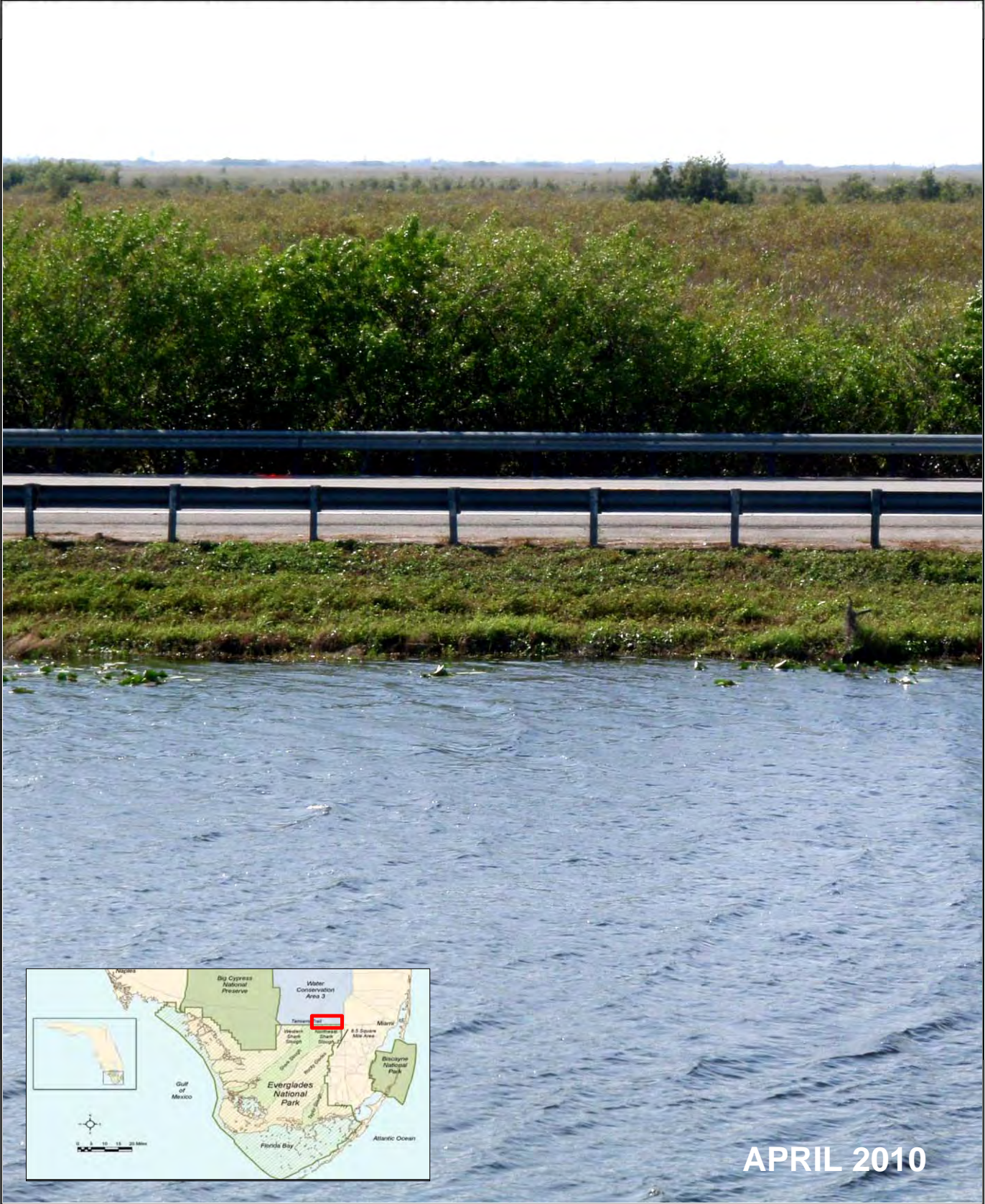


EVERGLADES NATIONAL PARK TAMIAMI TRAIL MODIFICATIONS: NEXT STEPS DRAFT ENVIRONMENTAL IMPACT STATEMENT



APRIL 2010

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Tamiami Trail Modifications: Next Steps Draft Environmental Impact Statement

Everglades National Park

Lead Agency: National Park Service

ABSTRACT

Construction of the 264-mile section of U.S. Highway 41/State Road 90 known as Tamiami Trail to connect Tampa and Miami began in 1915 and was completed in 1928. The construction of this roadway created an impediment to natural water flows into the Everglades, slowing and blocking water flow south into the southern Everglades and Everglades National Park.

This project arose as part of the 2009 Omnibus Appropriations Act passed by Congress on March 10, 2009. In this act, Congress directed the National Park Service “to immediately evaluate the feasibility of additional bridge length, beyond that to be constructed pursuant to the Modified Water Deliveries to Everglades National Park Project (16 U.S.C. SS 410r-S), including a continuous bridge, or additional bridges or some combination thereof, for the Tamiami Trail (U.S. Highway 41) to restore more natural water flow to Everglades National Park and Florida Bay and for the purpose of restoring habitat within the Park and the ecological connectivity between the Park and the Water Conservation Areas.”

The study area consists of a 10.7-mile stretch of Tamiami Trail, adjacent to the northern edge of Everglades National Park. The western terminus of the project corridor is at the S-333 water control structure near the L-67 Extension Levee, and the eastern terminus is at the S-334 water control structure near the L-30 Levee and Canal and the L-31N Levee.

This document presents an environmental analysis of six alternatives that the National Park Service is currently considering, for public input and review, in accordance with the National Environmental Policy Act of 1969: No-Action Alternative - A 1-mile eastern bridge and elevation of the remaining roadway to allow for 8.5 foot stage in the L-29 Canal (currently being constructed by the U.S. Army Corps of Engineers); Alternative 1 - 2.2 miles of bridges and the remaining highway raised to an elevation of 12.3 feet; Alternative 2a - 3.3 miles of bridges and the remaining highway raised to an elevation of 12.3 feet; Alternative 4 – 1.0 mile of bridges and the remaining highway raised to an elevation of 12.3 feet; Alternative 5 – 1.5 miles of bridges and the remaining highway raised to an elevation of 12.3 feet; and Alternative 6e – 5.5 miles of bridges and the remaining highway raised to an elevation of 12.3 feet.

The environmentally preferred alternative for the project has been determined to be Alternative 6e. The alternative that provides the most value for the project is also Alternative 6e, which provides 5.5 miles of bridging along the corridor. Alternative 6e most closely meets the project objectives and the National Park Service mission by having the highest total importance value after summing the importance scores for each of the eight factors for each alternative. While Alternative 6e has the highest benefit, this alternative also has the highest cost. After quantifying the importance (i.e., benefits) for all alternatives using the “Choosing By Advantages,” the alternatives were further evaluated using the cost-to-importance analysis prescribed by the CBA



based on the importance scores and the total project costs. When the total project cost is plotted against the importance scores for all alternatives, the results produce a somewhat linear relationship between the variables, indicative of similar benefit-to-cost ratios; however, an inflection point for Alternative 2a indicates this alternative may provide the best cost-to-benefit value. Since it was unclear whether Alternative 2a was a true best value, or simply an artifact of the CBA scoring methodology, NPS requested that the U.S. Army Corps of Engineers apply the cost-benefit analysis technique commonly used in its project assessments. These results showed all alternatives to be cost effective, but Alternative 6e was determined to be a better value (most efficient) when compared to the other alternatives, including Alternative 2a. Therefore, the NPS CBA Importance Analysis, coupled with the USACE cost-benefit analysis, resulted in the decision to identify Alternative 6e as the preferred alternative.

Public comments will be considered in preparation of a Final Environmental Impact Statement, which, if approved, would guide the construction of the selected alternative.



How to Comment on This Plan

This Draft EIS will be available for public review for 60 days. If you wish to comment, you are encouraged to submit your comments directly on the NPS Planning, Environment, and Public Comment (PEPC) website. Please E-mail comments through the NPS PEPC planning website: <http://parkplanning.nps.gov>, select “Everglades National Park” from the drop down box, and follow the links for the Tamiami Trail Modifications: Next Steps Project/EIS. The “Open for Public Comment” link on the left column provides access to the Draft EIS. The “Document List” link provides a list of South Florida libraries that have paper copies available for review. The public may also contact the park at (305) 242-7700 to find out South Florida library locations or to request a CD of the Draft EIS. If prompted by voice mail, press “2” at 1st prompt and “5” at 2nd prompt to leave mailing information. A limited number of paper copies of the Draft EIS are also available. Another option is to mail comments to the name and address provided below:

Please mail written comments to:

Everglades National Park
Attn: Bruce Boler, Tamiami Trail EIS
950 N. Krome Avenue
Homestead, FL 33034

Before including your address, phone number, e-mail address, or other personal identifying information in your comment, you should be aware that your entire comment – including your personal identifying information – may be made publicly available at any time. Although you can ask us in your comment to withhold your personal identifying information from public review, we cannot guarantee that we will be able to do so.



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EXECUTIVE SUMMARY

Introduction

This Environmental Impact Statement (EIS) has been prepared for the Tamiami Trail Modifications: Next Steps project by Everglades National Park under the jurisdiction of the National Park Service (NPS). This project arose as part of the 2009 Omnibus Appropriations Act passed by Congress on March 10, 2009. In this act, Congress directed the NPS “to immediately evaluate the feasibility of additional bridge length, beyond that to be constructed pursuant to the Modified Water Deliveries to Everglades National Park Project (16 U.S.C. SS 410r-S), including a continuous bridge, or additional bridges or some combination thereof, for the Tamiami Trail (U.S. Highway 41) to restore more natural water flow to Everglades National Park and Florida Bay and for the purpose of restoring habitat within the Park and the ecological connectivity between the Park and the Water Conservation Areas.”

This EIS has been prepared in accordance with the National Environmental Policy Act (NEPA) of 1969 and implementing regulations, 40 CFR 1500-1508, and NPS *Director’s Order 12* and associated handbook, *Conservation Planning, Environmental Impact Analysis, and Decision-making* (NPS, 2001a).

Purpose and Need for the Action

Purpose

The project purpose was developed as part of the 2009 Omnibus Appropriations Act passed by Congress on March 10, 2009. The NPS proposes:

“To immediately evaluate the feasibility of additional bridge length, beyond that to be constructed pursuant to the Modified Water Deliveries to Everglades National Park Project (16 U.S.C. SS 410r-S), including a continuous bridge, or additional bridges or some combination thereof, for the Tamiami Trail (U.S. Highway 41) to restore more natural water flow to Everglades National Park and Florida Bay and for the purpose of restoring habitat within the Park and the ecological connectivity between the Park and the Water Conservation Areas.”

Need for Action

The need for the action is the same as cited in the Mod Waters Tamiami Trail Modification 2003 GRR/SEIS, 2005 RGR/SEIS, and 2008 LRR/EA:

“In its current condition, the segment of Tamiami Trail located between S-334 on the east and S-333 on the west has inadequate capacity to deliver the volumes of water required to restore ENP and in Northeast Shark River Slough without risking damage to the roadbed and its eventual degradation and causing a backwater impact on WCA-3B potentially drowning tree islands. The recommended plan must address: (1) measures to increase conveyance of water to Northeast Shark River Slough, and (2) modifications to the existing roadbed, if any, required to allow this conveyance.”

More precise needs based on specific language in the 2009 Omnibus Appropriations Act are:

- (1) to increase potential ecological connectivity (additional bridging) between marshes in Northeast Shark River Slough in ENP and marshes north of the trail,
- (2) to restore natural marsh flow patterns (flow rates and distributions) associated with unobstructed flows (removal of roads, canals, and levees) between marshes, and



- (3) to restore ridge and slough habitat in ENP by reconnecting sloughs severed by the existing road.

Overview of the Alternatives

Based on the previous preliminary analysis including the 2005 RGRR/SEIS and 2008 LRR/EA, internal scoping with the NPS, and the public input related to the proposed project, the following alternatives were carried forward for analysis in the EIS.

Six action alternatives were identified for detailed engineering evaluation and comparative analysis. The 2005 RGRR/SEIS was used as the basis for developing the initial suite of alternatives. These alternatives were renamed later for ease of use. Through further discussion and refinement other project alternatives emerged and if they were small adjustments to an existing alternative there were given a lower case letter designation (e.g. a, b, or c) depending on the order in which they were developed.

All alternatives include bridge construction and reconstruction of the remaining highway, with differences being in the bridge or ConSpan (prefabricated culvert) lengths and locations. The bridge typical sections would satisfy current FDOT standards and be uniform throughout their entire lengths.

The existing Tamiami Trail roadway embankment would be removed from the areas where the bridges would be constructed. The remaining highway embankment would be reconstructed to raise the crown elevation to 12.3 feet, the minimum required based on the design high water of 9.7 feet and the roadway cross section geometry. To meet current FDOT standards for roadway geometry, the higher profile of the roadway would result in a wider roadbed than currently exists. Therefore, expansion of the highway footprint southward would be necessary to avoid impacting the L-29 Canal.

Access facilities, such as ramps to the bridge or elevated roadway, would be provided for existing facilities. The maintenance of traffic and construction sequence for the bridge and roadway would be based on the best balance of traffic safety, environmental impacts, and construction cost and duration.

Staging areas for construction equipment and materials may be located at business sites along the corridor. Staging and other functions may also require use of the existing shoulder for temporary periods. Additional staging areas may be necessary near the eastern end of the corridor. This project would generate a large quantity of material excavated from the road bed that could be disposed or recycled for use in other area projects. One disposal site, Rocky Glades, which is owned by SFWMD, is approximately 15 to 20 miles from the construction site. Selected quantities of soils and organic peat may be evaluated for placement in the nearby Broward Water Preserve Area. Asphalt material could be used in other road beds. Excavated fill could be used for backfilling the levee for the L-67 Extension project, where up to 50,000 cubic yards of material could be needed. Storing and recycling material could reduce hauling and disposal costs, as well as provide cost savings on other projects where this type of material is needed. Additionally, FDOT may consider some of the excavated material to be "salvageable materials" that could be used by FDOT for other purposes.

No-Action Alternative

The No-Action Alternative is authorized by the 2008 Limited Reevaluation Report/Environmental Assessment and consists of construction of a 1-mile eastern bridge with the remaining road raised to allow an increase in the allowable stage in L-29C from 7.5 ft-NGVD to 8.5 ft-NGVD.



All of the following action alternatives assume the 1-mile eastern bridge (2008 LRR) has been constructed. The lengths of the bridges, transition areas between the bridges and the roadway, and the roadway are separated in the descriptions. Please note that Alternative 3 was eliminated per direction of the USACE.

Alternative 1 – 2.2 Miles of Bridges

This alternative includes 4 bridges (for a total of 2.2 miles of bridges): a 0.56-mile bridge (Bridge A1) located between the Osceola Camp and the Lincoln Financial Radio Tower; a 0.45-mile (Bridge B1) located between the Lincoln Financial Radio Tower and Everglades Safari Park facility; a 0.51-mile bridge (Bridge C1) located between the Everglades Safari Park facility and Frog City; a 0.38-mile bridge (Bridge E1) located between Frog City and Gator Park; and a 0.26 ConSpan (ConSpan H1) located just west of Coopertown, at control structure S-355B. The bridges and ConSpan would create a conveyance opening through Tamiami Trail by removing the sections of the existing highway and embankment. The bridges would be constructed approximately 50 feet south of the centerline of the existing roadway to maintain motor vehicle traffic during bridge construction. The remaining highway embankment (approximately 4.99 miles) would be reconstructed to raise the crown elevation to 12.3 feet, the minimum required based on the design high water of 9.7 feet and the roadway cross section geometry.

Alternative 2a – 3.3 Miles of Bridges

The bridge configurations include: (1) a 0.56 mile bridge located between the Osceola Camp and the Lincoln Financial Radio Tower, (2) a 0.45 mile bridge located between the Lincoln Financial Radio Tower and Everglades Safari Park, (3) a 0.51 mile bridge located between Everglades Safari Park and the Airboat Association, (4) a 0.38 mile bridge located the Airboat Association and the Tiger Tail Camp, (5) a 0.26 mile ConSpan located between the Coopertown facility and the Salem Communications radio tower, (6) a 0.53 bridge located between the Salem Communications radio tower and the existing one-mile bridge and , (7) a 0.66 mile bridge located between the existing 1-mile bridge and the S-334 structure.

Alternative 2a would involve creating conveyance openings through Tamiami Trail by removing 3.3 miles of the existing highway and embankment. Bridges would be constructed approximately 50 feet south of the centerline of the existing roadway to maintain motor vehicle traffic during bridge construction. The remaining highway embankment would be reconstructed to raise the crown elevation to 12.3 feet, the minimum required based on the design high water of 9.7 feet and the roadway cross section geometry.

Alternative 4 – 1.0 Mile of Bridges

This alternative includes 2 bridges: A1 and B1 (for a total of 1.0 mile), as described for Alternative 1. The bridges would create a conveyance opening through Tamiami Trail by removing the sections of the existing highway and embankment. The bridges would be constructed approximately 50 feet south of the centerline of the existing roadway to maintain motor vehicle traffic during bridge construction. The remaining highway embankment (approximately 7.80 miles) would be reconstructed to raise the crown elevation to 12.3 feet, the minimum required based on the design high water of 9.7 feet and the roadway cross section geometry.

Alternative 5 – 1.5 Miles of Bridges

Alternative 5 consists of 3 bridges; bridges A1, B1, and C1 (for a total of 1.5 miles) as described for Alternative 1. The bridges would create a conveyance opening through Tamiami Trail by removing the sections of the existing highway and embankment. The bridges would be constructed approximately 50 feet south of the centerline of the existing roadway to maintain



motor vehicle traffic during bridge construction. The remaining highway embankment (approximately 6.57 miles) would be reconstructed to raise the crown elevation to 12.3 feet, the minimum required based on the design high water of 9.7 feet and the roadway cross section geometry.

Alternative 6e – 5.5 Miles of Bridges

Alternative 6e is the maximum bridging option and consist of 5.5 miles of bridges and elevating the remaining roadway. The bridge configurations include: (1) a 2.60 mile bridge located between the Osceola Camp and the Airboat Association, (2) a 0.4 mile bridge located between the Airboat Association and the Tiger Tail Camp, (3) a 1.8 mile bridge located between the Tiger Tail Camp and the existing one-mile bridge, and (4) a 0.7 mile bridge located between the existing 1-mile bridge and the S-334 structure. The bridges would create a conveyance opening through Tamiami Trail by removing the sections of the existing highway and embankment. The bridges would be constructed approximately 50 feet south of the centerline of the existing roadway to maintain motor vehicle traffic during bridge construction. The remaining highway embankment would be reconstructed to raise the crown elevation to 12.3 feet, the minimum required based on the design high water of 9.7 feet and the roadway cross section geometry.

Down Ramps. Bridge down ramp (access ramp) options were also developed for the purpose of maintaining access to Everglades Safari and Coopertown for Alternative 6e. Four down ramp options were developed for Everglades Safari. Option 4 (Modified Parallel Down Ramp) was selected as the preferred option. Five down ramp options were developed for Coopertown. Option 5 (Parallel Down Ramp with Existing Frontage Road) was selected as the preferred option.

The bridge down ramp typical section includes two 12-foot travel lanes with 5-foot shoulders and outside barriers. Radii of 50 feet are provided between the access road and Tamiami Trail travel lanes. These connections provide access from the bridged areas to properties south of the existing Tamiami Trail roadway. The down ramps were considered as frontage road connections with the same design criteria as collector streets. The elevated portion of the down ramps will be girder bridges supported on pile bents. Varying span lengths will be used to support the ramps along curves.

Table E-1 – Action Alternative Comparison

Evaluation Criteria	Alt. 1	Alt. 2a	Alt. 4	Alt. 5	Alt. 6e
Roadway at 12-foot offset (feet)	27,820	17,992	40,060	34,783	13,928
Alignment Transitions (feet)	11,280	16,210	5,080	7,680	9,560
Bridge (feet) ¹	10,016	16,262	5,354	8,031	28,354
Precast Arch-Type Bridge Culverts (feet) ²	1,378	1,378	0	0	0

¹ Structures identified as bridges are 47.08 feet wide with a clear distance of 44.00 feet between inside parapet faces. The bridges include two 12-foot travel lanes with 10-foot shoulders and outside barriers. Both the travel lane and shoulder are on a 2% cross slope. The structural system for the proposed bridge structures is based on the least cost structure identified in Appendix D of the 2005 RGRR/SEIS. The proposed bridge structures are Florida Bulb Tee (FBT) 72 beams with a composite CIPC deck, supported on pile bents at 99.15-foot spacing using 24-inch square precast prestressed concrete piles in to rock.

² Structures identified as precast arch-type bridge culverts are 48 feet wide with a clear distance of 46 feet between inside faces of the spandrel walls and a 9.05-foot vertical rise. The arches are supported on



Evaluation Criteria	Alt. 1	Alt. 2a	Alt. 4	Alt. 5	Alt. 6e
Total Length (feet)	50,494	51,842	50,494	50,494	51,842
Total Length (miles)	9.56	9.82	9.56	9.56	9.82
Number of Bridges	4	6	2	3	4
Number of Precast Arch-Type Bridge Culverts	1	1	0	0	0
Number of Down Ramps	0	0	0	0	2
Estimated Total Project Cost (x \$1 million)	\$198.5	\$219.0	\$155.3	\$172.7	\$329.8

Environmentally Preferred Alternative

In accordance with DO-12 (NPS, 2001), the NPS is required to identify the “environmentally preferred alternative” in all environmental documents, including an EIS. According to CEQ guidelines, the environmentally preferred alternative is the alternative that would promote the national environmental policy, as expressed in Section 101 of the National Environmental Policy Act (NEPA), to:

- (1) Fulfill the responsibilities of each generation as trustee of the environment for succeeding generations;
- (2) Assure for all Americans safe, healthful, productive, and aesthetically and culturally pleasing surroundings;
- (3) Attain the widest range of beneficial uses of the environment without degradation, risk to health or safety, or other undesirable and unintended consequences;
- (4) Preserve important historic, cultural and natural aspects of our national heritage; and maintain, wherever possible, an environment which supports diversity and variety of individual choices;
- (5) Achieve a balance between population and resource use which would permit high standards of living and a wide sharing of life’s amenities; and
- (6) Enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources.

A description of how each alternative would or would not achieve the requirements of sections 101 and 102(1) of the NEPA criteria is provided below and illustrated through a rating system in **Table E-2**.

Criterion 1 — Everglades National Park is a unit of the national park system and as the trustee of this place the National Park Service would continue to fulfill its obligation to protect this area for future generations. The No-Action Alternative would only provide a limited environmental benefit while environmental degradation to wetlands and wildlife habitat would continue because of lack of traditional surface water flows. Each of the action alternatives would create the conditions that would allow the enhancement the freshwater marshes within Northeast Shark River Slough and ENP and increased ecological connectivity; however, the anticipated incremental improvement to the environment of each alternative increases with increasing bridge lengths. Therefore, Alternative 6e (maximum bridging option) would do a better job at

CIPC footings socketed into the bedrock. The typical road section of two 12-foot travel lanes with 10-foot shoulders sits on subgrade above the arches.



providing a long-term solution for the area and thus would provide the greatest level of protection for Park resources over time.

Criterion 2 — The No-Action Alternative would provide a safe and culturally pleasing surroundings; however, because potential environmental benefits are limited to the one existing bridge, potential enhancement to environmental productivity and aesthetics are limited and environmental degradation from lack of flows would continue. All action alternatives would provide for the same level of public health and safety and culturally pleasing surroundings. Action alternatives 1, 4, and 5 would provide for incrementally greater environmental productivity and aesthetics based on their respective bridge openings, Alternatives 2a and 6e provides maximum potential benefits to environmental productivity and aesthetics based on bridge length and potential amount of flows that can be restored to Northeast Shark River Slough and ENP.

Criterion 3 — The No-Action Alternative would only provide a limited environmental benefit while environmental degradation to wetlands and wildlife habitat would continue because of lack of traditional surface water flows. The action alternatives would provide for conditions that would lead to enhanced wetland values and functions and increased ecological connectivity with incremental benefits incurred based on bridge length. All action alternatives would result in permanent impacts to wetlands, soils, and habitats of special status species. Alternatives 2a and 6e provide for the widest range of beneficial uses based on the potential for ecological enhancement provided by their bridge openings; however, Alternatives 2a and 6e would impact a core nesting area for wood storks, while the other action alternatives avoid the core nesting area. Therefore, Alternatives 1, 4, and 5 provide the widest range of beneficial uses with the least amount of undesirable environmental consequences.

Criterion 4 — The No-Action Alternative allows for maximum preservation of historic and cultural resources and access to opportunities that support diversity and individual choice. All action alternatives are associated with minor to moderate levels of impacts to cultural and historic resources with the exception of Action Alternative 6e, which would have a major cultural resource impact on the Coopertown property. The action alternatives also include the same level of recreational access and opportunities that lead to supporting diversity and individual choice.

Criterion 5 —The No-Action Alternative would offer only limited availability of resource use and enjoyment of amenities as degradation of the resource would continue into the future. The action alternatives would allow for enhanced access and enjoyment of resource amenities with incremental enhancements based on bridge lengths. Alternative 6e offers the maximum ability for access and enjoyment of resource amenities since the bridge length provides maximum increased access for recreation (i.e. airboats) and maximizes restoration potential of downstream wetlands.

Criterion 6 — The No-Action Alternative provides for some enhancement of renewable resources, while resulting in the lowest use of depletable resources (fuel) of all alternatives. Each of the action alternatives would result in enhancing the quality of renewable resources through NPS management in the project area. According to the carbon footprint analysis (an analysis of greenhouse gas emissions resulting from the use and combustion of fuel, a non-renewable resource, used for the project) conducted for the project, Alternatives 1, 4, and 5 would result in the lowest level of use of depletable resources. Alternatives 2a and 6e consume the highest amount of fuel and would result in the lowest amount of recycling of depletable resources.



Table E-2 – Environmentally Preferred Alternative Analysis

Criterion	No-Action	1	2a	4	5	6e
1. Fulfill the responsibilities of each generation as trustee of the environment for succeeding generations.	2	3	4	3	3	5
2. Ensure safe, healthful, productive, and aesthetically and culturally pleasing surroundings for all Americans.	2	3	5	3	3	5
3. Attain the widest range of beneficial uses of the environment without degradation, risk of health or safety, or other undesirable and unintended consequences.	2	4	3	4	4	3
4. Preserve important historic, cultural, and natural aspects of our national heritage and maintain, wherever possible, an environment that supports diversity and a variety of individual choices.	5	4	4	4	4	3
5. Achieve a balance between population and resource use that will permit high standards of living and a wide sharing of life's amenities.	2	3	4	3	3	5
6. Enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources.	3	4	3	4	4	3
Total Points*	16	21	23	21	21	24

* Five points were given to the alternative if it fully meets the criteria; four points if it meets nearly all of the elements of the criteria; three points if it meets more than one element of the criteria; two points if it meets only one element of the criteria; and one point if the alternative does not meet the criteria.

Based on the analysis above, the environmentally preferred alternative for the Tamiami Trail Modifications: Next Steps project is Alternative 6e. According to the ratings included in **Table E-2**, this alternative would surpass the other alternatives in realizing the full range of national environmental policy goals in Section 101 of NEPA. In particular, Alternative 6e best responds to criteria 1, 2, and 5 by providing the greatest level of safety, environmental protection/enhancement, and access to and enjoyment of the resource while minimizing environmental and cultural resource impacts to the greatest extent possible.

