could provide additional opportunities for visitors to experience the Everglades that could offset the growth in total number of visitors and their impacts at Shark Valley.

Existing facilities at a number of locations such as Shark Valley, Miccosukee Indian Village, and ValuJet Flight 592 Memorial offer potential trailhead amenities, such as parking, restrooms and educational elements. ROGG East also includes the greatest number of potential alignments, include one within the U.S. 41 maintained ROW on new or proposed bridges, within existing levee ROWs along the L-29, within the Old Tamiami Trail corridor, or Loop Road. Each potential alignment was evaluated in greater detail in order to determine all options in the feasibility of constructing the ROGG.

Environmental and cultural opportunities include a focused effort to remove exotic species to improve both habitat and viewsheds. Culturally significant lands include Native American lands in the western areas of ROGG East segment ,which includes the Miccosukee Indian village area.

This segment also has the greatest amount of proposed changes to the landscape as part of the recommended restoration efforts of the CEPP and related projects. These proposed improvements include the addition of several new bridges along U.S. 41 and the removal of the existing roadbed, partial and complete removal of some levees, removal of the Old Tamiami Trail roadbed and fill, and the addition or upgrades to several water control structures. The immediate time-lines for these restoration efforts are not known and ultimately could take decades to implement. As such, the addition of the ROGG to the existing levee network, within the Old Tamiami Trail corridor, or as part of the proposed bridges could still proceed in coordination with these efforts and ultimately could be constructed as a temporary route until the time of removal, although these uses would need to not inhibit future restoration activities.

Literature Review

The Literature Review documents the extensive literature base that exists as a result of years of evaluations and studies in the region. This review includes a summary of a portion of this literature of reports and studies particularly relevant to ROGG and assess the planning implications for the feasibility and master plan of the ROGG stemming from this literature base. In an effort to build upon the works of previous adopted plans and studies and to ensure coordination with other official documents that could influence the development of ROGG, multiple sources of information were reviewed. These sources identify designated improvements, regional studies, and regulations that could influence the development of or feasibility assessment for ROGG. They can be classified into five broad categories: governing codes and ordinances, master plans and management plans, transportation studies, environmental and cultural resource documents, and design guidelines and methodologies. Significant findings from guiding documents include:

South Florida Water Management District (SFWMD) Public Use Rule

SFWMD allows for public access and use of many lands adjacent to the ROGG Study Area for outdoor recreation activities. Regulations defined by SFWMD include use of bicycles within levee right-of-ways, along maintenance berms and on levee tops. Direct implications for ROGG include the potential use of SFWMD levees, levee berms and/or levee right-of-ways for the use of hiking, biking or other outdoor recreation uses. In addition, the pedestrian and bicycle access that could occur on levees would also connect to blueway connections for the canals in the system. These canals may be used for canoeing, kayaking or other water related outdoor recreation activities. Coordination with the SFWMD and other regulatory agencies in the region is needed to address public access on private lands with SFWMD easements as well as potential issues associated with using the levees relative to regional hydrological restoration goals.

South Florida Water Management District (SFWMD) Recreation Management And Partnership Plan: Land Stewardship Division

Recreation management of SFWMD lands seeks to balance access to consumptive and non-consumptive activities as well as provide connectivity to other public lands through greenway partnerships. Since the Office of Greenway and Trails has designated ROGG as a priority greenway route since 2004, options to facilitate ROGG through coordination with and use of lands managed by the SFWMD may provide opportunities to enhance regional greenway networks through the implementation of ROGG. Direct implications for ROGG includes the use of ROGG facilities to meet the plan objectives for SFWMD to provide outdoor recreation activities for both hiking and biking (non-consumptive use) and fishing and hunting (consumptive uses).

ETDM Summary Report; Project #12596 – River Of Grass Greenway; Planning Screen & Program Screen

These reports document that the reviewed portion of the ROGG (ROGG West) is included on pathways planning maps for the State of Florida Office of Greenways and Trails (highest priority level), North Dade Greenways Master Plan, the CERP Master Recreation Plan, Collier County Comprehensive Pathways Plan, and has been incorporated into the Collier MPO 2030 Long Range Transportation Plan. The reports (including the 03/11/11 Programming Screen) also noted that the FDEP Office of Greenways and Trails "supports the proposed project and has determined that the trail can be built to minimize environmental impacts while maintaining consistency with regional restoration efforts." The inclusion of ROGG on these plans provides avenues of future potential funding for improvements as well as an acknowledgment of the need and purpose for the ROGG.

Draft Integrated Project Implementation Report And Environmental Impact Statement: Central Everglades Planning Project (CEPP); 2013

The CEPP proposes the removal of a 4.3 mile long segment of the L-29 Levee, therefore removing a portion of existing infrastructure that could be used for ROGG. Dependent of the bridge design selected in Tamiami Trail Next Steps, the removal of the levee causes a gap in existing infrastructure available and/or programmed improvements other than on-road bicycle lanes that would maintain direct access along the U.S. 41 corridor for this 4.3 mile segment. The proposed Blue Shanty levee and L-67C provide a potential route separate from U.S. 41 around this gap, but this potential route would be significantly longer than a direct connection.

The recreation plan for CEPP includes several maintained, enhanced, or new improvements within the ROGG Study Area. Pedestrian trail connections would extends along the Blue Shanty flow way and the L-67A levee. This pedestrian access provides a connection point for recreation access to the northern portions of the CEPP study area and other regional greenway systems. The recreation plan for CEPP identifies trails on the proposed Blue Shanty levee and the portions of the L-29 and L-67A that would remain after the CEPP projects are completed that could be integrated into or connected to ROGG. The parking areas and improvements identified in the plan would potentially be available for trailhead facilities for ROGG.

Approximately six miles of the Old Tamiami Trail between the ENP Tram Road and the L-67 Extension Levee are identified for removal as part of CEPP, which is the majority of the former roadway east of the Miccosukee Village. The Old Tamiami Trail provides an existing piece of infrastructure with a paved surface that could be available for use by ROGG. The banks of the facility are dominated by shrubs, including exotic invasive species, which limits views into the adjacent habitats, but provides shade for people using the old roadbed. For ROGG, the Old Tamiami Trail provides an existing piece of infrastructure that could be available temporarily for trail use, although this would need to be done consistent with and in a manner that does not compromise hydrological restoration goals.

Comparables

Analysis of comparable projects throughout the world allows for the identification of best practices used in the design and implementation of comparable greenway projects and the assessment of lessons learned that can be applied to ROGG. While there is no single greenway project that replicates the exact conditions and constraints of the ROGG Study Area, there are a variety of projects around the world that offer successful solutions to issues relevant to the feasibility study and master plan for the ROGG. Comparable greenway projects within the following categories were reviewed because of similarities to conditions observed in the ROGG Study Area. These seven categories include comparables from projects that represent iconic or inspirational trails to projects that are exemplary of relatively localized issues such as low impact trails. The following are the seven categories researched followed by images of some comparable greenways:

1. Inspirational/ iconic trails
2. Trails of significant scale
3. Trails within two-lane highway right-of-way
4. Trails located on retrofitted highway bridges (culverts and large length bridges)
5. Trails associated with levee rights-of way, water control structures and canals
6. Trails in environmentally sensitive landscapes, including wetlands
7. Heritage trails

Lake Okeechobee Scenic Trail (on top of USACE-managed levee system)

Cyclist on the Nisqually Estuary Boardwalk Trail

Cyclists on the New Orleans Levee-Top Trail

Multi-modal transportation connectivity along the Grand Canyon Greenway, AZ

Part 03
CORRIDOR FEASIBILITY AND VISION

to be completed

To Be Completed

Part 04
IMPLEMENTATION

to be completed

To Be Completed

Carlos A. Gimenez
Mayor

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