NPS Preferred Alternative

On November 4, 2009, the NPS conducted a Value Analysis (VA) and Choosing by Advantage (CBA) workshop for the purpose of choosing a project alternative to bring forward as the recommended alternative. Workshop participants consisting of NPS staff and cooperating state and federal agency participants reviewed performance measures and project alternatives recommended during previous scoping meetings to choose the alternative that best meets the project purpose and needs.

The CBA team determined that of the performance measure factors that were most closely associated with the purpose and objectives of the project, the advantages of the “Sheet Flow” Factor were more important than the advantages of the other factors. Also, the team agreed that the most important or “Paramount Advantage” was represented by the most equitable distribution of overland flow over the 10.7-mile corridor length based on the topographic relief and location of proposed bridges in each alternative. Other important advantages were determined to be conditions in which 1) the greatest ecological connectivity was present, 2) alternatives which reconnected the greatest number of sloughs to restore the ridge-and-slough



landscape, 3) and conditions which would pass water from north to south at a velocity closest to natural marsh conditions (0.05 cfs).

Alternative 6e most closely meets the project objectives and the National Park Service mission by having the highest total importance value after summing the importance scores for each of the eight factors for each alternative. While Alternative 6e has the highest benefit, this alternative also has the highest cost. After quantifying the importance (i.e., benefits) for all alternatives using the CBA method, the alternatives were further evaluated using the cost-to-importance analysis prescribed by the CBA based on the importance scores and the total project costs.

When the total project cost is plotted against the importance scores for all alternatives, the results produce a somewhat linear relationship between the variables, indicative of similar benefit-to-cost ratios; however, an inflection point for Alternative 2a indicates this alternative may provide the best cost-to-benefit value. Since it was unclear whether Alternative 2a was a true best value, or simply an artifact of the CBA scoring methodology, NPS requested that the Corps apply the cost-benefit analysis technique commonly used in its project assessments. These results are depicted in **Table E-3** and resulted in all alternatives being characterized as cost effective, but Alternative 6e was determined to be a better value (most efficient) when compared to the other alternatives, including Alternative 2a. Therefore, the NPS CBA Importance Analysis, coupled with the Corps cost-benefit analysis, resulted in the decision to identify Alternative 6e as the preferred alternative.

Table E-3– Results of Cost-Benefit Analysis performed by USACE

Alternative	Total Cost (M\$)	Importance Score	Lift over No-Action	Cost per lift (M\$)	Cost Effective
No-Action	\$0	70	N/A	N/A	N/A
Alternative 4 – 1.0 mile	\$155.3	121	51	\$3.0	Yes
Alternative 5 – 1.5 miles	\$172.7	168	98	\$1.8	Yes
Alternative 1 – 2.2 miles	\$198.5	207	137	\$1.4	Yes
Alternative 2a – 3.3 miles	\$219.0	281	211	\$1.0	Yes
Alternative 6e – 5.5 miles	\$329.8	402	332	\$0.99	Most Efficient³

Alternative 6e, in combination with the 1.0 mile bridge to be constructed under the 2008 LRR plan, would restore a total of 6.5 miles of ecological connectivity between Everglades National Park and marshes to the north, reconnecting 10 sloughs that have been severed since 1928, and restoring marsh flow patterns across much of Northeast Shark River Slough. The increased connectivity results from the construction of the new bridges coupled with the removal of the existing Tamiami Trail roadway corresponding to the bridge locations. The greater expanse of bridging allows for improved distribution and timing of water flows at velocities of 0.08 feet per second (fps) similar to historical conditions (0.05 fps). The removal of 6.5 miles of roadway would also reduce wildlife mortality and reconnect a large swath of the historic ridge and slough landscape, restoring breeding and foraging conditions for many aquatic and terrestrial species. Alternative 6e would provide the conveyance capacity to meet the original MWD Project target

³ These results indicated that Alternative 6e had the best value for the environmental benefits provided in relation to costs. Alternative 6e was the only alternative exhibiting most efficient cost performance when compared to the other alternatives examined in the study.



water flow of 4,000 cfs and also accommodate future projects, including those of the CERP and recent State of Florida restoration initiatives. Importantly, the increased bridging of Alternative 6e would allow stages in the L-29 Canal to be raised to 9.7 feet. Hydrological analysis conducted for the 2005 RGRR indicated that substantial bridging, as in Alternative 6e, was needed for the higher volumes of flows to Northeast Shark River Slough without adversely impacting ecologically and culturally important tree islands in WCA-3B.

Alternative 6e would result in impacts to cultural resources and more direct wetland impacts than other alternatives considered. In order to maintain traffic flow during bridge and road construction and avoid impacts to state lands north of the existing highway, Alternative 6e would be constructed south of the existing highway in Everglades National Park. The construction easement for the 5.50 miles of bridges extends 50 linear feet south of the existing highway right-of-way, while the road-raising easement extends 30 linear feet south. The total wetland impact area would be 48.1 acres; however, the long-term benefits of the improved flow patterns and ecological connectivity were deemed to outweigh these impacts. It was also determined that Alternative 6e would adversely impact two cultural resources—the existing Tamiami Trail roadway and the Coopertown airboat facility—however, these impacts could be adequately mitigated and were justified based on the substantial environmental benefits of Alternative 6e compared to the other alternatives.

Summary of the Environmental Consequences

No-Action Alternative

Under the No-Action Alternative there would be no additional direct or indirect short- or long-term impacts on geologic resources/soils; water resources (water quality, hydrology, wetlands, and floodplains); wildlife and vegetation; land use; special status species; wilderness/unique ecosystems; cultural resources; visitor use and experience; park management and operations; noise/soundscapes; socioeconomics; transportation; or hazardous, toxic and radioactive waste other than those already realized from construction of the 2008 LRR/EA preferred alternative (1-mile eastern bridge).

The geology, topography, and soils, and water quality within the vicinity of the project area would remain unchanged. The current unnatural altered hydrologic conditions within the vicinity of the project area would continue to have a negative impact on wetland values and functions; floodplain functions; wildlife habitat and vegetation; special status species; and the wilderness character and experience within the WCAs, Everglades National Park, and Northeast Shark River Slough. Additionally, movement of wildlife (including species status species) between Northeast Shark River Slough and the WCAs would continue to be hindered by the presence of Tamiami Trail. Visitor use activities would be expected to continue as currently practiced within the study area and no impacts would be expected to the number of visitors who currently patron Everglades National Park. Activities associated with park management and operations (e.g., education and interpretation, maintenance, and enforcement) would be expected to continue as currently practiced within Everglades National Park. Commercial activities would also be expected to continue as currently practiced within the study area. Finally, transportation/traffic would be expected to remain unchanged, no impacts would occur to the Park's soundscapes, no changes in land use would occur, and no impacts would be caused by hazardous, toxic, or radioactive wastes. Consequently, there would not be an impairment to any of the Park's natural or cultural resources as a result of the No-Action Alternative.

Action Alternatives (Alternatives 1 – 6e)

Since all of the action alternatives include proposed bridging, the key difference in impacts experienced between the various action alternatives would be related to the length of bridging of



each of the alternatives. For most of the impact topics analyzed in this EIS (except where noted), the action alternative with the shortest length of proposed bridging (Alternative 4) would experience of least amount and shortest duration of construction-related adverse impacts as well as the least amount of beneficial long-term effects and vice versa for the alternative with the longest length of proposed bridging (Alternative 6e).

For any of the proposed action alternatives, effects to soils would be directly related to the short-term and long-term effects caused by construction, operations, and maintenance associated with the alternatives. It is anticipated that the soil impacts resulting from temporary construction-related activities would be adverse, local, minor, and short-term. Long-term impacts resulting from implementing any of the action alternatives are anticipated to be adverse, local, and minor.

Any of the action alternatives will have a short-term, adverse, minor localized impact on hydrology associated with project construction. Any of the action alternatives will also have a long-term, beneficial effect on hydrology based on the capacity to convey flows and relative low velocities.

Water quality effects would be directly related to the short-term and long-term effects caused by construction, operations, and maintenance associated with any of the action alternatives. It is anticipated that the water quality impacts resulting from construction-related activities would be adverse, local, minor, and short-term. No long-term impacts to water quality are expected to result from implementing any of the action alternatives.

Implementation of any of the action alternatives would result in moderate, adverse, short-term, localized impacts to wetlands associated with construction of temporary work areas. Additionally, implementation of the action alternatives would result in moderate, adverse, long-term, localized impacts to wetlands associated with permanent dredging and filling of wetlands in conjunction with raising the crown of Tamiami Trail and construction of bridges. At present, a water operations plan for the L-29 Canal is being developed; however, since it has not been completed, full project benefits cannot yet be realized. Potential benefits that would occur once an operational plan is defined and executed include enhancement of degraded wetland habitats within the Northeast Shark River Slough system. It is highly likely that implementation of any of the action alternatives in conjunction with the operational plan is self-mitigating, and that permanent and temporary wetland impacts associated with the construction of the proposed project would be offset by the enhancement to wetlands. However, long-term effects to wetlands resulting from operations remain unknown since an operational plan has not yet been developed. Since there is uncertainty as to the level of wetland improvements that would be achieved, an off-site mitigation plan would be implemented should anticipated project benefits not adequately offset the project's impacts to wetland value and functions. Potential off-site mitigation scenarios may include purchase of mitigation bank credits or performing mitigation elsewhere on park property.

Any of the action alternatives will have a short-term, adverse, minor, localized effect on floodplain values and functions associated with project construction including diminished ability of the floodplain to convey storm and flood events due to temporary fill and rerouting of water flow. However, long-term impacts to floodplain functions and values would be beneficial based on the additional capacity the floodplain would have to convey storm and flood events.

Short-term, negligible to minor, adverse, localized impacts to wildlife and vegetation/habitats would result from the construction of any of the action alternatives. Long-term beneficial effects to wildlife and habitat would result from the increased ecological connectivity provided through the implementation of any of the action alternatives. Consequently, there would be no impairment of wildlife and habitat as a result of the action alternatives.



Implementation of any of the action alternatives would have a minor, short-term, localized, adverse impact associated with project construction and a long-term, localized, adverse, minor impact on land use in association with the conversion of existing land uses to transportation corridor.

Under any of the action alternatives, short-term disturbances to special status species and their habitat would occur from construction-related noise and vibration that causes special status species to flee from construction areas and the close proximity. However, these adverse effects are expected to be limited to the timeframe of construction and wildlife is expected to fully return to the project area following completion of construction. Therefore, these adverse impacts to special status species are expected to be moderate, localized, and short-term. Long-term impacts to special status species would be adverse, localized, and range in intensity from negligible to major, dependent upon the species. This Alternative may affect but is not likely to adversely affect the Florida panther, West Indian manatee, eastern indigo snake, Cape Sable seaside sparrow, and snail kite. The Alternative may adversely affect the wood stork. Additionally, a water operations plan is being developed for the L-29 Canal; however, since it has not been completed, project benefits cannot yet be fully realized. Potential benefits that would occur once an operational plan is defined and executed include enhancement of degraded habitats within the Northeast Shark River Slough system, benefiting special status species. It is highly likely that implementation of any of the action alternatives in conjunction with the operational plan is self-mitigating, and that permanent and temporary impacts to special status species and their habitats associated with the construction of the proposed project would be offset by the enhancement to special status species' habitats. However, long-term effects to habitats resulting from operations currently remain unknown. Since there is uncertainty as to the level of habitat improvements that would be achieved, an off-site mitigation plan would be implemented should anticipated project benefits not adequately offset the project's impacts to special status species' habitats.

Minor, short-term, localized, adverse impacts would occur from the implementation of any of the action alternatives as a result of noise, vibrations, and dust generated during construction activities. Minor, long-term, localized, adverse effects to wilderness would also occur from the implementation of any of the action alternatives as a result of direct footprint impacts to wilderness. Beneficial effects would result from improved connectivity and potential for improved hydrologic flow in the project area and Everglades National Park.

The proposed project would have minor, adverse, short-term effects on cultural resources associated with use of temporary construction easements. The project would additionally have minor to major adverse long-term effects on cultural resources associated with the construction and operation of the project.

Short-term impacts caused by construction of any of the bridging alternatives would cause visitors utilizing the section of Tamiami Trail within the project corridor to experience minor to moderate inconveniences such as lane closures; reduced speed limits; reduced accessibility to visitor facilities/activities; construction-related noise and vibration; reduced quality of wildlife-related recreational activities caused by construction-related noise and vibration impacts that cause wildlife to flee from construction areas; construction-related dust and fumes; and the visual presence of construction vehicles and heavy equipment in construction zones. Visitors would also experience some long-term beneficial effects (i.e., increased wildlife, increased aesthetic qualities, etc.) from the implementation of any of the action alternatives. However, most aspects of visitor use and experience would experience no change or a negligible change due to the implementation of any of the action alternatives proposed for the project. Therefore, minor to moderate, short-term, localized, adverse impacts and long-term beneficial effects to



visitor use and experience would result from the implementation of any of the action alternatives.

Activities associated with park management and operations (e.g., education and interpretation, maintenance, and enforcement) would experience no long-term impact due to the implementation of any of the action alternatives. A minor, localized, adverse impact on park management might occur in the short-term due to oversight of construction activities that would be required as a result of implementation of any of the action alternatives.

By following the NPS management practices and FDOT standards, no unacceptable impacts to noise sensitive sites in the project study area are expected to occur as a result of construction of this project. Likewise, considering the existing conditions and the long-established presence of traffic along the Tamiami Trail, the negligible increase in highway noise predicted to occur with the action alternatives is not expected cause operation and maintenance of this project to result in impairment or unacceptable impacts to nearby noise sensitive sites or the park's soundscape. Therefore it is concluded that the proposed project would cause short-term, moderate, adverse, localized, effects to the park's soundscape associated with project construction, however, there would be no long term effects associated with the project's operation.

Implementation of any of the action alternatives would have some positive effect on employment, gross output, and the gross regional product of Miami-Dade County; and to a lesser extent, the State of Florida, and any social impacts would be minimal. Therefore, the long-term impacts from the selection of any of the action alternatives would be beneficial.

Transportation impacts associated with any of the action alternatives would be adverse, local, minor, and short-term and primarily associated with traffic delays related to construction activities. Mitigation of these effects would be through implementation of maintenance of traffic (MOT) plan. No long-term impacts associated with increases in traffic levels are expected.

The Implementation of action alternatives 1, 2, 5, or 6e may lead to a long-term, adverse, negligible to moderate, localized impact to the environment due to contamination by hazardous or toxic waste. The implementation of Action Alternative 4 may lead to a long-term, adverse, negligible, localized effect to the environment due to contamination by hazardous or toxic waste.

Consequently, there would not be an impairment to any of the Park's natural or cultural resources as a result of implementation of any of the proposed action alternatives.



GUIDE TO THIS ENVIRONMENTAL IMPACT STATEMENT

The contents of this document are as follows:

Chapter 1: Purpose and Need for Action – The first chapter includes a discussion of the purpose and significance of the National Park Service and Everglades National Park, the proposed action's purpose and need, the relationship to laws and other plans, the tribal and public involvement in the process, the impact topics that were selected for detailed analysis, and the impact topics that were dismissed from further analysis.

Chapter 2: Alternatives – This chapter describes the Action Alternatives and the No-Action Alternative. It also discusses alternatives considered but dismissed.

Chapter 3: Affected Environment – This chapter describes existing environmental conditions in the areas potentially affected by the alternatives. This section addresses the following impact topics: geologic resources/soils, water resources (water quality, hydrology, wetlands, and floodplains), wildlife and vegetation, land use, special status species, wilderness/unique ecosystems, cultural resources, visitor use and experience, park management and operations, noise/soundscapes, socioeconomics, transportation, and hazardous/toxic/radioactive waste.

Chapter 4: Environmental Consequences – This chapter presents the methods and analysis of the potential impacts for each topic under each alternative and the No-Action Alternative.

Chapter 5: Environmental Compliance for the Preferred Alternative – This chapter presents the cumulative impacts; unavoidable adverse environmental impacts; irreversible and irretrievable commitment of resources; relationship between local short-term uses of the human environment and the maintenance and enhancement of long-term productivity; effects on energy requirements and conservation potential; compatibility with federal, state, and local objectives; conflicts and controversy; uncertain, unique, or unknown risks; precedent and principle for future actions; environmental commitments; and environmental compliance.

Chapter 6: Consultation and Coordination – This chapter summarizes the consultations undertaken in the preparation and review of this document, including the scoping process, public involvement, and agency and tribal coordination. It also includes a list of document preparers who have contributed to this EIS.

Chapter 7: References – This chapter lists the references cited in this document.

Chapter 8: Glossary – This chapter defines the technical terms, acronyms, and abbreviations used in this document.

Appendices – The appendices are as follows:

- Appendix A – Engineering Report
- Appendix B – Value Analysis / Choosing By Advantages Report
- Appendix C – Wetlands Statement of Findings
- Appendix D – Floodplains Statement of Findings
- Appendix E – Cultural Resources Report
- Appendix F – Socioeconomic Report
- Appendix G – Real Estate Report
- Appendix H – Consultation and Coordination Letters



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ACRONYMS AND ABBREVIATIONS

AADT	Average Annual Daily Traffic
ABAAS	Architectural Barriers Act Accessibility Standards
AIRFA	American Indian Religious Freedom Act
APE	Area of Potential Affect
ASR	Aquifer Storage and Recovery
BMPs	Best Management Practices
BO	Biological Opinion
C&SF	Central and Southern Florida Project
CAA	Clean Air Act
CBA	Choosing By Advantages
CCATF	Climate Change Advisory Task Force
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response Compensation and Liability Act
CERP	Comprehensive Everglades Restoration Plan
CFR	Code of Federal Regulations
CFS	Cubic Feet per Second
CSOP	Combined Structural and Operation Plan
CZMA	Coastal Zone Management Act
CZMP	Coastal Zone Management Program
dB	Decibels
DERM	Miami-Dade County Environmental Resource Management
DO	Dissolved Oxygen
DOI	U.S. Department of the Interior
DHW	Design High Water
EA	Environmental Assessment
EAA	Everglades Agricultural Area
EEWS	East Everglades Wilderness Study
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
ENP	Everglades National Park
EO	Executive Order
EPA	Environmental Protection Agency
ESA	Endangered Species Act



ESAL..... Equivalent Single Axle Load
 FCMP Florida Coastal Management Program
 FDACS.....Florida Department of Agriculture and Consumer Services
 FDEP Florida Department of Environmental Protection
 FDOT Florida Department of Transportation
 FFWCCFlorida Fish and Wildlife Conservation Commission
 FHWA Federal Highway Administration
 FLUCFCSFlorida Land Use, Cover, and Forms Classification System
 FONSI Finding of No Significant Impact
 GCTLs..... Groundwater Cleanup Target Levels
 GDM.....General Design Memorandum
 GMP General Management Plan
 GRR General Reevaluation Report
 HAED High Accuracy Elevation Data
 HEC-RAS..... Hydrologic Engineering Center - River Analysis System
 HSWA Hazardous and Solid Waste Amendments
 HTRW Hazardous, Toxic, and Radioactive Waste
 IOP Interim Operation Plan
 IPCC Intergovernmental Panel on Climate Change
 ISOP Interim Structural and Operation Plan
 Ldn day-night average noise level
 LEED..... Leadership in Energy and Environmental Design
 Leq.....energy equivalent noise level
 LF.....Linear Feet
 LOS..... Level of Service
 LRR.....Limited Reevaluation Report
 LUST..... Leaking Underground Storage Tank
 MPRSA Marine Protection, Research, and Sanctuary Act
 Mr.....Resilient Modulus
 MTBEMethyl Tertiary Butyl Ether
 MTCE.....Metric Tons of Carbon Equivalent
 MWD Modified Water Deliveries
 NAC Noise Abatement Criteria
 NAGPRA..... Native American Graves Protection and Repatriation Act



NEPA	National Environmental Policy Act
NGVD	National Geodetic Vertical Datum
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
NPDES	National Pollution Discharge Elimination System
NPS	National Park Service
NRHP	National Register of Historic Places
NTU	Nephelometric Turbidity Units
NWI	National Wetland Inventory
OFW	Outstanding Florida Water
OSE	Other Social Effects
PAHs	Polycyclic Aromatic Hydrocarbons
Park	Everglades National Park
PCA	Panther Consultation Area
PD&E	Project Development and Environment
PEPC	NPS Planning, Environment, and Public Comment website
PL	Public Law
POR	Period of Record
PPA	Panther Preservation Area
PSRPA	Park Service Resource Protection Act
REC	Recognized Environmental Concern
RCRA	Resource Conservation and Recovery Act
RGRR	Revised General Reevaluation Report
RMA	Resource Management Associates Model
ROD	Record of Decision
ROG	River of Grass
ROW	Right-of-Way
RPAs	Reasonable and Prudent Alternatives
SARA	Superfund Amendments and Reauthorization Act
SAS	Surficial Aquifer System
SEIS	Supplemental Environmental Impact Statement
SERC	Southeast Environmental Research Center



SF Square Foot
 SFWMD South Florida Water Management District
 SFWMM South Florida Water Management Model
 SHPO State Historic Preservation Officer
 SLOPES Standard Local Operating Procedures for Endangered Species
 SMA 8.5 Square Mile Area
 SN Structural Number
 SOF Statement of Findings
 SRF Systematic Reconnaissance Flights
 TCE Temporary Construction Easement
 TNM Traffic Noise Model
 TP Total Phosphorous
 UMAM Uniform Mitigation Assessment Method
 USACE U.S. Army Corps of Engineers
 USC United States Code
 USEPA U.S. Environmental Protection Agency
 USFWS U.S. Fish and Wildlife Service
 USGS U.S. Geological Survey
 VA/CBA Value Analysis
 VOAs Volative Organic Aromatics
 vpd vehicles per day
 WCA Water Conservation Area
 WRDA Water Resources Development Act



**EVERGLADES NATIONAL PARK
TAMIAMI TRAIL MODIFICATIONS: NEXT STEPS
DRAFT ENVIRONMENTAL IMPACT STATEMENT**



**CHAPTER 1
PURPOSE AND NEED FOR ACTION**

CHAPTER 1: PURPOSE AND NEED FOR ACTION

1.1 Introduction

This Environmental Impact Statement (EIS) has been prepared for the Tamiami Trail Modifications: Next Steps project by Everglades National Park under the jurisdiction of the National Park Service (NPS). This project arose as part of the 2009 Omnibus Appropriations Act passed by Congress on March 10, 2009. In this act, Congress directed the NPS “to immediately evaluate the feasibility of additional bridge length, beyond that to be constructed pursuant to the Modified Water Deliveries to Everglades National Park Project (16 U.S.C. SS 410r-S), including a continuous bridge, or additional bridges or some combination thereof, for the Tamiami Trail (U.S. Highway 41) to restore more natural water flow to Everglades National Park and Florida Bay and for the purpose of restoring habitat within the Park and the ecological connectivity between the Park and the Water Conservation Areas.”

This EIS has been prepared in accordance with the National Environmental Policy Act (NEPA) of 1969 and implementing regulations, 40 CFR 1500-1508, and NPS *Director’s Order 12* and associated handbook, *Conservation Planning, Environmental Impact Analysis, and Decision-making* (NPS, 2001a).

1.2 Background

Everglades National Park (ENP/the “Park”) is one of 392 units of the National Park System administered by the NPS, U.S. Department of the Interior (DOI). Established in 1947, the Park’s original boundaries contained 460,000 acres. Subsequent legislation increased its size to 1,509,000 acres, including most of Florida Bay. The most recent addition came in 1989 when Congress added 107,600 acres in the East Everglades area of the Park.

The Florida Everglades is one of the largest and most complex freshwater wetland ecosystems in the world. The location, timing, duration, and depth of flooding, combined with geology and other factors, determine the distribution and composition of the plant and animal communities of the Everglades. The southernmost end and receiving waters for the 18,000 square mile South Florida Everglades ecosystem is ENP. Virtually all waters delivered to the Park other than direct rainfall are provided by the Central and Southern Florida (C&SF) Project, which was authorized by the *Flood Control Act of 1948* (PL 858, 80th Congress) for flood control, water supply, prevention of salt water intrusion, preservation of fish and wildlife, recreation, and navigation. The C&SF Project divided the shallow and slow-flowing Everglades wetlands into compartments and installed pumps and gated structures to control flow from one segment to another. The U.S. Army Corps of Engineers (USACE) began building the C&SF Project in the 1950s. Construction was largely complete by 1962, although some construction continues to this day.

Construction of the 264-mile section of U.S. Highway 41/State Road 90 known as Tamiami Trail to connect Tampa and Miami began in 1915 and was completed in 1928 by the Florida State Road Department [known today as the Florida Department of Transportation (FDOT)]. The construction of this roadway created an impediment to natural water flows into the Everglades, slowing and blocking water flow south into the southern Everglades and ENP. Additional blockage of direct flows occurred with the 1962 construction of the L-28 and L-29 levees which enclosed Water Conservation Area (WCA) 3. The WCA-3 was then separated by the L-67A and L-67C levees into independent units, WCAs 3A and 3B, in an effort to reduce ground water seepage through the porous Biscayne aquifer. Enlargement of the L-29 Canal as part of the C&SF project also contributed to flow restriction. The cumulative result of construction of



Tamiami Trail and the C&SF Project was significant reduction in the volume, timing, and duration of water flow to Northeast Shark River Slough.

Until Congress enacted the 1989 Everglades Protection and Expansion Act, ENP was smaller than at present. The large S-12 gate structures on the L-29 Levee at the south end of WCA-3A could deliver high water volumes to ENP itself, but most of Northeast Shark River Slough lay in the undeveloped lands between ENP and the developed areas near the east coast. This area received water only from direct rainfall and through culvert sets constructed under the roadway. An extension of the L-67 Levee, running along ENP's eastern boundary, restricted flow into Northeast Shark River Slough from the west. Reduced inflows from the north and west resulting from the compartmentalization of the system led to reduction of flooding depths and durations and loss of long-hydroperiod habitats inside ENP. Slough habitat, the unique Everglades wetland complex immortalized as the "river of grass" by Marjory Stoneman Douglas, was among the most adversely impacted by flow reduction.

In response to conservationists' concerns over loss of Everglades' values during the 1980s, Congress passed PL 98-191 in 1983, providing for experimental supplemental deliveries of water to ENP. After a series of studies authorized under this act, it became evident that it would be difficult to increase water deliveries to ENP lands without adversely affecting adjacent agricultural lands. In 1989, Congress passed the Everglades National Park Protection and Expansion Act (PL 101-229). This act authorized acquisition of 107,600 acres of privately owned and state lands located south of Tamiami Trail between the L-67 Extension and the L-31 Canal. This area was a major expansion of ENP lands that would eventually allow for their re-hydration; but in 1989, there were minimal structures available to convey water into these newly acquired ENP lands that had previously been kept relatively dry for agricultural and recreational use. Therefore, the act also directed the USACE to increase flows into ENP to the extent practicable.

The USACE prepared a General Design Memorandum (GDM) and EIS for Modified Water Deliveries (MWD) to ENP. The overall purpose of the MWD to ENP project is to restore natural hydrologic conditions in ENP, which was altered by the construction of roads, levees and canals. MWD is one of many foundation projects for the Comprehensive Everglades Restoration Plan (CERP). The GDM/EIS was completed in 1992 and included five major components: (1) Flood mitigation for the 8.5 Square Mile Area (SMA), a residential area located just west of the L-31N Levee (the newly authorized eastern Park boundary) that would flood if additional water were discharged into the eastern Park extension; (2) Conveyance and seepage control features, designed to facilitate flow from WCA-3A to WCA-3B and from WCA-3B to the L-29 Canal adjacent to Tamiami Trail, and to limit seepage eastward from WCA-3B and ENP into developed areas of Miami-Dade County; (3) Modifications to Tamiami Trail to raise it in the vicinity of the S-334 structure; (4) Raising Tigertail and Osceola Indian Camps to levels above the expected flood levels; and (5) A new operational plan for the water control structures was recommended that would deliver 55 percent of total water volumes east of L-67 and 45 percent to the west, to better reflect historic flow paths.

The 1992 GDM/EIS noted that maximum rainy season flow volumes into ENP could reach 4,000 cubic feet per second (cfs) and recommended structures to deliver these flows into the L-29 Canal just north of Tamiami Trail. It did not anticipate that the existing culverts would be inadequate to deliver this volume, and recommended raising the Tamiami Trail only to accommodate the S-334 and S-356 pump structures (at the far eastern end of the road segment).

Since 1992, the NPS has acquired nearly all the additional authorized lands east of the old ENP boundary. A flood mitigation plan for the 8.5 SMA, including relocation of the S-357 pump



station, was approved in 2000 and reaffirmed in 2003, and construction is now nearing completion. Tigertail Camp has been raised above the flood elevation. Everglades National Park is in dialog with the Osceola group in preparation for raising this camp as well. The S-356 pump station was built as a temporary pump station at the location indicated in the GDM. The S-355A and S-355B spillways, allowing water flow from the south end of WCA-3B into L-29 Canal, have been built. However, the last remaining conveyance and seepage features, the S-349 spillways and S-345 flow structures that would allow flow through the L-67 Levees between WCAs-3A and 3B, remain to be built.

The 2000 Water Resources Development Act (WRDA) authorized the Comprehensive Everglades Restoration Plan (CERP). The restudy of the C&SF Project that led to CERP indicated that further work on reducing barriers to flow in WCA-3 was justified. However, the WRDA also required that the MWD plan be complete before CERP modifications could begin construction.

By the late 1990s it was known that in contrast to the 1992 GDM/EIS assumption, the existing culvert sets along Tamiami Trail were inadequate to pass MWD design flows and that operating with no additional conveyance structures would ultimately damage the roadbed. The GDM/EIS merely recommended changing the flow distribution across Tamiami Trail such that 55 percent of total flows would be delivered east of the L-67 Levee and 45 percent delivered to the west. However, subsequent studies showed that, while the design volumes of water could indeed be passed through Tamiami Trail into Northeast Shark River Slough, this flow rate through the culvert sets would only occur with a high “head” on the north side of the culverts; that is, after water levels on the north side of the road increased enough to force water through. Under current operating conditions, such high levels would occur in the rainy season, except that deliveries are stopped to avoid exceeding a stage of 7.5 feet in L-29 Canal, the level considered safe by FDOT standards. Operational safeguards to prevent damage include closing the S-333 Structure according to stage readings on a gauge south of the Tamiami Trail to avoid high heads in the L-29 Canal. If high levels were to occur regularly or persist for longer periods they would make the road vulnerable to structural damage.

In 2003, a reevaluation of features along the 10.7-mile stretch of Tamiami Trail east of the L-67 Levee recommended a 3,000-foot bridge and a proposed real estate agreement to pay compensation for a flowage easement. The USACE published a General Reevaluation Report (GRR) and Supplemental EIS (SEIS) in 2003, which recommended a 3,000-foot bridge and noted that the original GDM had probably underestimated the design high water stage. The 2003 study used a design water elevation of 9.7 feet. Although this report recommended acquiring a flowage easement over the un-bridged part of Tamiami Trail and compensation to FDOT for damages, no agreement could be reached with FDOT, and the GRR and SEIS were withdrawn without a signed Record of Decision (ROD).

In 2005, a Revised GRR (RGRR) and a second SEIS were prepared, which recommended construction of a three-mile, two-bridge alternative and reconstruction of the entire 10.7-mile stretch of Tamiami Trail to accommodate the higher water levels (up to 9.7 foot stage) under the road. After extensive public and agency coordination a ROD identifying the Selected Plan was signed on January 25, 2006. However, after a period of rapidly rising costs of fuel and raw materials, Congress in 2007 found that the updated cost of the 2005 recommended plan was unacceptable and the Congressional managers drafting the new WRDA (2007) directed the USACE to conduct a reevaluation study.

Under the direction of Congressional managers, a Limited Reevaluation Report (LRR) and Environmental Assessment (EA) were prepared in 2008. The 2008 LRR and EA recommended features to convey the additional flows from the L-29 Canal, north of the Tamiami Trail, south to



ENP. The 2008 LRR/EA recommended the following: (1) Acquisition of the necessary real estate interests required for construction of the project from the Airboat Association of Florida, Florida Power and Light (FP&L), and FDOT; (2) Construction of a one-mile bridge and reinforcement of the remainder of the Tamiami Trail within the project area in order to counteract the project's higher water levels in the L-29 Canal. (Road reinforcement is part of the Tamiami Trail Modifications and would be paid for by the MWD project. FDOT would contribute \$4.5 million to the road reinforcement as part of their normal maintenance program); and (3) Acquisition of real estate interests from FDOT by means of a relocation agreement within the project area to include a channel easement, a flowage easement, a temporary work area easement, and a right-of-entry for construction upon the FDOT lands in order to construct the project features. The Finding of No Significant Impact (FONSI) for the LRR and EA was signed in June 2008.

As part of the 2009 Omnibus Appropriations Act passed by Congress on March 10, 2009, Congress directed the NPS "to immediately evaluate the feasibility of additional bridge length, beyond that to be constructed pursuant to the Modified Water Deliveries to Everglades National Park Project (16 U.S.C. SS 410r-S), including a continuous bridge, or additional bridges or some combination thereof, for the Tamiami Trail (U.S. Highway 41) to restore more natural water flow to Everglades National Park and Florida Bay and for the purpose of restoring habitat within the Park and the ecological connectivity between the Park and the Water Conservation Areas."

Please see **Figure 1-1**, below, for a timeline of the above referenced studies.

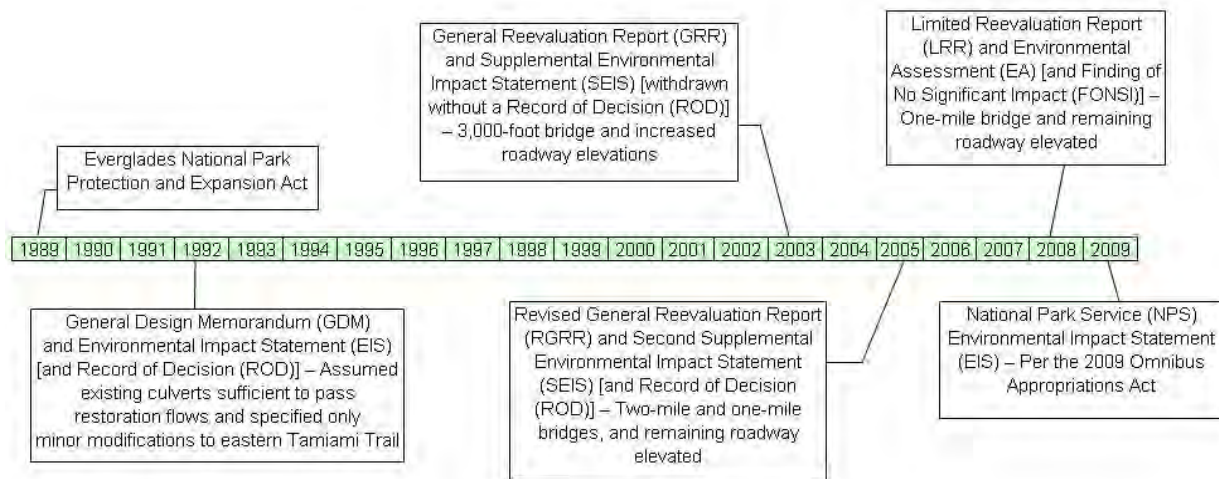


Figure 1-1 – Tamiami Trail Modifications Timeline

1.2.1 Project Site Location and Scope of the Analysis

The study area consists of a 10.7-mile stretch of the portion of U.S. Highway 41 known as Tamiami Trail, a highway which connects Tampa to Miami. This 10.7-mile section of Tamiami Trail is located in Miami-Dade County within Florida's 25th Congressional District. The western terminus of the project corridor is at the S-333 water control structure near the L-67 Extension Levee, and the eastern terminus is at the S-334 water control structure near the L-30 Levee and Canal and the L-31N Levee. The L-29 Canal (Tamiami Canal) runs along the north side of Tamiami Trail. The L-29 Levee runs along the north side of the L-29 Canal. The levee comprises the southern boundary of WCA-3B. Everglades National Park borders the roadway



on the south side of the project corridor. The specific area of analysis and potential effect is defined for each resource in Chapter 4 – Environmental Consequences.

Please see **Figures 1-2, 1-3, and 1-4**, below, for maps of the project location and features.

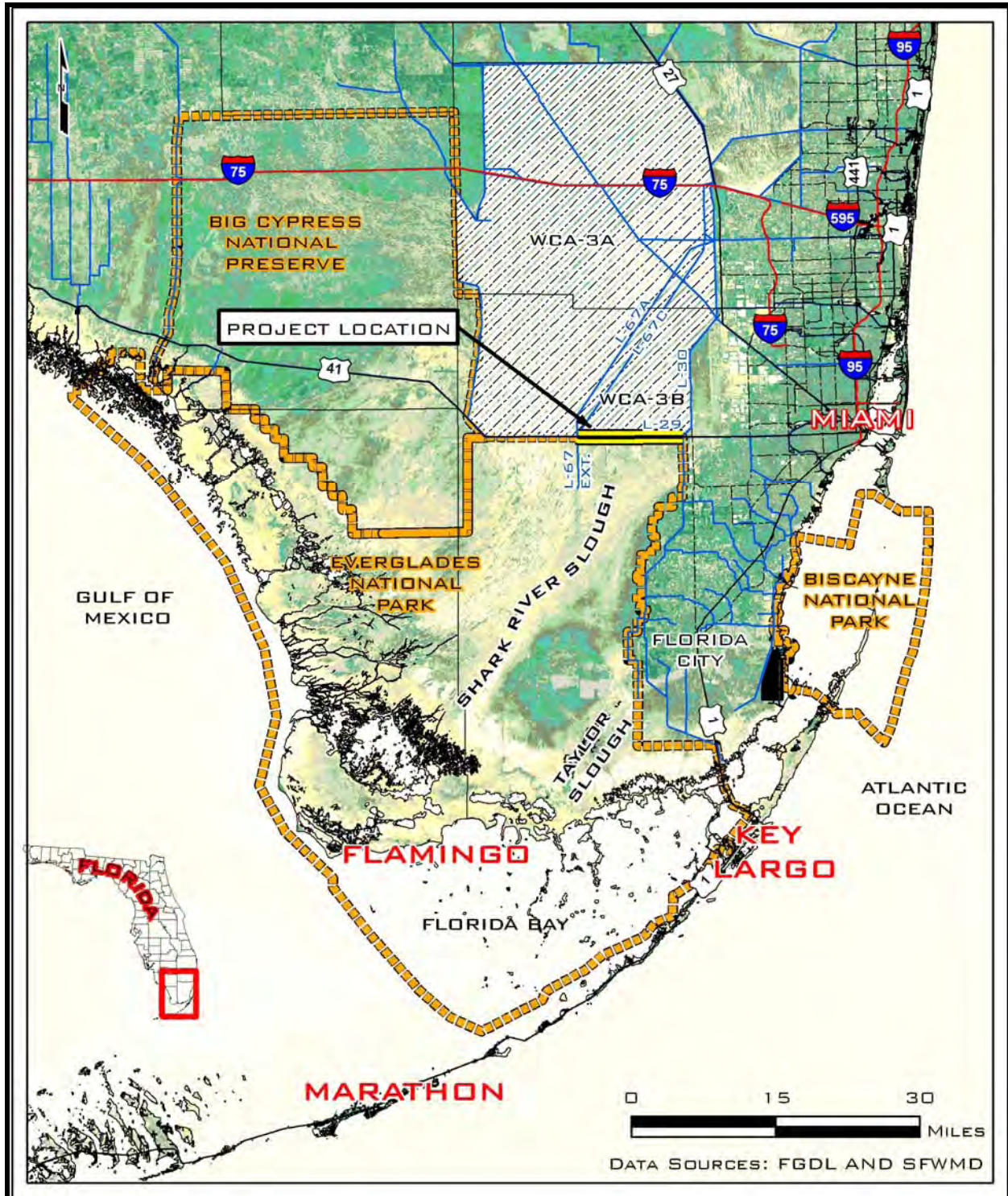


Figure 1-2 – General Project Location Map



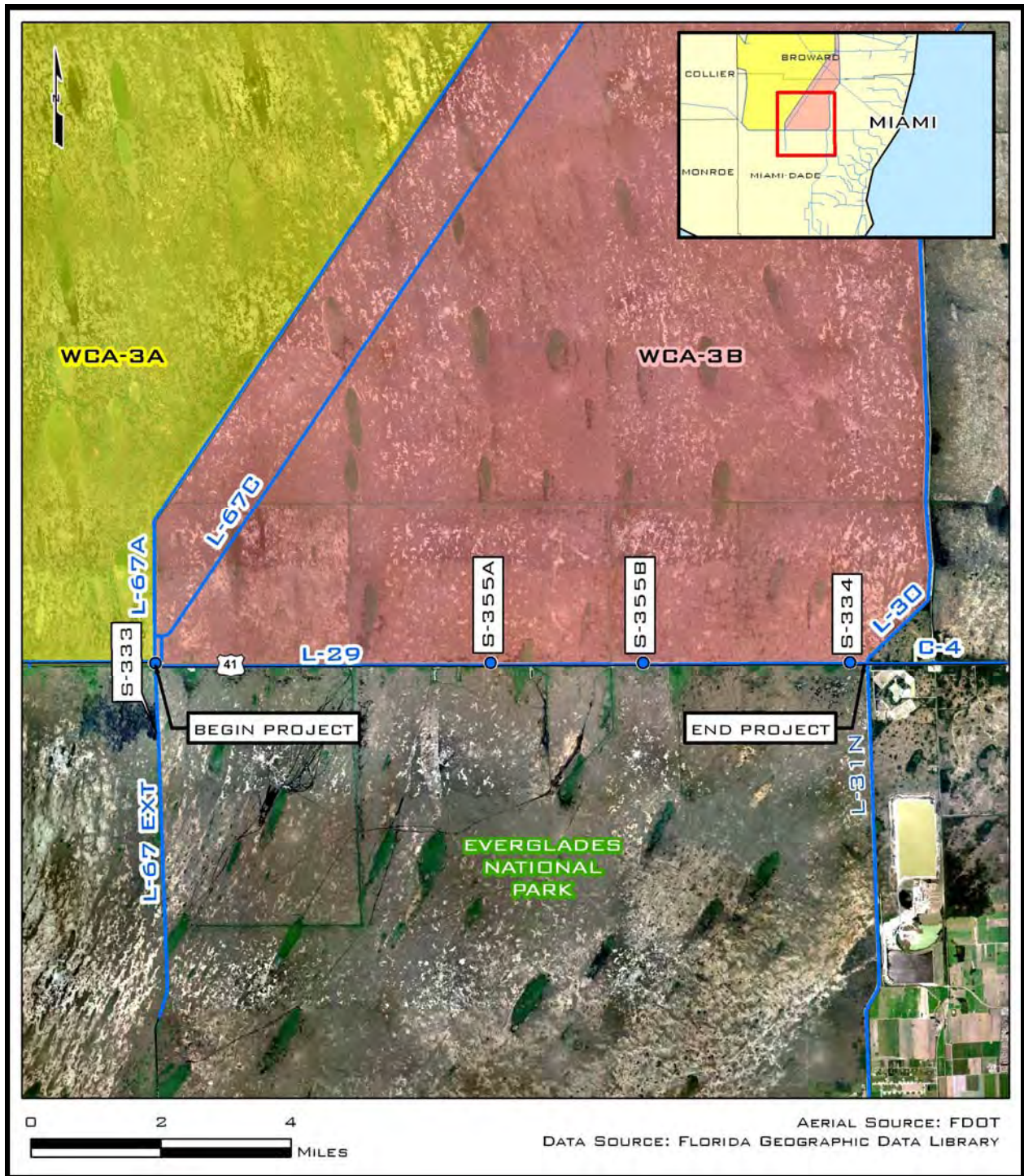


Figure 1-3 – Detailed Project Location Map



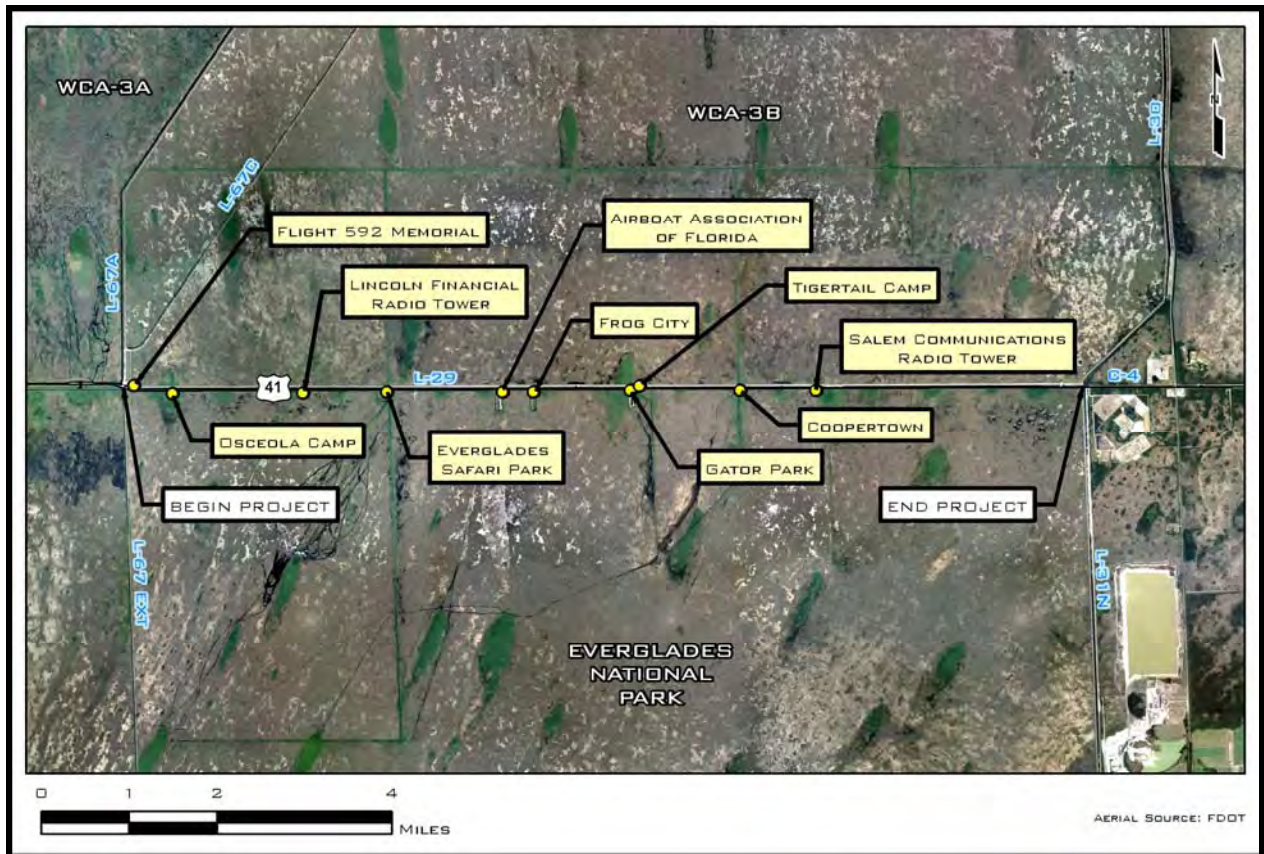


Figure 1-4 – Project Features Map

1.2.2 Purpose and Need for Action

1.2.2.1 Purpose of the Project

“Purpose” is an overarching statement of what the project must do to be considered a success. The project purpose was developed as part of the 2009 Omnibus Appropriations Act passed by Congress on March 10, 2009. The NPS proposes:

“To immediately evaluate the feasibility of additional bridge length, beyond that to be constructed pursuant to the Modified Water Deliveries to Everglades National Park Project (16 U.S.C. SS 410r-S), including a continuous bridge, or additional bridges or some combination thereof, for the Tamiami Trail (U.S. Highway 41) to restore more natural water flow to Everglades National Park and Florida Bay and for the purpose of restoring habitat within the Park and the ecological connectivity between the Park and the Water Conservation Areas.”

1.2.2.2 Need for Action

“Need for Action” describes why action is required. It summarizes the most important points of the planning issues and provides the reasons the project is needed at this time.



The need for the action is the same as cited in the Mod Waters Tamiami Trail Modification 2003 GRR/SEIS, 2005 RGRR/SEIS, and 2008 LRR/EA⁴:

“In its current condition, the segment of Tamiami Trail located between S-334 on the east and S-333 on the west has inadequate capacity to deliver the volumes of water required to restore ENP and in Northeast Shark River Slough without risking damage to the roadbed and its eventual degradation and causing a backwater impact on WCA-3B potentially drowning tree islands. The recommended plan must address: (1) measures to increase conveyance of water to Northeast Shark River Slough, and (2) modifications to the existing roadbed, if any, required to allow this conveyance.”

More precise needs based on specific language in the 2009 Omnibus Appropriations Act are:

- (1) to increase potential ecological connectivity (additional bridging) between marshes in Northeast Shark River Slough in ENP and marshes north of the trail,
- (2) to restore natural marsh flow patterns (flow rates and distributions) associated with unobstructed flows (removal of roads, canals, and levees) between marshes, and
- (3) to restore ridge and slough habitat in ENP by reconnecting sloughs severed by the existing road.

1.2.3 Objectives in Taking Action

“Objectives” are specific purpose statements that describe what must be accomplished to a large degree for the action to be considered a success (*Director’s Order 12*).

Based on a consideration of the purpose for the project, the problems occurring and the opportunities available to accomplish restoration goals, the following project objectives were developed by the NPS ENP staff:

- Restore more natural water flow to ENP
 - Construct additional bridging and road raising of the Tamiami Trail to provide for unconstrained flows to Northeast Shark River Slough and Florida Bay
- Restore ecological connectivity
 - Improve ecological connectivity by removing obstructions to sheet flow
 - Enhance unobstructed movement of animals between the north and south of Tamiami Trail
- Restore habitat within ENP
 - Restore slough vegetation and the deep water sloughs
 - Restore processes that produce and maintain ridge and slough communities in ENP east of the L-67 Extension

⁴ While the need for action is the same as cited in the Mod Waters Tamiami Trail Modification 2003 GRR/SEIS, 2005 RGRR/SEIS, and 2008 LRR/EA, the reader should note that a one-mile eastern bridge is being constructed as part of the 2008 LRR/EA.



1.3 Purpose and Significance of Everglades National Park

1.3.1 Enabling Legislation

Authorized as a unit of the NPS on May 30, 1934, Everglades National Park is one of 392 units of the National Park System administered by the NPS. Congress authorized the establishment of Everglades National Park to be "...wilderness where no development...or plan for the entertainment of visitors shall be undertaken which would interfere with the preservation of the unique flora and fauna of the essential primitive natural conditions now prevailing in the area." Dubbed by opponents as the "alligator and snake swamp bill," the legislation stalled during the Great Depression and World War II. Finally, on December 6, 1947, President Harry S. Truman dedicated Everglades National Park (NPS, 2001b).

1.3.2 Purpose and Significance

The following provides the purpose and significance for Everglades National Park, which must be taken into account in any Park planning.

Purpose

Everglades National Park is a public park for the benefit of the people. It is set aside as a permanent wilderness preserving essential primitive conditions including the natural abundance, diversity, behavior, and ecological integrity of its flora and fauna.

Significance

Significance statements capture the essence of the Park's importance to our country's natural and cultural heritage. Significance statements represent the Park's distinctiveness and help to place the Park within its regional, national, and international context.

Everglades National Park is nationally and internationally significant because:

- It is the only place in the United States designated as a World Heritage site, an International Biosphere Reserve, and a Wetland of International Significance.
- It comprises the largest designated subtropical wilderness reserve on the North American continent (1,296,000 acres). The Park contains vast subtropical upland and marine ecosystems, including freshwater marshes, tropical hardwood, rock pineland, extensive mangroves, and seagrass ecosystems that support world-class fisheries.
- It serves as a sanctuary for the protection of more than 20 federal- and 70 state-listed rare, threatened, and endangered species.
- It provides important foraging and breeding habitat for more than 400 species of birds (including homeland to world-renowned wading bird populations) and functions as a major corridor for migratory bird populations.
- It includes archaeological and historical resources spanning about 5,000 years of human history. These range from prehistoric sites revealing a fishing-hunting-gathering adaptation to a tropical environment (unique within the continental United States), to surviving structures from a Nike missile installation constructed in the early 1960s as a part of South Florida's Cold War defenses.
- It preserves natural and cultural resources associated with the past and present homeland of Native Americans of Florida (including the Miccosukee Tribe of Indians of Florida, the Seminole Tribe of Florida, and the Seminole Nation of Oklahoma).



1.3.3 General Park Background

Spanning the southern tip of the Florida peninsula and most of Florida Bay, Everglades National Park is the largest subtropical wilderness in North America. The Park is only a portion of the Everglades fragile ecosystem. Everglades National Park provides a prime example of the systemic linkages between national parks, the larger ecosystem, and surrounding communities (NPS, 2001b). The Park's original boundaries contained 460,000 acres; subsequent additions to the Park have increased its size to 1,509,000 acres, including most of Florida Bay. The most recent addition came in 1989 when Congress added 107,600 acres in the East Everglades area of the Park, including a portion of the Northeast Shark River Slough—a waterway critical for the protection of Park resources (over 220 significant archeological and historic sites) and hydrologic restoration. The Park stretches more than 60 miles north-to-south and 40 miles east-to-west. It holds the largest expanse of wilderness east of the Rocky Mountains. Congress designated 1,296,500 acres of this vast Park as the Marjorie Stoneman Douglas Wilderness to honor this conservation pioneer who brought the beauty and fragility of the Everglades to public attention in her 1947 book *The Everglades: River of Grass*.

Located at the interface of temperate and subtropical environments, the Park has a great diversity of resources. These include more than 400 species of birds, 800 species of land and water vertebrates, 1,600 species of vascular plants, 125 species of fish, 24 varieties of orchids, and over 220 significant archeological and historic sites. The Park is home to more than 20 federally-listed species and 70 state-listed species. Because of its rich diversity and unique landscape, more than one million visitors come to experience the Park each year. Popular activities include canoeing, kayaking, camping, boating, wildlife observation, and fishing.

Visitors access information about the Park via four main contact stations – the Ernest Coe Visitor Center in Homestead, the Flamingo Visitor Center, the Shark Valley Visitor Center, and the Gulf Coast Visitor Center in Everglades City.

1.4 Laws, Regulations, and Policies

Numerous laws, regulations, and policies at the federal, state, and local levels guide the decisions and actions regarding the project. Some of the primary examples of these legal and regulatory constraints and bounds follow.

1.4.1 National Park Service

National Park Service Organic Act (1916) and Management Policies

In the National Park Service *Organic Act of 1916* (Organic Act), Congress directed the U.S. Department of the Interior and the NPS to manage parks “to conserve the scenery and the natural and historic objects and the wildlife therein and to provide for the enjoyment of the same in such manner and by such means as would leave them unimpaired for the enjoyment of future generations” (16 USC §1). Congress reiterated this mandate in the Redwood National Park Expansion Act of 1978 by stating that the NPS must conduct its actions in a manner that would ensure no “derogation of the values and purposes for which these various areas have been established, except as may have been or shall be directly and specifically provided by Congress” (16 USC §1 a-1).

Despite these mandates, the Organic Act and its amendments afford the NPS latitude when making resource decisions that balance visitor experience and resource preservation. By these acts, Congress “empowered [the NPS] with the authority to determine what uses of Park resources are proper and what proportion of the Park resources are available for each use” (*Bicycle Trails Council of Marin v. Babbitt*, 82 F.3d 1445, 1453 [9th Cir. 1996]).



Yet courts consistently interpreted the Organic Act and its amendments to elevate resource conservation above visitor experience. *Michigan United Conservation Clubs v. Lujan*, 949 F2d 202, 206 (6th Cir. 1991) states, “Congress placed specific emphasis on conservation.” The court in *National Rifle Association of America v. Potter*, stated “in the Organic Act Congress speaks of but a single purpose, namely, conservation.” The NPS *Management Policies 2006* also recognize that resource conservation takes precedence over visitor experience. The policy dictates that “when there is a conflict between conserving resources and values and providing for enjoyment of them, conservation is to be predominant” (NPS *Management Policies 2006*, 1.4.3).

Because conservation remains predominant, the NPS seeks to avoid or to minimize adverse impacts on park resources and values. Yet the NPS has discretion to allow negative impacts when necessary (NPS *Management Policies 2006*, sec. 1.4.3). While some actions and activities cause impacts, the National Park Service cannot allow an adverse impact that constitutes resource impairment (NPS *Management Policies 2006*, sec. 1.4.3). The Organic Act prohibits actions that permanently impair park resources unless a law directly and specifically allows for the action (16 U.S.C. 1a-1). An action constitutes an impairment when its impacts “harm the integrity of park resources or values, including the opportunities that otherwise would be present for the enjoyment of those resources or values” (NPS *Management Policies 2006*, sec. 1.4.5). To determine impairment, the NPS must evaluate “the particular resources and values that would be affected; the severity, duration, and timing of the impact; the direct and indirect effects of the impact; and the cumulative effects of the impact in question and other impacts” (NPS *Management Policies 2006*, sec. 1.4.5).

Because the purposes for establishing national park units vary based on their enabling legislation, natural resources, cultural resources, and missions, management activities appropriate for each unit and for areas in each unit vary as well. An action appropriate in one unit would impair resources in another unit. Thus, this EIS would analyze the context, duration, and intensity of impacts related to the Tamiami Trail Modifications: Next Steps Project, as well as the potential for resource impairment, as required by *Director’s Order 12: Conservation Planning, Environmental Impact Analysis and Decision-making*.

Management Policies

NPS *Management Policies 2006* establishes service-wide policies for the preservation, management, and use of park resources and facilities. These policies provide guidelines and direction for management of resources within the Park. The alternatives considered in this EIS would incorporate and comply with the provisions of these mandates and policies. Management policies specifically applicable to each impact topic analyzed in this EIS are discussed in Chapter 4 – Environmental Consequences.

Director’s Order #2: Park Planning

Director’s Order #2: Park Planning, has been superseded by Chapter 2 of NPS *Management Policies 2006*. Chapter 2 of NPS *Management Policies 2006* states that:

Park planning helps define the set of resource conditions, visitor experiences, and management actions that, taken as a whole, will best achieve the mandate to preserve resources unimpaired for the enjoyment of present and future generations. NPS planning processes will flow from broad-scale general management planning through progressively more specific strategic planning, implementation planning, and annual performance planning and reporting, all of which will be grounded in foundation statements.



This planning process occurs through general principles laid out by the NPS for decision-making; scientific, technical, and scholarly analysis; public participation; and goal orientation. In Chapter 2 of the *NPS Management Policies 2006*, the NPS states the following:

The National Park Service will use planning to bring logic, analysis, public involvement, and accountability into the decision-making process. Park planning and decision-making will be conducted as a continuous, dynamic cycle, from broad visions shared with the public to individual, annual work assignments and evaluations ...

Decision-makers and planners will use the best available scientific and technical information and scholarly analysis to identify appropriate management actions for protection and use of park resources. Analysis will be interdisciplinary and tiered ...

The Service will actively seek out and consult with existing and potential visitors, neighbors, American Indians, other people with traditional cultural ties to park lands, scientists and scholars, concessioners, cooperating associations, gateway communities, other partners, and government agencies...

Managers will be held accountable for identifying and accomplishing measurable long-term goals and annual goals that are incremental steps to carrying out the park mission. Such planning is a critical and essential part of the NPS performance management system that is designed to improve the Park Service's performance and results.

Director's Order #12 and Handbook: Conservation Planning, Environmental Impact Analysis, and Decision-Making

Director's Order #12 and the accompanying handbook (NPS, 2006a) lay the groundwork for how the NPS complies with NEPA. *Director's Order #12* and the handbook set forth a planning process for incorporating scientific and technical information and establishing a solid administrative record for NPS projects.

Director's Order #12 requires that impacts to park resources be analyzed in terms of their context, duration, and intensity. It is crucial for the public and decision-makers to understand implications of those impacts in the short and long-term, cumulatively, and in context, based on an understanding and interpretation by resource professionals and specialists. *Director's Order #12* also requires that an analysis of impairment to park resources and values be part of the NEPA document.

Director's Order #28: Cultural Resource Management (1998)

This Director's Order sets forth the guidelines for management of cultural resources, including cultural landscapes, archaeological resources, historic and prehistoric structures, museum objects, and ethnographic resources. This order calls for the NPS to protect and manage cultural resources in its custody through effective research, planning, and stewardship in accordance with the policies and principles contained in the *NPS Management Policies 2006*.

Director's Order #41: Wilderness Preservation and Management

The purpose of this Director's Order is to provide accountability, consistency, and continuity to the NPS's wilderness management program, and to otherwise guide NPS-wide efforts in meeting the letter and spirit of the 1964 Wilderness Act. This Director's Order clarifies specific provisions of NPS Management Policies and established specific instructions and requirements concerning the management of all NPS wilderness areas. Director's Order #41 is applied to management actions carried out within the framework of a park's general management plan, the Government Performance and Results Act, a park's natural and cultural resources plans, and the park's wilderness management plan.



Director's Order #75A: Civic Engagement and Public Involvement

Director's Order #75A, issued in 2007, elaborates on the Section 1.7, Civic Engagement, of the *NPS Management Policies 2006*. The purpose of this Director's Order is to articulate the NPS "commitment to civic engagement, and to have all National Park Service units and offices embrace civic engagement as the essential foundation and framework for creating plans and developing programs." *Director's Order #75A* further states the NPS view that:

Civic engagement is a continuous, dynamic conversation with the public on many levels that reinforces public commitment to the preservation of heritage resources, both cultural and natural, and strengthens public understanding of the full meaning and contemporary relevance of these resources. The foundation of civic engagement is a commitment to building and sustaining relationships with neighbors and communities of interest.

Director's Order #77: Natural Resource Protection

Director's Order #77 addresses Natural Resource Protection, with specific guidance provided in *Reference Manual #77: Natural Resource Management*. This Director's Order includes *Director's Order #77-1: Wetland Protection* and *Director's Order #77-2: Floodplain Management*, both of which would be considered since the proposed project is located within wetland resources and a mapped floodplain.

Director's Order #77-1, reissued in 2008, establishes policies, requirements, and standards for implementing Executive Order 11990: Protection of Wetlands. Under this order, the NPS adopts a goal of "no net loss of wetlands." In addition, the NPS would strive to achieve a long-term goal of net gain of wetlands Service-wide. For proposed new development or other new activities, plans, or programs that are either located in or otherwise have the potential for direct or indirect adverse impacts on wetlands, the NPS would employ a sequence of: avoiding adverse wetland impacts to the extent practicable, minimizing impacts that could not be avoided, and compensating for remaining unavoidable adverse wetland impacts by restoring degraded wetlands. If the preferred alternative would result in adverse impacts to wetlands, the NPS would prepare and approve a Statement of Findings (SOF) in accordance with procedures described in *Procedural Manual 77-1: Wetland Protection*. Since wetland resources are located within the study area and would be affected by the proposed project, a SOF has been prepared in accordance with procedures described in *Procedural Manual #77-1*.

Director's Order #77-2, approved in 2003, applies to all NPS proposed actions, including the direct and indirect support of floodplain development that would adversely affect the natural resources and functions of floodplains, including coastal floodplains, or increased flood risks. This Director's Order also applies to existing actions when they are the subjects of regularly occurring updates of NPS planning documents. Under *Director's Order #77-2*, it is NPS policy to preserve floodplain values and minimize potentially hazardous conditions associated with flooding. In managing floodplains on park lands, the NPS would (1) manage for the preservation of floodplain values; (2) minimize potentially hazardous conditions associated with flooding; and (3) comply with the NPS Organic Act and all other federal laws and Executive Orders related to the management of activities in flood-prone areas, including Executive Order 11988 (Floodplain Management), NEPA, applicable provisions of the Clean Water Act, and the Rivers and Harbors Appropriation Act of 1899. Specifically, the NPS would protect and preserve the natural resources and functions of floodplains; avoid the long- and short-term environmental effects associated with the occupancy and modification of floodplains; and avoid direct and indirect support of floodplain development and actions that would adversely affect the natural resources and functions of floodplains or increase flood risks. When it is not practicable to locate or relocate development or inappropriate human activities to a site outside and not affecting the



floodplain, the NPS would prepare and approve a SOF, in accordance with procedures described in *Procedural Manual #77-2: Floodplain Management*, and take all reasonable actions to minimize the impact to the natural resources of floodplains. Since this project is located within a mapped floodplain that would be affected by the proposed project, a SOF has been prepared in accordance with procedures outlined in *Procedural Manual #77-2*.

1.4.2 Other Federal Laws and Executive Orders

The NPS is also required to comply with the following laws, Executive Orders, regulations, and policies in developing this project.

National Environmental Policy Act, 1969, as Amended

Section 102(2)(c) of this act requires that an environmental analysis be prepared for proposed federal actions that may significantly affect the quality of the human environment or are major or controversial federal actions. NEPA is implemented through regulations of the Council on Environmental Quality (CEQ) (40 CFR 1500-1508). The NPS has, in turn, adopted procedures to comply with the act and the CEQ regulations, as found in *Director's Order 12: Conservation Planning, Environmental Impact Analysis, and Decision Making*, and its accompanying handbook (NPS 2001a). Section 102(2)(c) of this act requires that an EIS be prepared for proposed major federal actions that may significantly affect the quality of the human environment.

National Parks Omnibus Management Act of 1998

This act (16 USC 5901, et seq.) underscores NEPA in that both are fundamental to NPS park management decisions. Both acts provide direction for articulating and connecting the ultimate resource management decision to the analysis of impacts, using appropriate technical and scientific information. Both also recognize that such data may not be readily available and provide options for resource impact analysis in this case.

Redwood National Park Act of 1978, as Amended

All National Park System units are to be managed and protected as parks, whether established as a recreation area, historic site, or any other designation. This act states that the National Park Service must conduct its actions in a manner that would ensure no “derogation of the values and purposes for which these various areas have been established, except as may have been or shall directly and specifically provided by Congress.”

Endangered Species Act of 1973, as Amended

This act requires all federal agencies to consult with the Secretary of the Interior on all projects and proposals with the potential to impact federally endangered or threatened plants and animals. It also requires federal agencies to use their authorities in furtherance of the purposes of the *Endangered Species Act* by carrying out programs for the conservation of endangered and threatened species and to ensure that any agency action authorized, funded, or carried out by the agency is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of designated critical habitat.

Since Federally-listed threatened and endangered species are located within the study area and would be affected by the proposed project, a Biological Assessment would be required by the USFWS for this project. Through ongoing coordination efforts with the USFWS (see Section 6.2.2), it has been agreed that the requirements for the Biological Assessment can be met through this EIS document.



National Historic Preservation Act of 1966, as Amended

Section 106 of this act requires federal agencies to consider the effects of their undertakings on properties listed or potentially eligible for listing on the National Register of Historic Places. All actions affecting the park's cultural resources must comply with this legislation.

Antiquities Act of 1906

The *Antiquities Act* protects all historic and prehistoric sites on Federal lands and prohibits excavation or destruction of such antiquities unless a permit (Antiquities Permit) is obtained from the Secretary of the department which has the jurisdiction over those lands. It also authorizes the President to declare areas of public lands as National Monuments and to reserve or accept private lands for that purpose.

Archaeological Resources Protection Act of 1979

This act requires Federal agencies to provide notice to the Secretary of the Interior of any dam constructions and, if archeological resources are found, for recovery or salvage of them. The law applies to any agency whenever it received information that a direct or federally assisted activity would cause irreparable harm to prehistoric, historic, or archaeological data. It also increases the penalty for stealing or vandalizing to \$500,000 and up to five years in prison.

Native American Graves Protection and Repatriation Act of 1990 (NAGPRA)

This act assigns ownership and control of Native American cultural items, human remains, and associated funerary objects to Native Americans. It also establishes requirements for the treatment of Native American human remains and sacred or cultural objects found on Federal land. This act further provides for the protection, inventory, and repatriation of Native American cultural items, human remains, and associated funerary objects. It requires museums that receive public funds to consult with Native Americans. Native Americans have the power to decide what happens to museum collections of human remains, grave goods, and sacred items. When these items are inadvertently discovered, all activity must cease activity, a reasonable effort must be made to protect the items, and the appropriate Indian tribe(s) and/or Native Hawaiian organization(s) must be notified.

American Indian Religious Freedom Act of 1978

The *American Indian Religious Freedom Act* affirms the right of Native Americans to have access to their sacred places. If a place of religious importance to American Indians may be affected by an undertaking, AIRFA promotes consultation with Indian religious practitioners, which may be coordinated with Section 106 consultation. Amendments to Section 101 of NHPA in 1992 strengthened the interface between AIRFA and NHPA by clarifying that:

“Properties of traditional religious and cultural importance to an Indian tribe or Native Hawaiian organization may be determined to be eligible for inclusion on the National Register.”

In carrying out its responsibilities under Section 106, a Federal agency shall consult with any Indian tribe or Native Hawaiian organization that attaches religious and cultural significance to properties described in subparagraph (A). [16 U.S.C. 470a (a)(6)(A) and (B)].

The Secretary of the Interior's Standards for the Treatment of Historic Properties, 1995

Standards for Preservation:

1. A property will be used as it was historically, or be given a new use that maximizes the retention of distinctive materials, features, spaces, and spatial relationships. Where a treatment and use have not been identified, a property will be protected and, if necessary, stabilized until additional work may be undertaken.



2. The historic character of a property will be retained and preserved. The replacement of intact or repairable historic materials or alteration of features, spaces, and spatial relationships that characterize a property will be avoided.
3. Each property will be recognized as a physical record of its time, place, and use. Work needed to stabilize, consolidate, and conserve existing historic materials and features will be physically and visually compatible, identifiable upon close inspection, and properly documented for future research.
4. Changes to a property that have acquired historic significance in their own right will be retained and preserved.
5. Distinctive materials, features, finishes, and construction techniques or examples of craftsmanship that characterize a property will be preserved.
6. The existing condition of historic features will be evaluated to determine the appropriate level of intervention needed. Where the severity of deterioration requires repair or limited replacement of a distinctive feature, the new material will match the old in composition, design, color, and texture.
7. Chemical or physical treatments, if appropriate, will be undertaken using the gentlest means possible. Treatments that cause damage to historic materials will not be used.
8. Archeological resources will be protected and preserved in place. If such resources must be disturbed, mitigation measures will be undertaken.

Civil Rights Act of 1964

Any proposed federal project must comply with the provisions of Title VI of the *Civil Rights Act of 1964*, as amended by Title VIII of the *Civil Rights Act of 1968*. Title VI of the 1964 *Civil Rights Act* provides that no person will, on the grounds of race, color, religion, sex, national origin, marital status, disability, or family composition be excluded from participation in, be denied the benefits of, or be otherwise subject to discrimination under any program of the federal, state, or local government. Title VIII of the 1968 *Civil Rights Act* guarantees each person equal opportunity in housing.

Clean Water Act

The *Federal Pollution Control and Prevention Act of 1972*, commonly known as the *Clean Water Act*, is the primary federal law in the United States governing water pollution. The purpose of the act is to make our nation's waters "fishable and swimmable" by 1983 by eliminating releases of toxic substances, controlling wastewater and storm water pollution of waterways, and instituting water quality standards and associated permitting systems.

The principal body of law currently in effect is based on the *Federal Water Pollution Control Amendments of 1972*, which substantially expanded and strengthened earlier legislation. Major amendments were made to the *Clean Water Act of 1977* enacted by the 95th United States Congress and the *Water Quality Act of 1987* enacted by the 100th United States Congress.

Flood Control Act of 1948

The *Flood Control Act of 1948* authorized the Chief of Engineers of the USACE to approve minor flood control projects without having to get Congressional approval. It also authorized several larger flood control projects and amended the budget set forth in the *Flood Control Act of 1946*.



Coastal Zone Management Act, 1966

The *Coastal Zone Management Act* (CZMA) (16 U.S.C. §§1451 et. seq.) seeks to preserve and protect coastal resources. Through the CZMA, states are encouraged to develop coastal zone management programs (CZMPs) to allow economic growth that is compatible with the protection of natural resources, the reduction of coastal hazards, the improvement of water quality, and sensible coastal development. The CZMA provides financial and technical incentives for coastal states to manage their coastal zones in a manner consistent with CZMA standards and goals. Section 307 of the CZMA requires that federal agency activities that affect any land or water use or natural resource of the coastal zone must be consistent to the maximum extent practicable with the enforceable policies of the state CZMP. Federal agencies and applicants for federal approvals must consult with state CZMPs and must provide the CZMP with a determination or certification that the activity is consistent with the CZMP's enforceable policies, where those policies would have a possible effect on state coastal resources, as defined by the CZMP and local land use plans.

The Florida Coastal Management Program (FCMP), the State of Florida's federally approved management program, was approved by the National Oceanic and Atmospheric Administration (NOAA) in 1981. The FCMP consists of a network of 23 Florida Statutes administered by 11 state agencies and four of the five water management districts designed to ensure the wise use and protection of the state's water, cultural, historic, and biological resources; to minimize the state's vulnerability to coastal hazards; to ensure compliance with the state's growth management laws; to protect the state's transportation system; and to protect the state's proprietary interest as the owner of sovereign submerged lands.

The State of Florida's coastal zone includes the area encompassed by the state's 67 counties and its territorial seas. Therefore, federal actions occurring throughout the state are reviewed by the state for consistency with the FCMP. However, the state has limited its federal consistency review of federally licensed and permitted activities to the federal licenses or permits specified in Section 380.23(3)c, Florida Statutes.

Magnuson-Stevens Fishery Conservation and Management Act, as amended

The *Sustainable Fisheries Act of 1996* (Public Law 104-267) requires all federal agencies to consult with NOAA's National Marine Fisheries Service (NMFS) on all actions, or proposed actions, permitted, funded, or undertaken by the agency, that may adversely affect Essential Fish Habitat (EFH). Essential fish habitat is defined as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." "Waters" include aquatic areas and their associated physical, chemical and biological properties. "Substrate" includes sediment underlying the waters. "Necessary" means the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem. Spawning, breeding, feeding, or growth to maturity covers all habitat types utilized by a species throughout its life cycle. The NMFS would provide recommendations on conserving essential fish habitat to federal or state agencies for activities that would adversely affect essential fish habitat.

Clean Air Act

The legal authority for federal programs regarding air pollution control is based on the *1990 Clean Air Act Amendments*. These are the latest in a series of amendments made to the *Clean Air Act*. This legislation modified and extended federal legal authority provided by the earlier *Clean Air Acts of 1963 and 1970*. The *Air Pollution Control Act of 1955* was the first federal legislation involving air pollution. This act provided funds for federal research in air pollution. The *Clean Air Act of 1963* was the first federal legislation regarding air pollution control. In 1967, the *Air Quality Act* was enacted in order to expand federal government activities. The *Air Quality*



Act of 1967 also authorized expanded studies of air pollutant emission inventories, ambient monitoring techniques, and control techniques (USEPA, 2008). Everglades National Park is a designated Class I air quality area under the *Clean Air Act*. Lands with this designation are subject to the most stringent air quality regulations.

Executive Order 11988 - Floodplain Management

This Executive Order directs federal agencies to avoid to the extent possible the long- and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct or indirect support of floodplain development wherever there is a practicable alternative.

Executive Order 11990 - Protection of Wetlands

This Executive Order directs federal agencies to avoid to the extent possible the long- and short-term adverse impacts associated with the destruction or modification of wetlands and to avoid direct or indirect support of new construction in wetlands wherever there is a practicable alternative.

Executive Order 12898 - Environmental Justice

In February 1994, the President of the United States issued Executive Order 12898 (Environmental Justice) requiring federal agencies to analyze and address, as appropriate, disproportionately high adverse human health and environmental effects of federal actions on ethnic and cultural minority populations and low income populations, when such analysis is required by the National Environmental Policy Act of 1969.

The U.S. Environmental Protection Agency (USEPA) defines environmental justice as:

The fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means that no group of people, including racial, ethnic, or socioeconomic group should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of federal, state, local, and tribal programs and policies.

“Meaningful involvement” means that: (1) potentially affected community residents have an appropriate opportunity to participate in decisions about a proposed activity that will affect their environment and/or health; (2) the public's contribution can influence the regulatory agency's decision; (3) the concerns of all participants involved will be considered in the decision-making process; and (4) the decision-makers seek out and facilitate the involvement of those potentially affected.

An adverse effect on minority and/or low-income populations occurs when: 1) The adverse effect occurs primarily to a minority and/or low income population; or 2) the adverse effect suffered by the minority and/or low-income population is more severe or greater in magnitude than the adverse effect suffered by the non-minority and/or non-low-income populations.

Executive Order 13112 – Invasive Species

This Executive Order requires federal agencies to prevent the introduction of invasive species, provide for their control, and to minimize the economic, ecological, and human health impacts that invasive species may cause.



Executive Order 13423 – Strengthening Environmental, Energy, and Transportation Management

Executive Order 13423 was signed on January 24, 2007, by President George W. Bush and was codified into law by the 2009 Omnibus Appropriations Act, which was signed on February 17, 2009. Executive Order 13423 consolidates and strengthens the sustainable practices of Executive Orders 13101, 13123, 13134, 13148, and 13149. Executive Order 13423 requires federal agencies to lead by example in advancing the nation’s energy security and environmental performance. It requires federal agencies to “conduct their environmental, transportation, and energy-related activities under the law in support of their respective missions in an environmentally, economically and fiscally sound, integrated, continuously improving, efficient, and sustainable manner.” It includes requirements for the reduction of greenhouse gases and other energy and water conservation measures. The order requires agencies to reduce greenhouse gas emissions by 3% annually through the end of fiscal year 2015, or 30% by the end of fiscal year 2015, relative to the baseline of the agency’s energy use in fiscal year 2003.

Executive Order 13514 – Federal Leadership in Environmental, Energy, and Economic Performance

Executive Order 13514 was signed on October 5, 2009, by President Barack Obama. Executive Order 13514 enhances Executive Order 13423 (which consolidated previous Executive Orders 13101, 13123, 13134, 13148, and 13149), which requires federal agencies to reduce energy and water intensity and achieve other sustainability goals. All the provisions of Executive Order 13423 remain in effect. Executive Order 13514 introduces new greenhouse gas emissions management requirements, expands water reduction requirements for federal agencies, and addresses waste diversion, local planning, sustainable buildings, environmental management, and electronics stewardship.

DOI Secretarial Order 3285 – Climate Change

DOI Secretarial Order 3285, issued on March 11, 2009, makes production and transmission of renewable energy on public lands a priority. This order establishes a DOI-wide approach for applying scientific tools to increase understanding of climate change and to coordinate an effective response to its impacts on tribes and on the land, water, ocean, fish and wildlife, and cultural heritage resources that the DOI manages. This order replaces Secretarial Order 3226 (Amendment No. 1), issued on January 16, 2009, and reinstates the provisions of Secretarial Order 3226, issued on January 19, 2001.

1.4.3 State Laws

Outstanding Florida Waters

All waters that are a part of Everglades National Park are defined as Outstanding Florida Waters (OFWs). Section 403.061 (27), Florida Statutes, grants the Florida Department of Environmental Protection (FDEP) power to: Establish rules that provide for a special category of water bodies within the state, to be referred as “Outstanding Florida Waters,” which shall be worthy of special protection because of their natural attributes. In general, the FDEP cannot issue permits for direct pollutant discharges to OFWs that would lower ambient (existing) water quality or indirect discharges that would significantly degrade the waters. Permits for new dredging and filling must be clearly in the public interest, taking into consideration whether the:

- Activity would adversely affect the public health, safety, or welfare or property of others;



- Activity would adversely affect the conservation of fish and wildlife, including endangered or threatened species, or their habitats;
- Activity would adversely affect navigation or the flow of water or cause harmful erosion or shoaling;
- Activity would adversely affect the fishing or recreational values or marine productivity in the vicinity of the activity;
- Activity would be of a temporary or permanent nature;
- Activity would adversely affect or enhance significant historical and archaeological resources under the provisions of Sec. 267.061 F.S.; and
- Current condition and relative value of functions being performed by areas affected by the proposed activity (373.414(1)(a), F.S.).

1.4.4 Relationship to other Plans, Policies and Actions

1.4.4.1 National Park Service Plans, Policies and Actions

National Park Service plans, policies, and actions beyond those listed previously that may influence the Tamiami Trail Modifications: Next Steps project are provided below:

Everglades National Park General Management Plan/East Everglades Wilderness Study

Everglades National Park is in the process of developing the Draft *General Management Plan/East Everglades Wilderness Study/Environmental Impact Statement* (GMP/EEWS/EIS) – a 20-year vision for the Park’s resource protection, visitor experiences, and management. As part of the GMP process, information was collected from the general public and interested parties regarding future management concerns. The Park is currently developing the Draft GMP/EEWS/EIS, which is expected to be released for public review and comment in early 2011. The GMP is scheduled for completion in 2012.

The scope of the GMP/EEWS/EIS was expanded in 2006 to include a Wilderness Study for the East Everglades Expansion Area lands. The expanded GMP process would fully consider all legislated uses and designations and would result in a viable management plan for the entire Park, including the expansion area.

The scope of the GMP/EEWS/EIS also includes a determination for the disposition of five privately owned parcels located along Tamiami Trail that were originally authorized for acquisition by DOI as part of *Everglades National Park Protection and Expansion Act of 1989*. Specifically, Section 103(d) of the Everglades National Park Protection and Expansion Act of 1989 authorizes DOI to “negotiate and enter into concession contracts with the owners of commercial airboat and tour facilities in existence on or before January 1, 1989.” The *1991 East Everglades Land Protection Plan/EA* provided further guidance for the acquisition of the parcels by stating that “it will be necessary to acquire all within the park addition in fee” to comply with the Congressional intent of Public Law 101-229. The DOI, through the NPS, is evaluating in the GMP/EEWS/EIS, the appropriate use and disposition of these parcels.

Modified Water Deliveries to Everglades National Park (MWD) – Spreader Swale Pilot Project Environmental Assessment

In October 2008, the NPS prepared an EA for a proposed pilot project to construct spreader swales immediately south of two culverts located along the 10.7-mile Tamiami Trail study corridor. Spreader swale use was proposed by the USACE as a way to increase flows to the



Everglades ecosystem lying south of Tamiami Trail. Since the effectiveness and potential level of benefits of the use of spreader swales was unknown a pilot project was proposed to determine if the use of the swales would be effective in increasing the level of water delivery.

South Florida and Caribbean Parks Exotic Plant Management Plan

The NPS has prepared a draft exotic vegetation management plan and EIS to control non-native plant species in the South Florida and Caribbean NPS units. Implementation of the plan would result in continued control and reduction of non-native plant species in the project area and throughout the Park.

1.4.4.2 Other Federal Plans, Policies and Actions

C-111 South Dade Project

The C-111 Canal separates agricultural lands from ENP in southern Miami-Dade County. Because of the excessive permeability of the Biscayne Aquifer in this area the canal controls the water levels in surrounding area. The USACE is undertaking a series of hydrological restoration projects along the C-111 Canal designed to restore fresh water deliveries to the eastern portion of ENP. At this time the USACE has developed an experimental program to test water delivery methods specifically to Shark River and Taylor sloughs.

1.4.4.3 Other State and Local Plans, Policies and Actions

2005-2006 Lower East Coast Water Supply Plan Update

This updated water supply plan was prepared by the SFWMD to revise the 1998 long-term planning document to reflect the increasing demand and decreasing supply of water in the east coast planning unit. Because of increased demands on water resources in the South Florida area the SFWMD's Board has recommended that the east coast planning unit focus on alternative water sources and projects. The updated plan:

- Describes the legislative, planning, and regulatory framework around which future water use and development decisions in the region will take place.
- Documents existing demands and projects future water demands through 2025 for agricultural and urban water sectors, as well as other water use categories.
- Identifies resource issues, including constraints on development of new traditional freshwater sources and the effects of urbanization on coastal resources.
- Evaluates the water source options available within the planning area. Alternative water supply sources include brackish groundwater, reclaimed water, new storage capacity for surface water or groundwater, and seawater. Water conservation will also play a key role in the region's water supply planning efforts.
- Identifies and discusses water resource development projects.
- Identifies water supply projects that will meet future human and environmental needs. Focuses on alternative water supply projects, such as brackish water from the Floridan Aquifer, captured storm water, aquifer storage and recovery (ASR) systems, and expanded use of reclaimed water.
- Describes funding opportunities available through the SFWMD to foster alternative water supply development.
- Identifies areas where collection of resource data and technical studies are needed. (SFWMD, 2010)



1.5 Scoping Process and Public Participation

1.5.1 Scoping

Project scoping is an early and open process to solicit public and internal concerns relating to a proposed action. In May 2009, NPS staff along with participants from cooperating federal and state agencies met for an internal scoping discussion. The main focus of the scoping meeting was to agree on the definition of the project's purpose and need, discuss project alternatives and performance measures, and to determine impact topics to be studied by the EIS.

During the development of the EIS, the Park actively involved the public in the process. The Park's goals for public participation included: understanding of the project by the public; substantive and valuable input to guide Park decisions; and minimization of conflicts through dissemination of information and starting discussion.

The Park elicited public participation in the discussion of issues, area to be studied, and potential alternatives. A Notice of Intent (NOI) to prepare an EIS was published in the Federal Register on May 29, 2009. A project scoping newsletter was distributed by the NPS by U.S. mail and electronic mail also in May 2009. This notice announced the Park's proposal and described preliminary alternative and resource considerations, and identified opportunities for public participation in the EIS process. A public scoping meeting was held on June 2, 2009, at the South Dade Regional Library in Miami, Florida. The structure of the meeting allowed individuals interested in participating in the planning process to be directly involved. Each of the information stations had a flip chart where comments could be provided, in addition those attending the meeting were also directed to the EIS newsletter, which provided additional opportunities for comment on the project, including direct comments by mail, e-mail, or through the NPS's Planning, Environment, and Public Comment (PEPC) website.

In November 2009, a Choosing by Advantage (CBA) workshop was convened for the purpose of choosing a project alternative to bring forward as the recommended alternative. Workshop participants consisting of NPS staff and cooperating state and federal agency participants reviewed performance measures and project alternatives recommended during previous scoping meetings to choose the alternative that best meets the projects purpose and need. See **Appendix B** for the Value Analysis / Choosing By Advantages Report.

Chapter 6 – Consultation and Coordination, provides additional details about these meetings and the subsequent public and agency comments received. Public and agency comments were used to help formulate the alternatives and identify the issues and impact topics considered in this document.

1.5.2 Derivation of Issues and Impact Topics

Issues describe problems or concerns associated with current impacts from environmental conditions as well as problems that may arise from the potential future management of Tamiami Trail. Issues and concerns related to the Tamiami Trail project were identified by the Park staff with input from the public, partners, and tribal organizations. Issues were then grouped into areas of similar concerns, which are addressed as impact topics in the EIS. These impact topics were identified based on issues raised during scoping, federal laws, regulations, executive orders, NPS *Management Policies 2006*, and NPS knowledge of resources.

1.5.3 Issues Not Addressed in this Plan

Per guidance provided from the Department of the Interior, several issues, while associated with the proposed project, are not addressed by this plan and will be addressed in future documents



(i.e., Everglades National Park General Management Plan; Combined Operational Plan, as a component of the Modified Water Deliveries to ENP project; and associated CERP projects). These issues include the potential designation of the East Everglades Expansion Area (a 109,600 acre addition to the northeast area of the park in 1989) as wilderness, continued operation of commercial ventures (i.e. commercial airboating) within the boundaries of Everglades National Park, and modification of water flows associated with raising operating water levels in the L-29 Canal and the subsequent impact or benefit of increased water flows south of Tamiami Trail into Everglades National Park.

1.5.4 Impact Topics Analyzed in this Environmental Impact Statement

The following impact topics are discussed and analyzed in Chapter 3 – Affected Environment and Chapter 4 – Environmental Consequences. These topics are resources of concern that would be beneficially or adversely affected by the actions proposed under each alternative and are developed to ensure that the alternatives are evaluated and compared based on the most relevant topics. A brief rationale for the selection of each impact topic is given. For those topics that were dismissed from further consideration, an explanation is provided later in this chapter.

1.5.4.1 *Geology, Topography and Soils*

The soil of the Tamiami Trail project area consists mainly of nearly level, poorly drained soils containing organic material eight to over 51 inches deep over limestone bedrock. Project construction would involve the movement of soils, driving of piles, and shallow excavation into the limestone bedrock. Concerns with impacts to soil resources include removal, compaction, and increase in sedimentation in downstream slough areas that have already experienced sedimentation from previous activities.

1.5.4.2 *Water Resources*

Hydrology

The Everglades once covered nearly four thousand square miles from Lake Okeechobee to Florida Bay and the Gulf of Mexico. Its original condition clearly showed that it was a flow-way, where shallow water derived from direct rainwater and from wet-season overflows from Lake Okeechobee moved southward as sheet flow to Florida Bay. Water management efforts have diverted this natural flow and have significantly disrupted this natural cycle.

Water Quality

The majority of proposed project activities would take place in wetlands and would have the potential to affect surface water quality. Major water quality concerns are that filling, driving of piles, and excavation of soils within wetlands associated with all project alternatives have the potential to cause elevated levels of turbidity, suspended solids, and lowered levels of dissolved oxygen within the water column. Of additional concern is the high level of nutrients, heavy metals, and pesticides that are found in surface waters entering the Park.

Wetlands

The Everglades is comprised of a series of complex interconnected wetland systems. Construction of the proposed project alternatives would involve impacts to several wetland habitat types along the 10.7-mile project corridor. Potential negative impacts associated with project construction include loss of wetland habitat by filling or change in wetland function or habitat type through excavation or sedimentation.



Floodplains

Prior to human influence, one of the primary functions of the Everglades was to ameliorate the impact of storm flows and flooding events on adjacent uplands. Flood and water control projects within the South Florida region have greatly reduced the Everglades floodplain values and functions. Of primary concern with the proposed project is that the construction of structures and raised roadway does not worsen existing water flow problems along any of the 10.7-mile project corridor.

1.5.4.3 Wildlife and Vegetation / Habitat

The area surrounding Tamiami Trail provides important habitat for numerous wildlife species. This habitat is home to several protected species and the surrounding wetlands provide feeding and nesting habitat for wading birds. Potential negative impacts to wildlife habitat may result from construction-related activities such as the driving of piles, the placement of fill material, and soil disturbance. Short-term and temporary noise and vibration impacts from construction would also occur and may disturb wildlife feeding, foraging, breeding, and nesting behaviors.

1.5.4.4 Land Use

The existing land use within the study boundaries varies from preserve lands to commercial uses. Vast portions of South Florida remain natural, although much of it is disturbed land. The dominant natural features are Everglades National Park and Biscayne National Park, along with Biscayne and Florida Bay and remnant freshwater and coastal wetland and upland systems within and adjacent to the developed areas along the coast. For the most part, urban development is concentrated along the lower east coast of Miami-Dade County. The focus of this analysis is the area that would be directly affected by the proposed actions, primarily the project footprint plus 50 foot easements, and how the proposed action may change existing land uses.

1.5.4.5 Special Status Species

Federally Listed Species

Federally-listed animals that have the potential to utilize the habitat resources of the Tamiami Trail study area include the Everglade snail kite (*Rostrhamus sociabilis*), the wood stork (*Mycteria americana*), the West Indian manatee (*Trichechus manatus latirostris*), the Cape Sable seaside sparrow (*Ammodramus maritimus*), the Florida panther (*Puma concolor coryi*), the eastern indigo snake (*Drymarchon corais couperi*), and the American alligator (*Alligator mississippiensis*). The Florida population of the American crocodile was down-listed from endangered to threatened on March 20, 2007, due to improvements in the species' status. It remains listed as endangered throughout the rest of its range. No known federally-listed plant species occur within the Tamiami Trail study area. Construction activities associated with the proposed project have the potential to affect listed wildlife species and their habitats.

State Listed Species

There are six state-listed avian species of special concern which may utilize habitat resources within the Tamiami Trail study area: tricolored heron (*Egretta tricolor*), snowy egret (*Egretta thula*), little blue heron (*Egretta caerulea*), limpkin (*Aramus guarauna*), roseate spoonbill (*Ajaia ajaja*), and white ibis (*Eudocimus albus*). Additionally, wading bird rookeries containing these species occur within the proposed project corridor. The American alligator (*Alligator mississippiensis*), listed as a species of special concern, and the Everglades mink (*Mustela vison*), listed as threatened, also have the potential to occur along the Tamiami Trail corridor.



Additionally, there are three endangered, five threatened, and one commercially exploited state-listed plant species that have potential to occur within the project area. Construction activities associated with the proposed project have a potential to affect these listed species.

1.5.4.6 Wilderness/Unique Ecosystems

Everglades National Park is the largest designated wilderness area east of the Rocky Mountains (1,296,000 acres). The areas surrounding Tamiami Trail include both designated submerged and terrestrial wilderness (including areas under consideration to be designated as wilderness). The wilderness areas adjacent to the existing project area have the potential to be negatively impacted by construction noise and disturbance.

1.5.4.7 Cultural Resources

Historic Resources

The project study area contains three properties that are eligible for listing on the National Register of Historic Places and one property that is potentially eligible. These properties include Tamiami Trail, Airboat Association of Florida, Coopertown Restaurant and Airboat Rides, and the Miccosukee Osceola Camp. Construction activities associated with the proposed project alternatives have the potential to adversely affect these properties.

1.5.4.8 Visitor Use and Experience

The 10.7-mile section of Tamiami Trail that comprises the project area in Miami-Dade County serves as a gateway not only to visitor recreational opportunities within Everglades National Park, which receives over one million visitors annually, but also to the vast recreational opportunities in the South Florida region. Among the numerous activities available are canoeing/kayaking, fishing, diving, snorkeling, camping, hiking, bicycling, boating/airboating, hunting, frogging, saltwater beach recreating, and wildlife viewing. Additionally, a memorial to the victims of ValuJet Flight 592 is located at the western end of the project corridor. Benefits to visitor use and experience might occur from the proposed project as well as impacts associated with construction activity.

1.5.4.9 Park Management and Operations

Park management and operations refers to the quality and effectiveness of Everglades National Park staff to maintain and administer Park resources and provide for an effective visitor experience. Activities associated with Park management and operations include education and interpretation, maintenance, and enforcement. While no long-term issues are expected to be associated with this project, minor short-term issues might occur during the construction phase of the project. This issue is addressed in Chapter 3 – Affected Environment and Chapter 4 – Environmental Consequences.

1.5.4.10 Noise/Soundscapes

Three noise sensitive sites are located along the proposed project corridor, the Flight 592 Memorial and the Miccosukee Indian Osceola and Tiger Tail camps. The main concern for these noise sensitive locations is that increased traffic associated with improvement to Tamiami Trail would lead to permanent and significant increases in noise.

1.5.4.11 Socioeconomics

This issue includes a discussion of the local economy, demographics, and socioeconomic characteristics of the study area. The people who live in the study area, and the economic



activity, in which they are engaged, comprise important components of the area's total environment. Adverse changes in the health and condition of the natural system could cause negative impacts on the economic system. Conversely, beneficial changes to the natural system could also have a strong positive effect on the economic system.

1.5.4.12 Transportation

The 264-mile section of U.S. Highway 41 known as Tamiami Trail provides a major transportation link between Florida's east and west coast between Tampa and Miami. At present, the highway within the project area handles average annual daily traffic of 5,300 vehicles per day. Major transportation issues associated with the proposed project include the possibility of traffic load increases due to the improvement of Tamiami Trail and traffic delays associated with project construction.

1.5.4.13 Hazardous, Toxic, and Radioactive Waste

A draft Phase 1 Hazardous, Toxic, and Radioactive Waste (HTRW) Assessment for the proposed project was completed in September 2009. The assessment found that four sites – Salem Communications radio tower, Coopertown, Gator Park, and Everglades Safari – located along the project corridor contained hazardous substances. The main concern with the presence of these hazardous substances is that they could migrate through groundwater to the construction zone during project construction activities.

1.5.5 Impact Topics Dismissed from Further Analysis

- **Air Quality:** Everglades National Park is a designated Class I air quality area under the *Clean Air Act*. Lands with this designation are subject to the most stringent air quality regulations. Very limited increases in pollution are permitted in the vicinity. The air quality of the area is a valuable Park resource, enhancing visitation by providing clean air and high visibility to match the unique ecosystem experience. The *Clean Air Act of 1963* (42 USC 7401) requires federal land managers to protect air quality, and the *NPS Management Policies 2006* requires air quality to be analyzed when planning Park projects and activities.

If any of the action alternatives are implemented, emissions generated from transport and construction equipment would be mitigated through the use of best management practices implemented during construction and would not measurably contribute negatively to air quality conditions or adversely affect visitors or staff. Because of the high water table, it is unlikely that large quantities of dust would be generated, and any occurrence of fugitive dust would be localized and very transient. If dust were generated during construction, best management practices (BMPs) for dust suppression would be initiated. Emissions from construction equipment would be kept to a minimum by restricting idling time.

Based on an analysis of fuel used for construction of the project, the level of greenhouse gas emissions produced would range from 1,357 (Alternative 4) to 2,568 (Alternative 6e)⁵ metric tons of carbon equivalent (MTCE). As stated above, best management

⁵ Greenhouse gas emissions based on a calculation of project alternatives fuel usage with the NPS Climate Leadership in Parks (CLIP) tool with a fuel usage rate of one gallon per \$1,000 of construction costs (FHWA Technical Advisory T-5080.3 established fuel usage rate for highway/bridge construction).



practices and mitigation measures would be used to minimize the project's carbon footprint and its contribution to global climate change. When compared to the level of greenhouse gas emissions produced in the nation (approximately 6 billion MTCE in 2007) and the region, the emissions resulting from this project would be negligible and would not substantially contribute to air quality impacts.

Implementation of any of the alternatives described in the plan would have negligible effects on air quality, and the class I air quality status of the Park would be unaffected. Therefore, air quality was not analyzed in detail as a separate impact topic and was dismissed from detailed analysis in this EIS.

- **Archaeological Resources:** Studies for archaeological resources were conducted as part of the 2005 RGRR/SEIS to survey potential archaeological sites that might be present within the proposed project area. This work was conducted to comply with Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended, and the Archaeological and Historic Preservation Act of 1974. Background research was conducted at the Florida Master Site File, the Florida Collection of the Florida State Library. Additional literature was examined at the University of Florida libraries, the Miami-Dade Public Library, and the Historical Museum of Southern Florida. The archaeological survey consisted of visual examinations and limited shovel testing along the right-of-way of the Tamiami Trail. No archaeological resources were identified within the study area and no known archaeological resource exist within the study area.

To avoid damage to previously unknown archaeological resources, archaeological surveys and testing activities in previously un-surveyed and/or undisturbed areas would be conducted prior to ground-disturbing activities. If any resources are encountered, mitigation of project impacts (in consultation with appropriate agencies) or adjustment of the project design would take place to avoid or limit the adverse effects on prehistoric and historic archaeological resources. Stop-work provisions would be included in the construction documents should archaeological or paleontological resources be uncovered. If previously unknown archaeological resources are discovered, work would be stopped in the area of any discovery and the NPS would consult with affiliated tribes, pursuant to NAGPRA and the *Draft Park NAGPRA Plan of Action for Inadvertent Discoveries, Everglades National Park and Associated Tribes* (May 2008). However, it should be noted there is a low probability that the project area contains undiscovered archeological resources.

- **Conflicts with Land Use Plans:** The actions included in this EIS are compatible and not in conflict with local land use plans because the project seeks to restore environmental conditions. Therefore, this topic was not analyzed in detail in this EIS.
- **Cultural Landscapes:** According to the National Park Service's Director's Order 28: *Cultural Resource Management Guideline*, a cultural landscape is:

A reflection of human adaptation and use of natural resources and is often expressed in the way land is organized and divided, patterns of settlement, land use, systems of circulation, and the types of structures that are built. The character of a cultural landscape is defined both by the physical materials, such as roads, buildings, walls, and vegetation, and by use reflecting cultural values and traditions.

There are no designated cultural landscapes in the Tamiami Trail area of Everglades National Park. Therefore, there would be no impacts to cultural landscapes and this issue was not analyzed in detail as a separate topic in this EIS.



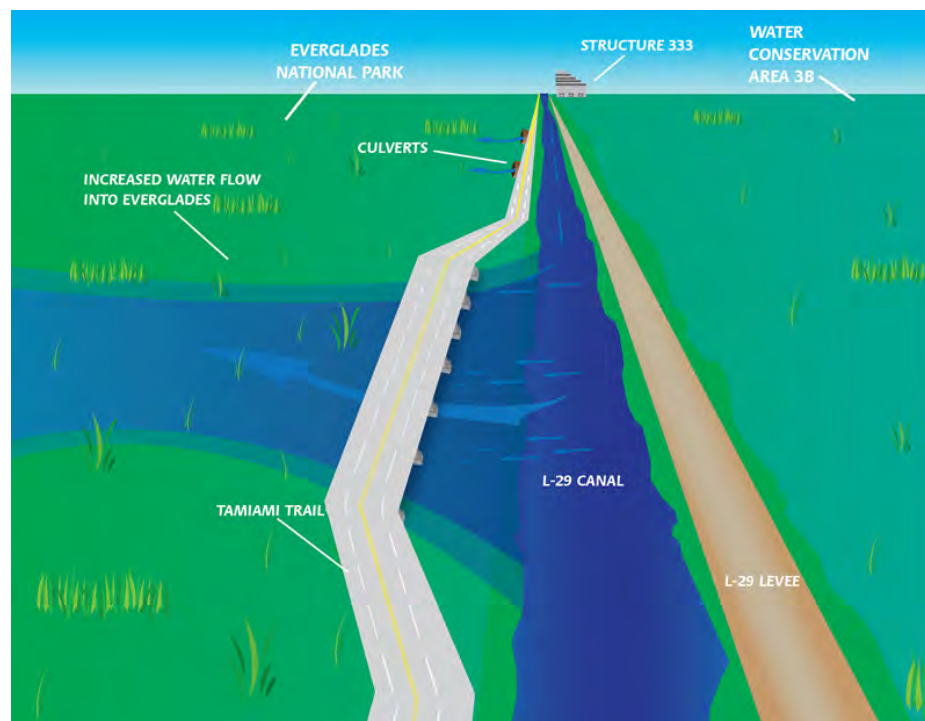
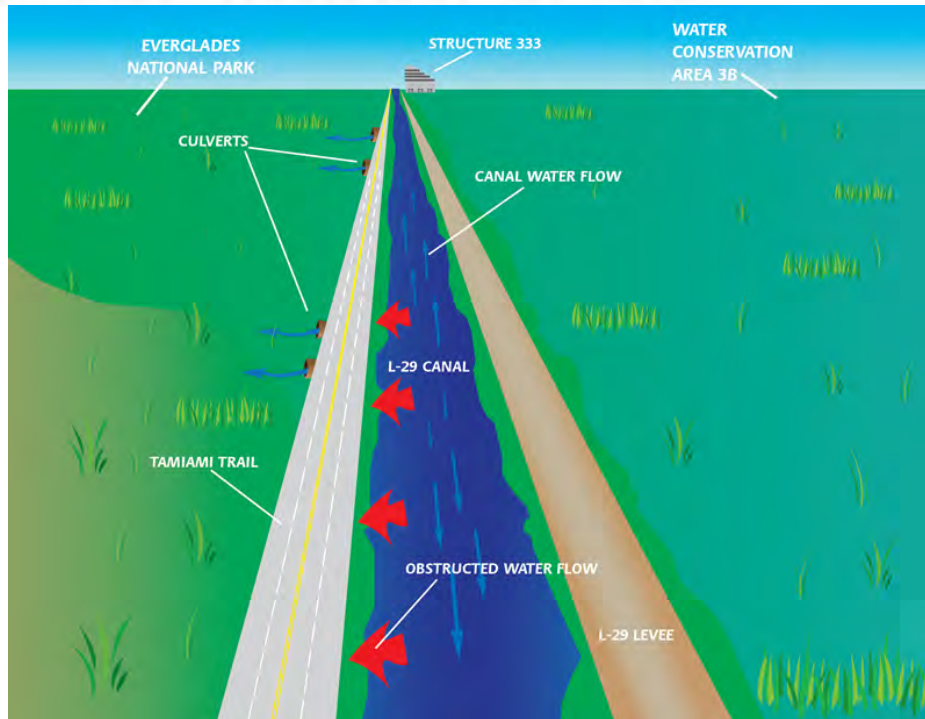
- **Ecologically Critical Areas:** Everglades National Park does not contain any designated ecologically critical areas, wild and scenic rivers, or other unique natural resources, as referenced in 40 Code of Federal Regulations (CFR) 1508.27. Therefore, this issue was not analyzed in detail as a separate impact topic in the EIS.
- **Energy Requirements and Conservation Potential:** There would be no permanent energy requirements from the implementation of the project. Energy requirements during construction would be negligible to minor, short-term, and temporary. Therefore, this issue was not analyzed in detail as a separate topic in this EIS.
- **Environmental Justice:** Executive Order 12898, “General Actions to Address Environmental Justice in Minority Populations and Low-Income Populations,” requires all federal agencies to incorporate environmental justice into their missions by identifying and addressing disproportionately high and adverse human health or environmental effects of their programs and policies on minorities and low-income populations and communities. No alternative would have health or environmental effects on minorities (including American Indian tribes) or low-income populations or communities as defined in the Environmental Protection Agency’s *Environmental Justice Guidance* (1998). Therefore, environmental justice was not analyzed in detail as a separate topic in this EIS.
- **Ethnographic Resources:** As defined by the NPS *Management Policies 2006*, ethnographic resources are the cultural and natural features of the Park that are of traditional significance to traditionally associated peoples. These peoples are the contemporary Park neighbors and ethnic or occupational communities that have been associated with the Park for two or more generations (40 years), and whose interests in the Park’s resources began before the Park’s establishment. Ethnographic resources can include sacred sites that have spiritual and religious significance to tribes and other traditionally associated groups, and may serve as the locations of ceremonial activities. The history of Everglades National Park includes settlement and the use of waters for fishing for both sustenance and profit by both Native Americans and early settlers to the area. The Miccosukee and Seminole tribes claim the Everglades as a homeland and traditional use area before the Park’s establishment. Fishing for subsistence and profit has occurred at the Park since the early 1900s and may be considered an ethnographic use. However, since the law prohibits commercial fishing, this ethnographic use has been terminated. Project actions would not interfere with any other ethnographic uses. Due to the location, minimal construction footprint of the project, and alternative access routes during construction, impacts from construction, if any, to ethnographic resources would be negligible. Therefore, this issue was not analyzed in detail as a separate impact topic in the EIS.
- **Indian Trust Assets:** Indian trust assets are owned by American Indians but held in trust by the United States. Requirements are included in the Secretary of the Interior’s Secretarial Order No. 3206, “American Indian Tribal Rites, Federal – Tribal Trust Responsibilities, and the Endangered Species Act,” and Secretarial Order No. 3175, “Departmental Responsibilities for Indian Trust Resources.” According to Park staff, Indian trust assets do not occur within Everglades National Park. There are no Indian trust resources in the project area. Thus, this issue was not analyzed in detail as a separate topic in this EIS.



- **Museum Collections:** There are no museum collections in the project area that would be affected by the implementation of the project. Therefore, this issue was not analyzed in detail as a separate topic in this EIS.
- **Natural or Depletable Resource Requirements and Conservation Potential:** The NPS uses sustainable practices to minimize the short- and long-term environmental impacts of development and other activities through resource conservation, recycling, waste minimization, and the use of energy-efficient and ecologically responsible materials and techniques. Project actions would not compete with dominant Park features or interfere with natural processes, such as the seasonal migration of wildlife or hydrologic activity associated with wetlands. Therefore, this issue was not analyzed in detail as a separate topic in this EIS.
- **Night Sky:** Since lighting is not a component of any of the action alternatives and construction activities are anticipated to occur only during daylight hours, no impacts to night sky would occur. Therefore, night sky was not analyzed in detail as a separate impact topic in this EIS.
- **Prime or Unique Farmland:** Prime farmland has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops. Unique agricultural land is land other than prime farmland that is used for production of specific high-value food and fiber crops. Both categories require that the land is available for farming uses. Lands within the Park are not available for farming and therefore do not meet the definitions. Therefore, this issue was not analyzed in detail as a separate impact topic in this EIS.
- **Public Health and Safety:** There is no anticipated increase in traffic associated with the project. Additionally, construction of bridges and roadways would be required to meet Federal Highway Administration and FDOT safety design standards. Therefore, this issue was not analyzed in detail as a separate impact topic in this EIS.
- **Urban Quality and Gateway Communities:** Although Homestead, Florida City, and the Redland area of South Miami-Dade County are located adjacent to the Park and provide food and lodging for a number of Park visitors, these communities are not officially designated gateway communities for the Park and would not be impacted by the proposed action alternatives. Therefore, this issue was not analyzed in detail as a separate topic in this EIS.



EVERGLADES NATIONAL PARK TAMIAMI TRAIL MODIFICATIONS: NEXT STEPS DRAFT ENVIRONMENTAL IMPACT STATEMENT



CHAPTER 2: ALTERNATIVES

2.1 Development of the Alternatives

Guiding Regulations and Policies

NEPA implementing regulations provide guidance on the consideration of alternatives in an EIS. These regulations require the decision-maker to consider the environmental effects of the proposed action, including “no action”, on a range of alternatives (40 CFR § 1502.14). The range of alternatives includes reasonable alternatives that must be rigorously and objectively explored, as well as other alternatives that are eliminated from detailed study. To be “reasonable,” an alternative must meet the stated purpose of and need for the project. Project alternatives may originate from the proponent agency, local government officials, or members of the public, at public meetings, or during the early stages of project development. Alternatives may also be developed in response to comments from coordinating or cooperating agencies. The alternatives analyzed in this document, in accordance with NEPA, are the result of internal scoping and public scoping.

The purpose of including a No-Action Alternative in the environmental analysis is to ensure that agencies compare the potential impacts of the proposed action to the known impacts of maintaining the status quo. Current conditions are used as a benchmark. By using the current conditions as the No-Action Alternative, impacts of the proposed alternatives could be directly compared to the existing baseline.

The No-Action Alternative represents the current conditions present in the project area. Action alternatives considered in this EIS were developed by the NPS and input by the public during project scoping. The collective efforts of these individuals in documenting the requirements for the project formed the basis for development of the proposed action alternatives, including the Preferred Alternative.

The Preferred Alternative represents the NPS proposed action and defines the rationale for the action in terms of resource protection and management, visitor use and operational use, and other applicable factors.

NEPA regulations require that the action proponent assess means to mitigate adverse environmental impacts associated with implementation of the proposed alternatives (40 CFR § 1502.16). Each alternative analyzed in this EIS includes mitigation measures intended to reduce the environmental effects of restoring connectivity and flow in the Northeast Shark River Slough. Mitigation measures, such as Best Management Practices and Standard Operating Procedures that would be implemented under any of the proposed actions are included in the description of the alternatives.

Alternative Development History

In 1989, Everglades National Park was expanded by adding the Northeast Shark River Slough, called the “East Everglades Expansion Area” of 107,600 acres. Plans to improve water flows into the Northeast Shark River Slough began – a program called Modified Water Deliveries (MWD) or “Mod Waters.” While that work was developing, the separate and far broader Everglades restoration initiative, called the “Restudy,” began in 1992, and became CERP after acceptance by Congress in 2000. Research on flows in the pre-drainage Everglades, using the “Natural System Model” developed for CERP, showed that the eastern half of the Shark River Slough, including Northeast Shark River Slough, had originally carried 65% of the Everglades flows, with only 35% on the western half. Conversely, the routing established by the C&SF Project put 78% of modern flows to the west, and only 22% through Northeast Shark River



Slough. The intent of the current Alternative Development Report is to find solutions that would allow the full extent of Everglades Restoration to be realized without the Tamiami Trail being a limiting factor on the flows to and through Northeast Shark River Slough that are needed to restore ecological functions in Everglades National Park. As such, the effort is neither CERP nor MWD, but seeks ecological benefits within the context of future CERP projects so that modifications to the Trail would only need to be made once.

Alternatives for water conveyance from the L-29 canal across the Tamiami Trail were first evaluated in a General Reevaluation Report and Supplemental Environmental Impact Statement (GRR/SEIS) in 2003. The 2003 Preferred Plan was a 3,000 foot bridge in combination with raising the un-bridged roadway segment. In 2005, a revision of the 2003 GRR/SEIS (called the RGRR/SEIS) analysis was performed to re-evaluate the 2003 GRR/SEIS and additional alternatives. Subsequently nine (9) alternatives and the no-action alternative were retained for detailed analysis. The 2005 Recommended Plan was Alternative 14 (two-mile long bridge at the western region of the project area and a one-mile long bridge at the eastern end). The total project cost was estimated at approximately \$144 Million. A Record of Decision selecting Alternative 14 was signed on January 25, 2006. However, when rapidly rising costs of fuel and raw materials greatly increased the project cost estimate, Congress in 2007 directed the USACE to re-evaluate the 2005 Recommended Plan as well as develop less costly alternatives. In developing these alternatives, the USACE was directed to increase flows to the Park of at least 1,400 cubic feet per second, without significantly increasing the risk of roadbed failure. USACE prepared a Limited Reevaluation Report and Environmental Assessment (LRR/EA) in 2008. For this report, the USACE considered 27 options including No-Action and the 2005 RGRR plan (Alternative 14). It was determined that the best performing and most cost-effective plan was Alternative 3.2.2.a. This alternative combines a one-mile bridge in the eastern location with raising the stage constraint at L-29 by one foot, to 8.5 feet, and providing road mitigation to this level. The cost for this tentatively selected plan is \$225.4 million. The tentatively selected plan developed in the LRR/EA was accepted by and adopted in a Record of Decision.

The 2009 Omnibus Appropriations Act directed the Corps to immediately begin construction of Alternative 3.2.2a (construction should be completed within 3 years). However, considering that the modifications to the Tamiami Trail contained in the 2008 LRR/EA would provide less than half (1,400 to 1,800 CFS) of the flow volume target contained in the original 1992 GDM (4,000 CFS), the 2009 Omnibus Act authorizes the Department of the Interior “to immediately evaluate the feasibility of additional bridge length, beyond that to be constructed pursuant to the Modified Water Deliveries to Everglades National Park Project (16 U.S.C. § 410r-S), including a continuous bridge, or additional bridges or some combination thereof, for the Tamiami Trail to restore more natural water flow to Everglades National Park and Florida Bay and for the purpose of restoring habitat within the Park and the ecological connectivity between the Park and the Water Conservation Areas” (2009 Omnibus Appropriations Act).

Additionally, the culvert analysis in the 2005 RGRR/SEIS indicates the hydraulic head required to deliver desired quantities of water has detrimental impacts to both Tamiami Trail and more importantly WCA-3B. This increased head would require that Tamiami Trail be raised higher than proposed, with only the culvert sets to convey water. In addition, the compounded head loss from the culvert sets and the S-355’s would result in higher stages and longer durations within WCA-3B, causing detrimental impact to the ecosystem within this area. The other limitation of the culvert sets is that they provide only point source discharge in an area where the goal of the project is to restore historic sheet flow. The ultimate goal for the restoration of the Greater Everglades Area is to make man-made features (such as roads, levees, canals, etc.) transparent to the movement of water (2005 RGRR/SEIS). Since the purpose of this project is to



remove barriers to sheet flow and provide for increased ecological connectivity between marshes in ENP and marshes in WCA-3B, the NPS determined that a culvert-only alternative for this project was inconsistent with the project purposes and objectives.

Therefore, the NPS has developed a range of alternatives that would expand the 2008 LRR/EA plan to include more bridge length and a No-Action Alternative for evaluation in this EIS.

2.2 Project Alternatives

Based on the previous preliminary analysis including the 2005 RGRR/SEIS and 2008 LRR/EA, internal scoping with the NPS, and the public input related to the proposed project, the following alternatives were carried forward for analysis in the EIS. For reference, figures depicting the bridge locations associated with each of the alternatives are included for review at the end of Chapter 2.

Six action alternatives were identified for detailed engineering evaluation and comparative analysis. The 2005 RGRR/SEIS was used as the basis for developing the initial suite of alternatives. These alternatives were renamed later for ease of use. Through further discussion and refinement other project alternatives emerged and if they were small adjustments to an existing alternative there were given a lower case letter designation (e.g. a, b, or c) depending on the order in which they were developed.

All alternatives include bridge construction and reconstruction of the remaining highway, with differences being in the bridge or ConSpan (prefabricated culvert) lengths and locations. The bridge typical sections would satisfy current FDOT standards and be uniform throughout their entire lengths.

The existing Tamiami Trail roadway embankment would be removed from the areas where the bridges would be constructed. The remaining highway embankment would be reconstructed to raise the crown elevation to 12.3 feet, the minimum required based on the design high water of 9.7 feet and the roadway cross section geometry. To meet current FDOT standards for roadway geometry, the higher profile of the roadway would result in a wider roadbed than currently exists. Therefore, expansion of the highway footprint southward would be necessary to avoid impacting the L-29 Canal.

Access facilities, such as ramps to the bridge or elevated roadway, would be provided for existing facilities. The maintenance of traffic and construction sequence for the bridge and roadway would be based on the best balance of traffic safety, environmental impacts, and construction cost and duration.

Staging areas for construction equipment and materials may be located at business sites along the corridor. Staging and other functions may also require use of the existing shoulder for temporary periods. Additional staging areas may be necessary near the eastern end of the corridor. This project would generate a large quantity of material excavated from the road bed that could be disposed or recycled for use in other area projects. One disposal site, Rocky Glades, which is owned by SFWMD, is approximately 15 to 20 miles from the construction site. Selected quantities of soils and organic peat may be evaluated for placement in the nearby Broward Water Preserve Area. Asphalt material could be used in other road beds. Excavated fill could be used for backfilling the levee for the L-67 Extension project, where up to 50,000 cubic yards of material could be needed. Storing and recycling material could reduce hauling and disposal costs, as well as provide cost savings on other projects where this type of material is needed. Additionally, FDOT may consider some of the excavated material to be “salvageable materials” that could be used by FDOT for other purposes.



2.2.1 No-Action Alternative

The No-Action Alternative is authorized by the 2008 Limited Reevaluation Report/Environmental Assessment and consists of construction of a 1-mile eastern bridge with the remaining road raised to allow an increase in the allowable stage in L-29C from 7.5 ft-NGVD to 8.5 ft-NGVD.

All of the following action alternatives assume the 1-mile eastern bridge (2008 LRR) has been constructed. The lengths of the bridges, transition areas between the bridges and the roadway, and the roadway are separated in the descriptions. Please note that Alternative 3 was eliminated per direction of the USACE.

2.2.2 Action Alternatives

2.2.2.1 *Alternative 1 – 2.2 Miles of Bridges*

This alternative includes 4 bridges (for a total of 2.2 miles of bridges): a 0.56-mile bridge (Bridge A1) located between the Osceola Camp and the Lincoln Financial Radio Tower; a 0.45-mile (Bridge B1) located between the Lincoln Financial Radio Tower and Everglades Safari Park facility; a 0.51-mile bridge (Bridge C1) located between the Everglades Safari Park facility and Frog City; a 0.38-mile bridge (Bridge E1) located between Frog City and Gator Park; and a 0.26 ConSpan (ConSpan H1) located just west of Coopertown, at control structure S-355B. The bridges and ConSpan would create a conveyance opening through Tamiami Trail by removing the sections of the existing highway and embankment. The bridges would be constructed approximately 50 feet south of the centerline of the existing roadway to maintain motor vehicle traffic during bridge construction. The remaining highway embankment (approximately 4.99 miles) would be reconstructed to raise the crown elevation to 12.3 feet, the minimum required based on the design high water of 9.7 feet and the roadway cross section geometry. Please refer to **Table 2-1** and **Figure 2-1** for details.

2.2.2.2 *Alternative 2a – 3.3 Miles of Bridges*

The bridge configurations include: (1) a 0.56 mile bridge located between the Osceola Camp and the Lincoln Financial Radio Tower, (2) a 0.45 mile bridge located between the Lincoln Financial Radio Tower and Everglades Safari Park, (3) a 0.51 mile bridge located between Everglades Safari Park and the Airboat Association, (4) a 0.38 mile bridge located the Airboat Association and the Tiger Tail Camp, (5) a 0.26 mile ConSpan located between the Coopertown facility and the Salem Communications radio tower, (6) a 0.53 bridge located between the Salem Communications radio tower and the existing one-mile bridge and , (7) a 0.66 mile bridge located between the existing 1-mile bridge and the S-334 structure.

Alternative 2a would involve creating conveyance openings through Tamiami Trail by removing 3.3 miles of the existing highway and embankment. Bridges would be constructed approximately 50 feet south of the centerline of the existing roadway to maintain motor vehicle traffic during bridge construction. The remaining highway embankment would be reconstructed to raise the crown elevation to 12.3 feet, the minimum required based on the design high water of 9.7 feet and the roadway cross section geometry. Please refer to **Table 2-1** and **Figure 2-2** for details.

2.2.2.3 *Alternative 4 – 1.0 Mile of Bridges*

This alternative includes 2 bridges: A1 and B1 (for a total of 1.0 mile), as described for Alternative 1. The bridges would create a conveyance opening through Tamiami Trail by removing the sections of the existing highway and embankment. The bridges would be constructed approximately 50 feet south of the centerline of the existing roadway to maintain motor vehicle traffic during bridge construction. The remaining highway embankment



(approximately 7.80 miles) would be reconstructed to raise the crown elevation to 12.3 feet, the minimum required based on the design high water of 9.7 feet and the roadway cross section geometry. Please refer to **Table 2-1** and **Figure 2-3** for details.

2.2.2.4 *Alternative 5 – 1.5 Miles of Bridges*

Alternative 5 consists of 3 bridges; bridges A1, B1, and C1 (for a total of 1.5 miles) as described for Alternative 1. The bridges would create a conveyance opening through Tamiami Trail by removing the sections of the existing highway and embankment. The bridges would be constructed approximately 50 feet south of the centerline of the existing roadway to maintain motor vehicle traffic during bridge construction. The remaining highway embankment (approximately 6.57 miles) would be reconstructed to raise the crown elevation to 12.3 feet, the minimum required based on the design high water of 9.7 feet and the roadway cross section geometry. Please refer to **Table 2-1** and **Figure 2-4** for details.

2.2.2.5 *Alternative 6e – 5.5 Miles of Bridges*

Alternative 6e is the maximum bridging option and consist of 5.5 miles of bridges and elevating the remaining roadway. The bridge configurations include: (1) a 2.60 mile bridge located between the Osceola Camp and the Airboat Association, (2) a 0.4 mile bridge located between the Airboat Association and the Tiger Tail Camp, (3) a 1.8 mile bridge located between the Tiger Tail Camp and the existing one-mile bridge, and (4) a 0.7 mile bridge located between the existing 1-mile bridge and the S-334 structure. The bridges would create a conveyance opening through Tamiami Trail by removing the sections of the existing highway and embankment under the bridges. The bridges would be constructed approximately 50 feet south of the centerline of the existing roadway to maintain motor vehicle traffic during bridge construction. The remaining highway embankment would be reconstructed to raise the crown elevation to 12.3 feet, the minimum required based on the design high water of 9.7 feet and the roadway cross section geometry. Please refer to **Table 2-1** and **Figure 2-5** for details.

Down Ramps. Bridge down ramp (access ramp) options were also developed for the purpose of maintaining access to Everglades Safari and Coopertown for Alternative 6e. Four down ramp options were developed for Everglades Safari. Option 4 (Modified Parallel Down Ramp) was selected as the preferred option. Five down ramp options were developed for Coopertown. Option 5 (Parallel Down Ramp with Existing Frontage Road) was selected as the preferred option.

The bridge down ramp typical section includes two 12-foot travel lanes with 5-foot shoulders and outside barriers. Radii of 50 feet are provided between the access road and Tamiami Trail travel lanes. These connections provide access from the bridged areas to properties south of the existing Tamiami Trail roadway. The down ramps were considered as frontage road connections with the same design criteria as collector streets. The elevated portion of the down ramps will be girder bridges supported on pile bents. Varying span lengths will be used to support the ramps along curves.



Table 2-1 – Action Alternative Comparison

Evaluation Criteria	Alt. 1	Alt. 2a	Alt. 4	Alt. 5	Alt. 6e
Roadway at 12-foot offset (feet)	27,820	17,992	40,060	34,783	13,928
Alignment Transitions (feet)	11,280	16,210	5,080	7,680	9,560
Bridge (feet) ⁶	10,016	16,262	5,354	8,031	28,354
Precast Arch-Type Bridge Culverts (feet) ⁷	1,378	1,378	0	0	0
Total Length (feet)	50,494	51,842	50,494	50,494	51,842
Total Length (miles)	9.56	9.82	9.56	9.56	9.82
Number of Bridges	4	6	2	3	4
Number of Precast Arch-Type Bridge Culverts	1	1	0	0	0
Number of Down Ramps	0	0	0	0	2
Estimated Total Project Cost (x \$1 million)	\$198.5	\$219.0	\$155.3	\$172.7	\$329.8

2.2.3 Elements Common to All Action Alternatives

Several of the elements proposed as a part of this project would be common to all the alternatives considered, excluding the No-Action Alternative. These elements are described below.

- **Roadway Typical Section:** The typical section consists of two 12-foot wide travel lanes, 5-foot paved shoulders on each side of the roadway, and 6.5-foot grassed shoulders along the outside of the paved shoulders, aligned with the proposed roadway centerline. The travel lanes are on a 2% cross slope and the shoulders are on a 6% cross slope. Guardrail is present along both sides of the roadway for the length of the project. See **Appendix A – Engineering Report** for (Plates C-1) for the proposed typical section. No dedicated left turn lanes, dedicated passing lanes, median buffers, or roadway lighting are proposed.
- **Alignment Transition:** The roadway alignment transition typical section includes two 12-foot wide travel lanes, 5-foot paved shoulders on each side of the roadway and 6.5-foot grassed shoulders along the outside of the paved shoulders, aligned with the proposed centerline. The majority of the alignment transitions are on a 2% cross slope and the shoulders are on a 6% cross slope. Some transitions are super-elevated to shorten their length to maintain access to existing private parcels. Super-elevated transitions are on a

⁶ Structures identified as bridges are 47.08 feet wide with a clear distance of 44.00 feet between inside parapet faces. The bridges include two 12-foot travel lanes with 10-foot shoulders and outside barriers. Both the travel lane and shoulder are on a 2% cross slope. The structural system for the proposed bridge structures is based on the least cost structure identified in Appendix D of the 2005 RGR/SEIS. The proposed bridge structures are Florida Bulb Tee (FBT) 72 beams with a composite CIPC deck, supported on pile bents at 99.15-foot spacing using 24-inch square precast prestressed concrete piles in to rock.

⁷ Structures identified as precast arch-type bridge culverts are 48 feet wide with a clear distance of 46 feet between inside faces of the spandrel walls and a 9.05-foot vertical rise. The arches are supported on CIPC footings socketed into the bedrock. The typical road section of two 12-foot travel lanes with 10-foot shoulders sits on subgrade above the arches.



2.5% maximum cross slope and the shoulders are on a 4.5% and 6.0% cross slope on high side and low side, respectively. Crowned alignment transitions are 1,850 feet long and super-elevated alignment transitions are 1,250 feet long from begin of super-elevation transition to begin of structure. See **Appendix A** – Engineering Report for (Plates C-3 and C-4) for normal crown and super-elevated alignment transition details.

- **Pavement Design:** The flexible pavement design is based on future traffic loading and the new embankment subgrade Resilient Modulus (Mr). The open-to-traffic date is assumed to be 2018, with a planning horizon year of 2038. Using a linear project based on the last 10 years of the Average Annual Daily Traffic (AADT), the 2018 AADT is estimated to be 5,800 and the 2038 AADT is estimated to be 7,200. 2038 traffic statistics were estimated as follows: K30=8.07%, D30=66%, T=11.5%, LOS=B. This level is considered acceptable for this facility. The Equivalent 18-kip Single Axle Load (ESAL) is 4.9 million, based on the 2038 traffic projection, 90% reliability and a 0.96 factor for rural arterials. A design Mr of 12,000 pounds per square inch (psi) was used for new embankment material as this is the Mr used for the new embankment material for the base condition. The Mr was reduced by 25% to 9,000 psi as discussed in the 2008 FDOT Flexible Pavement Design Manual for 2-foot base clearance. Three-foot base clearance could be used with no reduction in Mr, but would require additional ROW at all roadway and alignment transition sections. The proposed pavement design uses two-foot base clearance. A pavement section Structural Number (SN) of 4.20 is required for a 20-year forecast 4.9 million ESAL, a subgrade Mr of 9,000 psi (for new A-1 or A-3 embankment material) and 90% reliability. The proposed pavement design provides a SN of 4.30. The pavement design, including separate shoulder requirements, would be refined during the PED phase. The recommended resurfacing interval for this pavement section is 10 years, at the low end of the 10 to 15-year interval typical in Florida. The typical pavement section for new construction consists of:
 - ¾" Friction Course FC-5 (Traffic C)
 - 3½" Type SP Structural Course (Traffic C), SN = 1.54
 - 10" Limerock (OBG 9), LBR 100, SN = 1.8
 - 12" Type B, LBR 40, SN=0.96
 - A-1 or A-3 Embankment, (Design Mr = 9,000 psi).
- **Right-of-Way:** Within the project limits, the majority of the existing ROW width varies from 58 feet to 75 feet. The existing ROW widens to 95 feet for approximately 450 feet at the west end of the project. The existing ROW offset from the existing centerline is 32 feet to 45 feet on the north and 24 feet to 30 feet on the south. For the roadway, the existing ROW to the south ranges from 24 to 30 feet from the roadway centerline, with an average of approximately 29 feet. As a result of raising the road, the average proposed ROW would increase to 23.5 feet beyond the existing average (i.e. 52.5 feet from the existing roadway centerline). The raised roadway includes a proposed ROW that ranges from 15.4 to 23.5 feet beyond the existing ROW. The bridges include a proposed ROW that is approximately 43 feet beyond the existing ROW. The roadway alignment transitions include a proposed ROW that varies from 15.4 to 76.5 feet beyond the existing ROW. The roadway and bridge approach sections would require a 10-foot Temporary Construction Easement (TCE) on the south side of the roadway. The bridges and precast arch-type bridge culverts would require a 50-foot TCE. All TCE's would be restored to original condition upon completion of construction activities.



- **Waste Management:** Waste is primarily expected to be generated from servicing and maintenance of equipment. This waste is expected to be maintained in the construction area. Portable toilets would be arranged and placed at the construction area. The waste from the portable toilets would be pumped out, removed from the Park and disposed of at an appropriate disposal facility.
- **Sediment and Turbidity Control:** Construction procedures would include the use of BMPs to contain disturbed sediments and reduce water quality impacts. A turbidity monitoring plan would be implemented during construction to ensure continued compliance with State water quality criteria.
- **Construction Monitoring:** Anticipated monitoring during construction would include water quality monitoring and monitoring for protected wildlife species. Anticipated long-term monitoring/maintenance would include roadway/bridge monitoring for maintenance activities conducted by the FDOT.
- **Construction:** Roadway construction would be phased. Maintenance of Traffic (MOT) for this project involves construction of temporary pavement on the existing westbound shoulder to maintain two-way traffic during construction. Once traffic is shifted to the proposed roadway, the existing pavement would be demolished.

2.3 Performance Measures

The NPS, along with a multi-agency team comprised of state and federal agencies, considered the 13 performance measures reviewed in the 2005 RGRR/SEIS, and excluded those below from further consideration in this study due to the identified reasons.

- No hydrologic data were available for the new alternatives for the following performance measures:
 - Average Annual Flow Volumes
 - Shift to open water, spikerush marsh, and slough communities in Northeast Shark River Slough
 - Risk of ridge and tree island peat burning in Northeast Shark River Slough
 - Invasion of exotic woody plant species
 - Total abundance of fishes in ENP marshes
 - Conditions for wading bird foraging and nesting (note: this performance measure was tied closely to the abundance of fish and thus was also removed)
- No new Resource Management Associates (RMA) modeling was available for the following performance measures:
 - Proportion of area with low flow velocity (<0.1 f/s) discharges within one mile of the Tamiami Trail
 - Distribution of flows, east to west [this is largely affected by lengths of opening(s) in Tamiami Trail]

The NPS also considered the performance measures which were used in the 2008 LRR/EA that had not been in the 2005 RGRR/SEIS, excluding those below from further consideration in this study due to the identified reasons.



- No hydrologic data were available for the new alternatives for the following performance measures:
 - One-in-ten year maximum discharge
 - Number of days water depth greater than two feet during wet season peak
 - Number of days water depth greater than three feet during peak wet season
 - Average water depth during wet season peak

Two performance measures from the 2005 RGRR/SEIS, which were revised for the 2008 LRR/EA, were used again for this study, with minor modifications:

- Reverse filling in of sloughs changed to “Number of sloughs crossed by each alternative”
- Flows from L-29 Canal into deep sloughs of Northeast Shark River Slough changed to “Flows into Northeast Shark River Slough provided via bridge”

One performance measure introduced in the 2008 LRR/EA was incorporated into this study:

- Reduction in Wildlife Mortality

The eight performance measures used in the “Choosing by Advantages” (CBA) analysis address important characteristics of ENP: connectivity, ridge and slough processes, flows, velocity, wildlife resources, cultural resources (roadway), cultural resources (historic properties), and wetlands. These eight performance measures reflect differences among alternative bridge lengths, locations, and openings. In addition, all performance measures represent potential benefits or impacts of the structural alternatives. See **Appendix B** for the Value Analysis / Choosing By Advantages Report.

A brief description of each of the eight performance measures is provided below, including what they represent, how they were developed, the input information, units of measure, targets, and the methods of calculation or estimation of values.

1. Potential connectivity of Water Conservation Area 3B marsh and Northeast Shark River Slough as percent of total project length.
2. Number of sloughs crossed by each alternative.
3. Flows into Northeast Shark River Slough provided via bridge.
4. Difference between average velocity in marsh and average velocity at road.
5. Reduction in wildlife mortality.
6. Impacts to Tamiami Trail as a cultural resource.
7. Impacts to historic properties.
8. Impacts to wetlands.

The “bridge length” as described in this section includes the one-mile of bridging associated with the No-Action Alternative. Throughout much of the rest of the EIS, the one mile of bridge length is not included. In addition, it is recognized that in some instances the “opening length” for any alternative might be slightly smaller than the “bridge length” used in this analysis (due to ramping configurations and/or inclusion of ConSpans). Although this discrepancy has been recognized, this difference is not significant and would not change the alternative analysis.

2.3.1 PM-1 – Potential connectivity of Water Conservation Area 3B marsh and Northeast Shark River Slough as percent of total project length

This performance measure describes the potential connection between WCA-3B and Northeast Shark River Slough if the L-29 Levee is removed under a future project. It is calculated by



dividing the length of bridge opening in miles by 10.7 miles, the length of the longest possible bridge that could be constructed in the project area.

A 100 percent value indicates full *potential* connectivity and is the target. Note that this marsh to marsh connectivity would also require degrading the L-29 Levee that encloses the WCA-3 impoundments. Degrading L-29 is not authorized under this project.

Table 2-2 – Potential Connectivity of Water Conservation Area 3B Marsh and Northeast Shark River Slough as Percent of Total Project Length

Alternative	Bridge Length (miles)	Connectivity Performance Measure Score
No-Action	1.0	9%
1	3.2	30%
2a	4.3	40%
4	2.0	19%
5	2.5	23%
6e	6.5	61%

2.3.2 PM-2 – Number of sloughs crossed by each alternative

This performance measure is related to the alignment of the bridge with existing degraded sloughs south of Tamiami Trail. Since the Tamiami Trail was constructed, sediment has accumulated in the sloughs downstream of the road. Situating a bridge directly upstream of the degraded slough would maximize the potential for storm flow velocities to maintain the sloughs through removal of the accumulated organic sediment. The length of the bridge has relevance only to the extent that it can encompass more sloughs within its flow cross-section.

The method used for estimating the number of sloughs crossed is based on the premise that the locations of the 19 sets of culverts were placed to match natural flow-ways. McVoy states in his swales report (McVoy et al., in press) that the locations of the 19 sets of culverts were "apparently placed to match the natural flow ways." The performance measure is evaluated by counting the number of culverts that each bridge alternative crosses. Culverts located in the approach areas were not counted. The target for this performance measure is 19, the total number of culverts under Tamiami Trail. This method differs from the 2005 RGRR/SEIS and 2008 LRR/EA analyses of this performance measure in which the High Accuracy Elevation Data (HAED) data was used to estimate the number of sloughs crossed by Tamiami Trail. Due to the locations of the alternatives in this study, the culverts were a better method to estimate the number of historic sloughs crossed by each alternative.



Table 2-3 – Number of Sloughs Crossed by Each Alternative

Alternatives	Bridge Length (miles)	Number of Sloughs Crossed
No-Action	1.0	1
1	3.2	5
2a	4.3	6
4	2.0	2
5	2.5	4
6e	6.5	10

2.3.3 PM-3 – Flows into Northeast Shark River Slough Provided via Bridge

While the existing culvert sets provide a hydraulic connection to the deeper sloughs existing within Northeast Shark River Slough, the capacity is not commensurate with the amount of flow expected in these deeper sloughs during both high and low flow conditions. Preferential flow through these deeper sloughs is even more pronounced during drier times.

The eastern portion of Shark Slough (from the L-67 extension to the L-31N Levee) varies in elevation from about 5.6 feet National Geodetic Vertical Datum (NGVD) to 7.2 feet NGVD. Without the obstruction of Tamiami Trail, the preferential flow path from this varying elevation would be in the deeper sloughs. The distribution of flow within Northeast Shark River Slough would become more uniformly distributed (from west to east) as depth increases and the relative depth differences reduce.

Average and High Flow Conditions

The stages in Northeast Shark River Slough range from about 4 feet NGVD (about two feet below ground surface) to 9 feet NGVD with a median stage of about 7.5 feet NGVD. Ground elevations vary along Tamiami Trail. The median stage of 7.5 feet NGVD results in an average water depth of about 1.1 feet with a maximum depth of about 1.9 feet and a minimum depth of about 0.3 feet.

The increased connection provided by the bridge aligned with deeper portions of Northeast Shark River Slough, facilitates increased flow where it should occur preferentially. When the water level is less than 0.5 foot above the ridges, most of the flow occurs in the deeper sloughs. It is important for water to be rapidly delivered to these deeper sloughs, commensurate with this capacity, during wet periods. Rapid water delivery would produce higher velocities desirable for the redevelopment and maintenance of open water vegetation in these sloughs. This assessment assumes that sheet flow is based on the following equations:

$$\text{Manning Equation; } Q = (u/n) A R_h^{(2/3)} (hf/L)^{(1/2)}$$

$$\text{A depth dependent Manning } n (n = \sim d^{0.77})$$

Where:

A = Cross Section Flow Area = W * d

W = Flow Width

d = Flow Depth

P = Wetted Perimeter

R = Hydraulic Radium = A/P = (W * d) / W ~ d



Dry Conditions

The importance of these connections during drier periods is increased by the fact that both the existing condition and the expected range of the “with project” conditions (Tamiami Trail Bridge in conjunction with revised operations) are drier than the desired conditions as represented by the Natural System Model (NSM)⁸. The increased connection that a bridge provides as compared with culverts in terms of capacity and connectivity (sheet flow with low velocity versus higher flow volume through a narrower culvert) is expected, for the same water availability, to have the following effects:

- Better distribution of the water; high water levels with more natural recession rates and less abnormal dry conditions as the limited water available would be able to reach these sloughs.
- A reduction in unnatural predation around the culverts due to their limited area.

Evaluation Procedure

Considering each bridge location, the benefits of different bridge lengths and locations were assessed. A representative “marsh capacity” was estimated on 200 foot wide intervals using the USGS helicopter ground elevations and Manning’s “n” based flow equation used in the South Florida Water Management Model (SFWMM). The location of each bridge was then used to calculate the marsh capacity directly connected by a bridge opening. This marsh capacity for the bridge was then divided by the marsh capacity of the approximately 11 mile wide Northeast Shark River Slough from the L-67 Extension to the L-31N Levee (NAD83 horizontal coordinates from 763,500 to 821,250) and expressed as a percentage.

Table 2-4 – Flows into Northeast Shark River Slough Provided via Bridge

Alternative	Bridge Length (miles)	Flows into Northeast Shark River Slough Provided via Bridge
No-Action	1.0	10
1	3.2	35
2a	4.3	50
4	2.0	26
5	2.5	29
6e	6.5	64

2.3.4 PM-4 –Difference between average velocity in marsh and average velocity at road

The objective of this project is to allow for “unconstrained” flows to ENP, while providing flow velocities at the bridges approaching velocities seen in the freshwater marsh. The total bridge capacity must pass the greatest anticipated flows without exceeding the maximum allowable

⁸ The Natural System Model depicts the hydrologic response of the pre-drained system to rainfall and other hydrologic conditions of the period from 1965 through 1995. It does not depict the conditions of the pre-drained Everglades system, although there is a misconception that it does; such data do not exist (1999 *Final Integrated Feasibility Report and Programmatic Environmental Impact Statement*, a product of the *Central and Southern Florida Project Comprehensive Review Study*, also known as the *Restudy*).



stage in the L-29 Canal. For this project the Tamiami Trail would be improved to allow for a maximum stage in the L-29 Canal of 9.7 feet. The Hydrologic Engineering Center - River Analysis System (HEC-RAS) model was used to evaluate the six alternatives (including “No-Action”), plus a 10.7-mile bridge, using steady flow water surface profiles. The HEC-RAS model allows for simulation of multiple bridge and culvert openings by solving the one-dimensional energy equation. Energy losses were computed using a depth-varying Manning’s n-value, and contraction/expansion coefficients. The models show that all of the proposed alternatives can pass the maximum anticipated flows (6,200 cfs) at the 9.7 foot design stage.

Results for computed velocities at the bridges and in the marsh, and the normalized performance measure scores, are shown in **Table 2-5**. Performance measure scores are based on a percent increase in flow velocity at bridges over marsh velocity. Scores are normalized on a scale of 0 to 1, and represent lift above base conditions (the No-Action alternative).

Table 2-5 – Difference between Average Velocity in Marsh and Average Velocity at Road

Alternative	Average velocity 200' blw bridge (ft/sec)	Normalized PM Score
No-Action	0.34	0.0
1	0.14	0.7
2a	0.10	0.8
4	0.20	0.5
5	0.16	0.6
6e	0.08	0.9

2.3.5 PM-5 – Estimated Reduction in wildlife mortality

This performance measure is based on average mortality data from the U.S. Fish and Wildlife Service (USFWS) collected for the Tamiami Trail. The data describe an average of 261 deaths per mile of road per year and assume that this rate applies to the entire 10.7-mile long project corridor.

The deaths of small animals from collision with automobiles would continue to occur on the sections of Tamiami Trail that would be connected to the adjacent marsh and canal. The deaths would not occur on the bridged sections of Tamiami Trail because there would be no connection between the road surface and the marsh and canal habitat of the animals. The animals would not easily reach the road surface in these sections and then be at risk of being hit. However, because the L-29 Canal and levee are not eliminated and because conditions may be artificially deep under the bridge, limited bridging (e.g., one mile) may simply redirect animals to cross at other sections of the unbridged Tamiami Trail.

The performance measure presents the estimated number of deaths that would be avoided because of the presence of the bridge(s). It is calculated by multiplying 261 deaths per mile per year by the total length of the bridge(s) in miles. A short bridge would only result in a small reduction in mortality while a bridge that spans the entire project area would produce the maximum value of 2,793 deaths per year avoided (**Table 2-6**).



Table 2-6 – Estimated Reduction in Wildlife Mortality

Alternative	Total Bridge Length (miles)	Estimated # Average Annual Deaths Avoided
No-Action	1.0	261
1	3.2	835
2a	4.3	1,122
4	2.0	522
5	2.5	653
6e	6.5	1,697

2.3.6 PM-6 – Impacts to Tamiami Trail as a cultural resource

The Tamiami Trail is eligible for listing on the National Register. Elements of the Tamiami Trail are susceptible to adverse affect or damage due to increased water levels, changes to the embankments intended to protect the roadway from damage, and destruction of the roadway to construct bridges or install ConSpans. This performance is evaluated in terms of how the alternatives under consideration would impact the Tamiami Trail and if there is an advantage of one alternative over another due to a reduced impact on the roadway.

Table 2-7 – Miles of Highway Affected/Protected

Alternative	# of Resources Adversely Effected (Miles of Highway)	# Miles Protected
No-Action	1.0	9.7
1	3.2	7.5
2a	4.3	6.4
4	2.0	8.7
5	2.5	8.2
6e	6.5	4.2

2.3.7 PM-7 – Impacts to historic properties

The properties adjacent to the Tamiami Trail are also susceptible to adverse affect or damage resulting from this project. It is possible to complete this evaluation without knowing precisely whether artifacts or significant sites are present on the properties. A cultural resources evaluation of properties located within the project corridor conducted in July 2009 found two properties, Coopertown Restaurant and Airboat Rides and Airboat Association of Florida, eligible for listing in the National Register of Historic Places. A third property, the Miccosukee Osceola Camp, is potentially eligible. There are no intact historic buildings at the camp (Fred Dayhoff, personal communication). Shovel testing has not been conducted to check for buried cultural resources since fill has been placed at the site. Aerial photography indicates there is a tree island on the north side of the highway, to the north of the camp, which is a candidate for having archeological resources. The Osceola Camp is on the south tail of this tree island and appears to have been developed in a low area that was raised with fill material. As such, the



potential for buried archeological resources in the fill is low. If archeological deposits are present at the camp, they have been covered by the recently placed fill. The evaluation of the NRHP eligibility of the Osceola Camp remains incomplete, but for purposes of this project, it was considered potentially eligible. Increasing the roadway height would require additional right-of-way at the ground level or base of the embankment, resulting in loss of usable ground for all three of the historic properties located within the project corridor. Increasing the roadway height may also result in loss of property visibility, which is very important to commercial enterprises. This performance measure is evaluated according to the level of impact on the properties, as cultural resources, which could be expected from the alternatives under consideration. If all the alternatives affect the properties, as cultural resources, to the same degree, there is no advantage to be realized. If there is a difference in the amount of property affected or the location of the properties affected then the lower amount of impact would be considered an advantage for that alternative.

Table 2-8 – Impacts to Historic Properties

Alternative	Total Bridge Length (miles)	Airboat Association	Osceola Camp	Coopertown
No-Action	1.0	No Impact	No Impact	No Impact
1	3.2	Minor Impact	Minor Impact	Moderate Impact
2a	4.3	Minor Impact	Minor Impact	Moderate Impact
4	2.0	Minor Impact	Minor Impact	Moderate Impact
5	2.5	Minor Impact	Minor Impact	Moderate Impact
6e	6.5	Minor Impact	Minor Impact	Major Impact

2.3.8 PM-8 – Impacts to wetlands

A wetlands assessment was conducted for this project to assist in the CBA process. This evaluation was meant to assess the permanent effects (both impacts and benefits) to the functional value of wetlands resulting from the construction-related activities of the project. This evaluation did not assess any potential long-term benefits to wetlands that could result from implementation of the project with a future operational plan.

In Florida, wetland impacts are typically assessed through the Uniform Mitigation Assessment Method (UMAM), which was developed by the Florida Department of Environmental Protection and the state Water Management Districts and has been adopted for use by the Florida offices of the USACE. A UMAM-type tabletop analysis was performed to assess the effects to the functional value of wetlands. With this method, the wetland functional value is scored both prior to implementation of the project and after the project. This method takes into account the value of the landscape, the hydrological characteristics of the area, and the vegetation community composition. Since an official UMAM has not yet been conducted for this project, average UMAM scores that were completed for another similar project, the Tamiami Trail Pilot Spreader Swales project, within the project area, were used for this analysis. Scores for all vegetated areas prior to project implementation were 18.5/30. Scores for vegetated areas that would be located in the bridging footprints were scored 11/30 after project implementation to account for the functional loss of wetland value to these areas. Areas within road raising, roads and bridging approaches were scored as a 0/30 following project implementation. For areas that were previously road that are converted to wetlands, these areas were scored 0/30 prior to project implementation and 11/30 following project implementation.



For this analysis, the Geographic Information Systems (GIS) layers depicting the project construction features were intersected with the Land Use Land Classification layer to estimate the amount of permanent effects to wetlands. This acreage was then multiplied by the average UMAM score to assess the effects to the functional value of the wetlands prior to project implementation. The scores were then summed. Next, the effects to wetlands were assessed in the post project implementation conditions. These scores were then summed. The scores were then combined to assess the overall effects to wetlands both prior to and following project implementation. **Table 2-9** below shows the results of the UMAM-type analysis prepared for this project. The “UMAM” score below was calculated per the following equation:

$$\text{Permanent wetland effects} = [\text{UMAM score (after project)} \times \text{wetland acreage}] - [\text{UMAM score (before project)} \times \text{wetland acreage}]$$

Table 2-9 – Wetland UMAM Scores

Alternative	Total Bridge Length (miles)	UMAM Score
No-Action	1.0	-42.1
1	3.2	-588.4
2a	4.3	-507.9
4	2.0	-593.6
5	2.5	-572.7
6e	6.5	-194.4

Note: The least negative number represents the least amount of permanent wetland impacts.

2.4 Alternatives Considered and Dismissed

Due to the aggressive schedule needed to complete the report to Congress in one year, DOI managers provided guidance for the selection of alternatives and directed NPS to re-evaluate appropriate alternatives from the 2005 RGRR/SEIS and explore the potential to use additional alternatives to meet the project objectives. Each of the alternatives from the 2005 RGRR/SEIS was modified to remove the one-mile eastern bridge portion of each alternative since this plan was approved for construction per the 2008 LRR. Therefore, the one-mile eastern bridge approved for construction per the 2008 LRR/EA is the “No-Action” Alternative for this project. All of the alternatives in the 2005 RGRR elevated the roadway to allow stages in the L-29 Canal to be raised to 9.7 feet (consistent with this project): however, bridging lengths for the alternatives ranged from less than 1.0 mile to a 10.7-mile causeway. The bridging alternatives shorter than 1.0 mile were dismissed for further consideration due to perceived minimal improvements above the No-Action Alternative (1.0 mile of bridging). The 10.7-mile causeway alternative was dismissed due to potential impacts to Tribal areas (e.g. bridging over the two Tribal areas would result in both visual and auditory impacts to native customs and practices). This resulted in the development of six conceptual alternatives (Alternatives 1 to 6) to carry forward into the project for more detailed engineering analysis. Modified Alternatives 9, 11, 15 and 16 from the 2005



RGRR/SEIS were evaluated during the internal scoping process and were dismissed for the following reasons⁹ :

- 2005 RGRR/SEIS Alternative 9 – This alternative was dismissed from consideration in the EIS because the length of bridging was too minimal (once the 2008 LRR Preferred Action Alternative one-mile bridge was removed from the alternative) to be cost efficient for analysis and construction, and would not adequately meet the project objectives.
- 2005 RGRR/SEIS Alternative 11 – This alternative was dismissed from consideration in the EIS because currently, the greatest amount of water flow occurs through culvert sets at the eastern end of the project area due to the proximity to the L-31 Canal; the greatest benefit would be provided by constructing a bridge/span in another location that does not currently receive as great amount of water flow. Therefore, this alternative was dismissed from further analysis since it is similar to other less environmentally damaging alternatives.
- 2005 RGRR/SEIS Alternative 15 – This alternative was dismissed from consideration in the EIS because the length of bridging was too minimal (once the 2008 LRR Preferred Action Alternative one-mile bridge was removed from the alternative) to be cost efficient for analysis and construction, and would not adequately meet the project objectives.
- 2005 RGRR/SEIS Alternative 16 – This alternative was dismissed from consideration in the EIS because the length of bridging was too minimal (once the 2008 LRR Preferred Action Alternative one-mile bridge was removed from the alternative) to be cost efficient for analysis and construction, and would not adequately meet the project objectives.

After further discussion and refinement, Alternatives 2, 2b, 3, 6, 6a, 6b, 6c, and 6d were dismissed for the following reasons:

- Alternative 2 – This alternative included approximately 3.5 miles of bridging along with elevating the remaining roadway within the limits of the project corridor. This alternative, along with Alternative 6 were the only alternatives with a 0.7 mile bridge east of the existing 1-mile bridge (No-Action Alternative). Alternative 2 was subsequently split into 2 alternatives, 2a (with 0.7-mile eastern bridge) and 2b (without 0.7-mile eastern bridge).
- Alternative 2b – This alternative included the elements of Alternative 2, above, but with the removal of the approximate 0.7-mile easternmost bridge. However, NPS staff determined that a separate seepage study would be conducted prior to roadway construction and any resulting impacts would be addressed as part of that study. Thus, it was determined that the easternmost bridge be retained in order to maximize the restoration of more natural water flow and ecological connectivity for the purpose of restoring habitat within the Park. Therefore, Alternative 2b was dismissed since it was similar to Alternative 2a, and Alternative 2a was carried forward for further analysis.
- Alternative 3 – This alternative included approximately 2 miles of bridging along with elevating the remaining roadway within the limits of the project corridor. This alternative

⁹ NPS *Director's Order #12* states the following reasons that alternatives can be eliminated from further study: "(a) technical or economic infeasibility; (b) inability to meet project objectives or resolve need; (c) duplication with other, less environmentally damaging or less expensive alternatives; (d) conflict with an up-to-date and valid park plan, statement of purpose and significance, or other policy (see section 7-3 of this handbook), such that a major change in the plan or policy would be needed to implement; (e) too great an environmental impact" (NPS, 2006).



was dismissed due to the locations of the proposed bridges. It was determined that bridging needs to retain a buffer of approximately 0.5 miles from existing tribal areas to avoid potential impacts from aesthetic and noise-related effects. Therefore, Alternative 3 was dismissed from further analysis because it would cause too great of an environmental impact.

- Alternative 6 – This alternative included approximately 5.1 miles of bridging along with elevating the remaining roadway within the limits of the project corridor and was the alternative sought to maximize bridging. This alternative did not include access down ramps to the two radio tower facilities that exist along the project corridor because it was originally determined during the real estate assessment that the purchase of the two radio towers may be more cost effective than cost-to-cure (retain these facilities in an operational capacity). This alternative was subsequently split into 5 alternatives (alternatives 6a – 6e) to further analyze variations to this alternative.
- Alternative 6a – This alternative included the elements of Alternative 6, above, including the removal of the access down-ramps from Tamiami Trail to Everglades Safari and Coopertown airboat facilities. This alternative was dismissed from further analysis because not providing access to the airboat facilities was determined to be inconsistent with NPS commitments to provide this access with all viable design alternatives. Therefore, Alternative 6a was dismissed from further analysis.
- Alternative 6b – This alternative included the elements of Alternative 6, above, including provisions for access down-ramps from Tamiami Trail to Everglades Safari and Coopertown airboat facilities. This alternative was dismissed because it did not include access down ramps to the two radio tower facilities that exist along the project corridor, which conflicts with NPS commitments.
- Alternative 6c - This alternative included the elements of Alternative 6b, above, including provisions for access down-ramps from Tamiami Trail to Everglades Safari and Coopertown airboat facilities. In addition, this alternative included the removal of the approximate 0.7-mile easternmost bridge to minimize potential freshwater seepage affects east of the L-31N canal (outside of natural system areas in Everglades National Park). However, NPS staff determined that a separate seepage study would be conducted prior to roadway construction and any resulting impacts would be addressed as part of that study. Thus, it was determined that the easternmost bridge be retained in order to maximize the restoration of more natural water flow and ecological connectivity for the purpose of restoring habitat within the Park. In addition, this alternative did not include access down ramps to the two radio tower facilities that exist along the project corridor. Therefore, Alternative 6c was dismissed from further analysis, which conflicts with NPS commitments.
- Alternative 6d – This alternative included the elements of Alternative 6c, above, including provisions for access down-ramps from Tamiami Trail to Everglades Safari and Coopertown airboat facilities as well as the removal of the approximate 0.7-mile easternmost bridge to minimize potential freshwater seepage affects east of the L-31N canal (outside of natural system areas in Everglades National Park). This alternative also included access down ramps to the two radio tower facilities that exist along the project corridor because it was determined during the real estate assessment that these facilities would remain operational. However, NPS staff determined that a separate seepage study would be conducted prior to roadway construction and any resulting impacts would be addressed as part of that study. Thus, it was determined that the



easternmost bridge be retained in order to maximize the restoration of more natural water flow and ecological connectivity for the purpose of restoring habitat within the Park. Therefore, Alternative 6d was dismissed from further analysis since it was similar to Alternative 6e.

2.5 Mitigation Measures

Mitigation measures and Best Management Practices would be used to prevent or minimize potential adverse impacts associated with the selected alternative, and these measures have been included in the evaluation of impacts of all action alternatives. Mitigation measures that would be undertaken during project implementation include, but are not limited to, those listed below.

2.5.1 General Construction Mitigation Measures

- Pre- and post-construction erosion control BMPs would be implemented, including the installation and inspection of silt fences, straw bale barriers, sediment traps, or other equivalent measures, and revegetation of area to control erosion, preserve water quality, protect wildlife and habitat, and prevent soil contamination. Erosion and sediment control BMPs would be inspected and maintained on a regular basis and after each measurable rainfall to ensure they are functioning properly.
- Steps would be taken to minimize the introduction of non-native species and would include washing equipment before entering the project area; minimizing disturbances; and initiating revegetation of disturbed areas immediately after construction. The NPS would follow all of the guidelines outlined in the South Florida and Caribbean Parks Exotic Plant Management Plan and the Everglades National Park Hurricane Plan.
- Environmental training would be implemented to help educate construction personnel with the intent of reducing impacts on water quality, wetland resources, and wildlife.
- All construction areas would be protected to confine potentially adverse activities to the minimum area required for construction. All protection measures would be clearly stated in the construction specifications, and workers would be instructed to avoid conducting activities beyond the construction zone. The use of previously undisturbed areas would be minimized to the extent possible by selectively choosing staging areas and clearly defining and marking construction zones and perimeters.

2.5.2 Geology, Topography and Soils

- Spill prevention, control, and countermeasure procedures, as well as storm water pollution prevention measures, would be implemented to protect soils from erosion and contamination.
- The use of tarps or similar cover materials would be used on stockpiled fill and other erosion prone areas during construction to minimize erosion as a result of storm events.

2.5.3 Water Resources

- A spill prevention, control, and countermeasures plan would be completed and implemented for any fuel storage tanks, which would meet all applicable standards for construction and leak detection. Areas used for refueling would be limited to areas where these activities currently occur.
- Equipment containing fuels would be checked frequently for leaks.



- A turbidity monitoring plan would be implemented to ensure compliance with State water quality criteria.
- Impacts to wetland resources would be avoided and minimized to the maximum extent feasible through the implementation of construction BMPs. All unavoidable impacts would be mitigated.
- Selected culvert sets would be blocked during construction to avoid excess turbidity.

2.5.4 Wildlife and Vegetation / Habitat

- Re-vegetation efforts would be limited to filled approaches. Marsh areas would be allowed to naturally re-vegetate; monitoring of reclamation; and implementing exotic species control will occur as necessary.
- Pre- and post-survey construction surveys for selected species would be implemented.
- Spill prevention, control, and countermeasure procedures, as well as storm water pollution prevention measures, would be implemented to reduce the potential for petroleum products from leaking equipment or vehicles to reach surface waters.
- Per NPS *Management Policies 2006*, artificial lighting would not be used in locations where its presence would disrupt wildlife dependent on the dark; minimal-impact lighting techniques would be used (e.g., consideration of yellow versus white lights, use of timers); artificial lighting would be shielded and directed, where necessary, with regard for natural night sky conditions. The use of lighting is not anticipated in view of the fact that all construction activities are expected to take place during daylight hours. However, construction crews may carry emergency/safety lighting and would be instructed to abide by the NPS *Management Policies 2006*.

2.5.5 Special Status Species

- To reduce potential impacts on wildlife, construction activities occurring near sensitive habitats would be scheduled to minimize potential impacts during periods of breeding, nesting, and rearing of young. Construction would occur only during daylight hours to reduce effects on nocturnal foraging or rest.
- Pre-construction surveys would be conducted to identify any federal- and state-listed species occurring in the area. Should individuals or nest sites be identified, additional measures would be taken to avoid impacts (e.g., fencing nest sites, providing information to contractors about the species).
- Construction would include all applicable environmental regulatory agencies' standard protection measures for all protected species, including monitoring during construction. Additional specific measures may be identified during Section 7 consultation with the agencies for the project permits. Specific measures include:
 - Survey protocol and protective measures would be implemented for manatees prior to initiation and during installation as discussed including curtains and waterway closures.
 - Guidelines for wood stork protection detailed in Section 4.6.3 would be followed during all phases of project construction.
 - The USFWS *Draft Snail Kite Management Guidelines* (2006) would be followed during all phases of project construction.



- Species protective measures would be implemented to avoid construction related disturbance to the eastern indigo snake.
- Construction contractors would receive training on federally- and state-listed species and how to avoid impacts to these species.
- Measures listed under “Wildlife” and other resource protection mitigation would also serve to reduce impacts on special status species. These include implementation of specific guidelines for protection of wood storks as detailed in Section 4.6.3.

2.5.6 Wilderness/Unique Ecosystems

- Measures listed above under “Water Resources” and “Wildlife” would serve to protect wilderness values and quality as well.
- Construction procedures would follow the minimum tool analysis for construction and would include provisions to minimize impacts to natural resources that contribute to wilderness values.

2.5.7 Cultural Resources

- To avoid damage to previously unknown archaeological resources, archaeological surveys and testing activities in previously un-surveyed and/or undisturbed areas would be conducted prior to ground-disturbing activities. If any resources are encountered, mitigation of project impacts (in consultation with appropriate agencies) or adjustment of the project design would take place to avoid or limit the adverse effects on prehistoric and historic archaeological resources. Stop-work provisions would be included in the construction documents should archaeological or paleontological resources be uncovered. It should be noted there is a low probability that the project area contains undiscovered archeological resources.
- Monitoring would be done if any excavation exceeds the depth of existing ground disturbance. In the event that cultural resources are encountered during any necessary excavation work, project work would be halted and the discovery process would be initiated.
- If previously unknown archaeological resources are discovered, work would be stopped in the area of any discovery and the NPS would consult with affiliated tribes, pursuant to NAGPRA and the *Draft Park NAGPRA Plan of Action for Inadvertent Discoveries, Everglades National Park and Associated Tribes* (May 2008)

2.5.8 Visitor Use and Experience

- Construction information and general information about the project would be posted at the park, distributed to visitors, and made available on the park’s web site. Signage and notices would be used to inform visitors about the purpose of the project and to protect visitor and staff safety during construction activities.
- Artificial lighting, including minimum illumination levels, light-emitting diodes (LED), limited color spectrum (e.g., yellow) lights, and timers and sensors would be used, where applicable, to ensure safety.
- The use of artificial lighting would be restricted to areas where security, basic human safety, and specific cultural resource requirements must be met.



2.5.9 Noise/Soundscapes

- Construction activities would involve multiple pieces of heavy equipment. Best management practices for noise, such as using mufflers on heavy equipment and noise-muffling construction materials, would be implemented, resulting in short-term minor impacts to soundscapes. Assuming that heavy equipment operates at 80 to 90 decibels (dB) measured at a distance of 50 feet, and that sound levels decrease approximately 6 dB with the doubling of distance (Harmon 2006), it would be estimated that natural attenuation would decrease the noise from these activities to no greater than 50 to 60 dB at a distance of approximately 1,500 feet from the work area; noise would continue to dissipate with increased distance from the construction activities.

2.5.10 Transportation

- In order to reduce traffic impacts from construction, a Maintenance of Traffic (MOT) plan would be implemented and construction would be scheduled during off-peak traffic hours.

2.5.11 Air Quality

- Everglades National Park enjoys a Class I clean air status. If dust were generated during construction, best management practices for dust suppression would be initiated. Emissions from construction vehicles would be kept to a minimum by restricting idling time.

2.6 Cost Analysis of the Alternatives

A preliminary cost analysis of the No-Action and action alternatives was conducted to estimate the financial feasibility of the proposed Tamiami Trail Modifications: Next Steps project under each of the scenarios.

Quantities and Cost Estimates

Quantities were computed based on the current layout and location for the alternatives being considered. The cost estimates were completed utilizing updated material quotes and available unit prices. FDOT average unit prices from 2008 were compared with recent project bid tabulations to determine the most current unit costs.

Therefore, costs provided in this report are in Fiscal Year 2010 dollars and were based on single-unit costs, and costs were not adjusted to account for possible volume discounts or similar cost savings. Detailed cost breakdown estimates for the No-Action alternative and the action alternatives can be found in the Engineering Report provided in **Appendix A**.

General Mark-ups

The only mark-up applied to these estimates is a 25% contingency. It is generally accepted that FDOT unit prices used for calculating the cost estimates have already factored in general contractor mark-ups for profit, Jobsite Office Overhead (JOOH), Home Office Overhead (HOOH) and bond. The costs of each alternative are to be used to establish a means of comparison between alternatives.

A percentage of the total construction costs without contingency were added for Engineering & Design (E&D) and Supervision & Administration (S&A). These percentages are listed below:

- E&D – 10%
- S&A – 10%



Construction Cost Estimates

A summary of the cost estimates is provided in **Table 2-10**.

Table 2-10 – Summary of Estimated Construction Costs

Alternative	Construction Cost	E&D	S&A	Contingency	Real Estate Cost ¹⁰	Total Project Cost ¹¹
1	\$93.2	\$9.3	\$9.3	\$23.3	\$63.4	\$198.5
2a	\$107.3	\$10.7	\$10.7	\$26.8	\$63.4	\$219.0
4	\$63.4	\$6.3	\$6.3	\$15.9	\$63.4	\$155.3
5	\$75.4	\$7.5	\$7.5	\$18.9	\$63.4	\$172.7
6e	\$183.7	\$18.4	\$18.4	\$45.9	\$63.4	\$329.8

Note: Costs in dollars x \$1 million

2.7 How Alternatives Meet Project Objectives

As stated in Chapter 1, Section 1.1.1 “Purpose of and Need for Action”, all action alternatives selected for analysis must meet all objectives to a large degree to be considered reasonable. The action alternatives must also address the stated purpose of the plan and resolve the need for action. Alternatives were assessed as to how well they would meet the plan objectives. **Table 2-11** (located at the end of Chapter 2) summarizes the results of this assessment. The action alternatives would meet the objectives either fully or to a large degree.

2.8 Environmentally Preferred Alternative

In accordance with DO-12 (NPS, 2001), the NPS is required to identify the “environmentally preferred alternative” in all environmental documents, including an EIS. According to CEQ guidelines, the environmentally preferred alternative is the alternative that would promote the national environmental policy, as expressed in Section 101 of the National Environmental Policy Act (NEPA), to:

- (1) Fulfill the responsibilities of each generation as trustee of the environment for succeeding generations;
- (2) Assure for all Americans safe, healthful, productive, and aesthetically and culturally pleasing surroundings;
- (3) Attain the widest range of beneficial uses of the environment without degradation, risk to health or safety, or other undesirable and unintended consequences;
- (4) Preserve important historic, cultural and natural aspects of our national heritage; and maintain, wherever possible, an environment which supports diversity, and variety of individual choices;

¹⁰ Includes fee acquisition, relocation, and management costs (\$24.3M), relocation of a telemetry tower operated by the SFWMD (estimated at \$2M), compensable business costs (estimated at \$30M), and demolition costs (estimated at \$8M). Any contamination cleanup costs will be the responsibility of the current landowners and will be deducted from the real estate purchase price.

¹¹ Total project cost is reported in Fiscal Year 2010 dollars and does not include any potential escalation costs that could be related to changes in inflation beyond Fiscal Year 2010.



(5) Achieve a balance between population and resource use which would permit high standards of living and a wide sharing of life's amenities; and

(6) Enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources.

A description of how each alternative would or would not achieve the requirements of sections 101 and 102(1) of the NEPA criteria is provided below and illustrated through a rating system in **Table 2-12**.

Criterion 1 — Everglades National Park is a unit of the national park system and as the trustee of this place the National Park Service would continue to fulfill its obligation to protect this area for future generations. The No-Action Alternative would only provide a limited environmental benefit while environmental degradation to wetlands and wildlife habitat would continue because of lack of traditional surface water flows. Each of the action alternatives would create the conditions that would allow the enhancement the freshwater marshes within Northeast Shark River Slough and ENP and increased ecological connectivity; however, the anticipated incremental improvement to the environment of each alternative increases with increasing bridge lengths. Therefore, Alternative 6e (maximum bridging option) would do a better job at providing a long-term solution for the area and thus would provide the greatest level of protection for Park resources over time.

Criterion 2 — The No-Action Alternative would provide a safe and culturally pleasing surroundings; however, because potential environmental benefits are limited to the one existing bridge, potential enhancement to environmental productivity and aesthetics are limited and environmental degradation from lack of flows would continue. All action alternatives would provide for the same level of public health and safety and culturally pleasing surroundings. Action alternatives 1, 4, and 5 would provide for incrementally greater environmental productivity and aesthetics based on their respective bridge openings, Alternatives 2a and 6e provides maximum potential benefits to environmental productivity and aesthetics based on bridge length and potential amount of flows that can be restored to Northeast Shark River Slough and ENP.

Criterion 3 — The No-Action Alternative would only provide a limited environmental benefit while environmental degradation to wetlands and wildlife habitat would continue because of lack of traditional surface water flows. The action alternatives would provide for conditions that would lead to enhanced wetland values and functions and increased ecological connectivity with incremental benefits incurred based on bridge length. All action alternatives would result in permanent impacts to wetlands, soils, and habitats of special status species. Alternatives 2a and 6e provide for the widest range of beneficial uses based on the potential for ecological enhancement provided by their bridge openings; however, Alternatives 2a and 6e would impact a core nesting area for wood storks, while the other action alternatives avoid the core nesting area. Therefore, Alternatives 1, 4, and 5 provide the widest range of beneficial uses with the least amount of undesirable environmental consequences.

Criterion 4 — The No-Action Alternative allows for maximum preservation of historic and cultural resources and access to opportunities that support diversity and individual choice. All action alternatives are associated with minor to moderate levels of impacts to cultural and historic resources with the exception of Action Alternative 6e, which would have a major cultural resource impact on the Coopertown property. The action alternatives also include the same level of recreational access and opportunities that lead to supporting diversity and individual choice.



Criterion 5 —The No-Action Alternative would offer only limited availability of resource use and enjoyment of amenities as degradation of the resource would continue into the future. The action alternatives would allow for enhanced access and enjoyment of resource amenities with incremental enhancements based on bridge lengths. Alternative 6e offers the maximum ability for access and enjoyment of resource amenities since the bridge length provides maximum increased access for recreation (i.e. airboats) and maximizes restoration potential of downstream wetlands.

Criterion 6 — The No-Action Alternative provides for some enhancement of renewable resources, while resulting in the lowest use of depletable resources (fuel) of all alternatives. Each of the action alternatives would result in enhancing the quality of renewable resources through NPS management in the project area. According to the carbon footprint analysis (an analysis of greenhouse gas emissions resulting from the use and combustion of fuel, a non-renewable resource, used for the project) conducted for the project, Alternatives 1, 4, and 5 would result in the lowest level of use of depletable resources. Alternatives 2a and 6e consume the highest amount of fuel and would result in the lowest amount of recycling of depletable resources.

Table 2-12 – Environmentally Preferred Alternative Analysis

Criterion	No-Action	1	2a	4	5	6e
1. Fulfill the responsibilities of each generation as trustee of the environment for succeeding generations.	2	3	4	3	3	5
2. Ensure safe, healthful, productive, and aesthetically and culturally pleasing surroundings for all Americans.	2	3	5	3	3	5
3. Attain the widest range of beneficial uses of the environment without degradation, risk of health or safety, or other undesirable and unintended consequences.	2	4	3	4	4	3
4. Preserve important historic, cultural, and natural aspects of our national heritage and maintain, wherever possible, an environment that supports diversity and a variety of individual choices.	5	4	4	4	4	3
5. Achieve a balance between population and resource use that will permit high standards of living and a wide sharing of life's amenities.	2	3	4	3	3	5
6. Enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources.	3	4	3	4	4	3
Total Points*	16	21	23	21	21	24

* Five points were given to the alternative if it fully meets the criteria; four points if it meets nearly all of the elements of the criteria; three points if it meets more than one element of the criteria; two points if it meets only one element of the criteria; and one point if the alternative does not meet the criteria.

Based on the analysis above, the environmentally preferred alternative for the Tamiami Trail Modifications: Next Steps project is Alternative 6e. According to the ratings included in **Table 2-12**, this alternative would surpass the other alternatives in realizing the full range of national environmental policy goals in Section 101 of NEPA. In particular, Alternative 6e best responds to criteria 1, 2, and 5 by providing the greatest level of safety, environmental protection/enhancement, and access to and enjoyment of the resource while minimizing environmental and cultural resource impacts to the greatest extent possible.



For further information on how the environmentally preferred alternative was determined, please reference **Table 2-13** (Environmental Consequences Summary) at the end of Chapter 2, which presents a summary comparison of the effects of the alternatives based on the evaluations of the impact topics in the Environmental Consequences section of this environmental assessment. The terms used to define the magnitude or intensity of the effects (e.g., negligible, minor, etc.) are described in Chapter 4.

2.8.1 Summary of Environmental Consequences

Table 2-13 found at the end of this chapter summarizes the environmental consequences associated with the implementation each project alternative including the No-Action Alternative. Additional information on impacts associated with project alternatives can be found in Chapter 3 – Affected Environment and Chapter 4 – Environmental Consequences

2.9 Value Analysis and Preferred Alternative

On November 4, 2009, the NPS conducted a Value Analysis (VA) and Choosing by Advantage (CBA) workshop for the purpose of choosing a project alternative to bring forward as the recommended alternative. Workshop participants consisting of NPS staff and cooperating state and federal agency participants reviewed performance measures and project alternatives recommended during previous scoping meetings to choose the alternative that best meets the project purpose and needs.

The CBA team determined that of the performance measure factors that were most closely associated with the purpose and objectives of the project, the advantages of the “Sheet Flow” Factor were more important than the advantages of the other factors. Also, the team agreed that the most important or “Paramount Advantage” was represented by the most equitable distribution of overland flow over the 10.7-mile corridor length based on the topographic relief and location of proposed bridges in each alternative. Other important advantages were determined to be conditions in which 1) the greatest ecological connectivity was present, 2) alternatives which reconnected the greatest number of sloughs to restore the ridge-and-slough landscape, 3) and conditions which would pass water from north to south at a velocity closest to natural marsh conditions (0.05 cfs).

Alternative 6e most closely meets the project objectives and the National Park Service mission by having the highest total importance value after summing the importance scores for each of the eight factors for each alternative. While Alternative 6e has the highest benefit, this alternative also has the highest cost. After quantifying the importance (i.e., benefits) for all alternatives using the CBA method, the alternatives were further evaluated using the cost-to-importance analysis prescribed by the CBA based on the importance scores and the total project costs.

When the total project cost is plotted against the importance scores for all alternatives (**Figure 2-6**), the results produce a somewhat linear relationship between the variables, indicative of similar benefit-to-cost ratios; however, an inflection point for Alternative 2a indicates this alternative may provide the best cost-to-benefit value. Since it was unclear whether Alternative 2a was a true best value, or simply an artifact of the CBA scoring methodology, NPS requested that the Corps apply the cost-benefit analysis technique commonly used in its project assessments. These results are depicted in **Table 2-14** and resulted in all alternatives being characterized as cost effective, but Alternative 6e was determined to be a better value (most efficient) when compared to the other alternatives, including Alternative 2a. Therefore, the NPS CBA Importance Analysis, coupled with the Corps cost-benefit analysis, resulted in the decision to identify Alternative 6e as the preferred alternative (see **Figure 2-5** at the end of this chapter.).



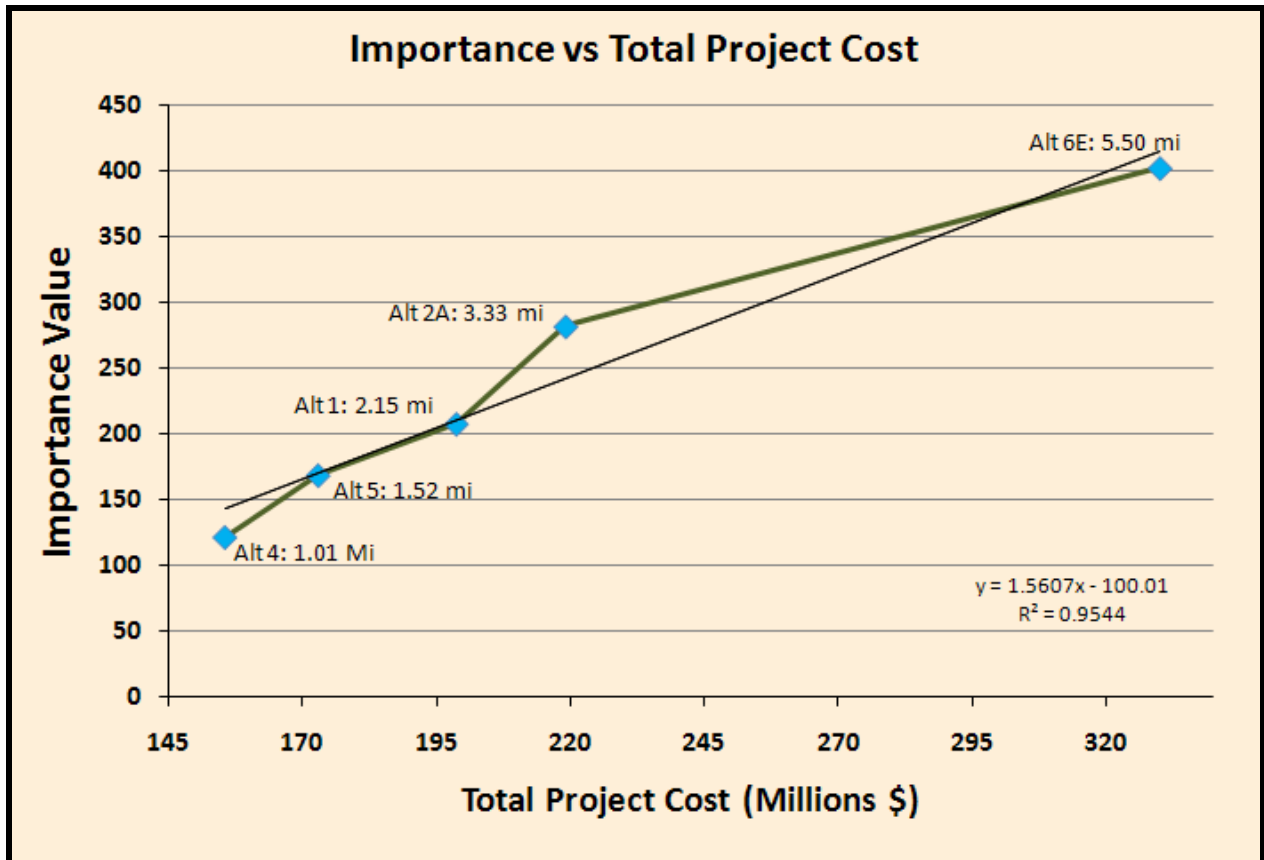


Figure 2-6 – Total cost versus importance as prescribed by the CBA value analysis methodology

Table 2-14 – Results of Cost-Benefit Analysis performed by USACE

Alternative	Total Cost (M\$)	Importance Score	Lift over No-Action	Cost per lift (M\$)	Cost Effective
No-Action	\$0	70	N/A	N/A	N/A
Alternative 4 – 1.0 mile	\$155.3	121	51	\$3.0	Yes
Alternative 5 – 1.5 miles	\$172.7	168	98	\$1.8	Yes
Alternative 1 – 2.2 miles	\$198.5	207	137	\$1.4	Yes
Alternative 2a – 3.3 miles	\$219.0	281	211	\$1.0	Yes
Alternative 6e – 5.5 miles	\$329.8	402	332	\$0.99	Most Efficient¹²

Alternative 6e, in combination with the 1.0 mile bridge to be constructed under the 2008 LRR plan, would restore a total of 6.5 miles of ecological connectivity between Everglades National

¹² These results indicated that Alternative 6e had the best value for the environmental benefits provided in relation to costs. Alternative 6e was the only alternative exhibiting most efficient cost performance when compared to the other alternatives examined in the study.



Park and marshes to the north, reconnecting 10 sloughs that have been severed since 1928, and restoring marsh flow patterns across much of Northeast Shark River Slough. The increased connectivity results from the construction of the new bridges coupled with the removal of the existing Tamiami Trail roadway corresponding to the bridge locations. The greater expanse of bridging allows for improved distribution and timing of water flows at velocities of 0.08 feet per second (fps) similar to historical conditions (0.05 fps). The removal of 6.5 miles of roadway would also reduce wildlife mortality and reconnect a large swath of the historic ridge and slough landscape, restoring breeding and foraging conditions for many aquatic and terrestrial species. Alternative 6e would provide the conveyance capacity to meet the original MWD Project target water flow of 4,000 cfs and also accommodate future projects, including those of the CERP and recent State of Florida restoration initiatives. Importantly, the increased bridging of Alternative 6e would allow stages in the L-29 Canal to be raised to 9.7 feet. Hydrological analysis conducted for the 2005 RGRR indicated that substantial bridging, as in Alternative 6e, was needed for the higher volumes of flows to Northeast Shark River Slough without adversely impacting ecologically and culturally important tree islands in WCA-3B.

Alternative 6e would result in impacts to cultural resources and more direct wetland impacts than other alternatives considered. In order to maintain traffic flow during bridge and road construction and avoid impacts to state lands north of the existing highway, Alternative 6e would be constructed south of the existing highway in Everglades National Park. The construction easement for the 5.50 miles of bridges extends 50 linear feet south of the existing highway right-of-way, while the road-raising easement extends 30 linear feet south. The total wetland impact area would be 48.1 acres; however, the long-term benefits of the improved flow patterns and ecological connectivity were deemed to outweigh these impacts. It was also determined that Alternative 6e would adversely impact two cultural resources—the existing Tamiami Trail roadway and the Coopertown airboat facility—however, these impacts could be adequately mitigated and were justified based on the substantial environmental benefits of Alternative 6e compared to the other alternatives.

2.10 Implementation Schedule

A single construction contract is anticipated, with a construction period estimated to be 43.8 months for the Preferred Alternative. This construction period does not address variables that could affect the construction duration, including but not limited to, design changes, unforeseen construction means and methods, and the ability to secure/procure materials, equipment and labor. This period does not include an allowance for design, ROW acquisition, and other pre-construction activities.

Construction Durations

Construction schedules and durations have been estimated for each of the action alternatives. Details and calculations for each schedule can be found in **Appendix A** – Engineering Report. These schedules encompass construction operations only and do not include proposed land acquisition, design and preparation of plans and specifications, funding activities or other non-construction related items.

These schedules are based on a standard 6 to 10-hour/day work week for the majority of the project. The roadway would utilize night crews and bridge work would be completed with day crews. Average production rates were applied to quantities provided to determine these durations. The use of multiple crews was used when calculating schedule durations as it should be easy for a contractor to mobilize more than one crew on this project.

The Notice to Proceed date (NTP) was assumed to be January 2, 2013. This is due to the current scheduled completion for the 1-mile LRR/EA bridge in December, 2012. This project



cannot start until after the completion of the 1-mile bridge. This allows a short time for contractor mobilization.

The construction of the roadway was averaged throughout the project alternatives and a standard rate of 29 Linear Feet (LF) per day per crew was used. It was assumed that the contractor would utilize two crews for the roadway work; one started on opposite ends of the project limits. For Alternatives 4 and 5, it was assumed that there would be less mobilization/demobilization time as the roadway sections are longer. Therefore, it is assumed that crews could tackle bigger sections of roadway work per phase and the production rate was increased to be 33 LF per day per crew. These rates factor in weather days and federal holidays.

It was assumed that the staging of the bridges could accommodate two crews working at one time. Therefore, two bridges are being constructed at one time during the project. The construction of the bridges was averaged throughout the project alternatives and a standard rate of 33 LF per day per crew was used. Staging of the bridge work such as driving piles, steel reinforcing, form work and concrete pouring, can better be accomplished with further detailed scheduling at the final submittal. This rate factors in weather days and federal holidays.

Table 2-15, below, presents a preliminary implementation schedule for the Preferred Alternative.

Table 2-15 – Preliminary Implementation Schedule for the Preferred Alternative

Project Task	Duration (days)	Start Date	End Date
Tamiami Trail Modifications: Next Steps	1357	1/2/2013	8/25/2016
Notice to Proceed	0	1/2/2013	1/2/2013
Contractor Mobilization for Construction	10	1/2/2013	1/13/2013
Pre-Construction Conference	1	1/13/2013	1/16/2013
Order/Delivery of Foundation Piles	20	1/16/2013	2/4/2013
Roadway Stage I	952	1/16/2013	8/5/2015
Osceola Camp (Phase I)	274	1/16/2013	10/6/2013
Osceola Camp (Phase II)	563	10/6/2013	4/18/2015
Osceola Camp (Phase III)	16	4/18/2015	5/2/2015
Osceola Camp (Phase IV)	85	5/2/2015	7/24/2015
Osceola Camp (Phase V)	14	7/24/2015	8/5/2015
Bridge A2	346	7/31/2014	7/7/2015
Roadway Stage II	777	1/16/2013	2/18/2015
Gator Park (Phase I)	239	1/16/2013	9/3/2013
Gator Park (Phase II)	439	9/3/2013	11/5/2014
Gator Park (Phase III)	15	11/5/2014	11/21/2014
Gator Park (Phase IV)	72	11/21/2014	2/6/2015



Project Task	Duration (days)	Start Date	End Date
Gator Park (Phase V)	12	2/6/2015	2/18/2015
Bridge G2	256	5/13/2014	1/23/2015
Roadway Stage III	367	2/18/2015	2/13/2016
Airboat Association (Phase I)	101	2/18/2015	5/26/2015
Airboat Association (Phase II)	203	5/26/2015	12/8/2015
Airboat Association (Phase III)	13	12/8/2015	12/20/2015
Airboat Association (Phase IV)	44	12/20/2015	2/7/2016
Airboat Association (Phase V)	6	2/7/2016	2/13/2016
Bridge E1	122	9/30/2015	2/1/2016
Roadway Stage IV	195	2/13/2016	8/19/2016
End Project (Phase I)	26	2/13/2016	3/11/2016
End Project (Phase II)	117	3/11/2016	6/29/2016
End Project (Phase III)	4	6/29/2016	7/5/2016
End Project (Phase IV)	45	7/5/2016	8/15/2016
End Project (Phase V)	3	8/15/2016	8/19/2016
Bridge J1	142	3/27/2016	8/9/2016
Project Completion	7	8/19/2016	8/25/2016



Figure 2-1 – Alternative 1

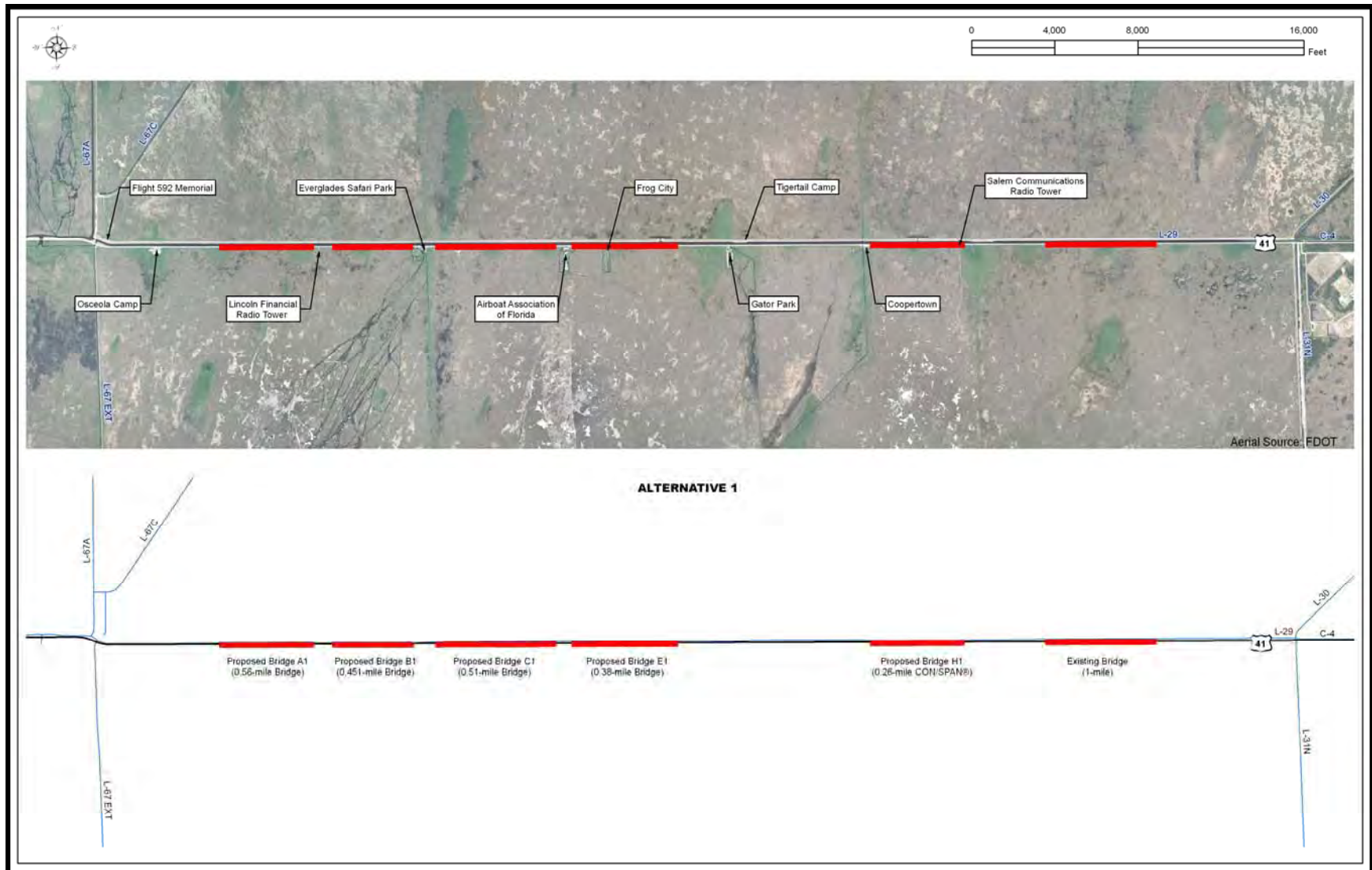


Figure 2-2 – Alternative 2a

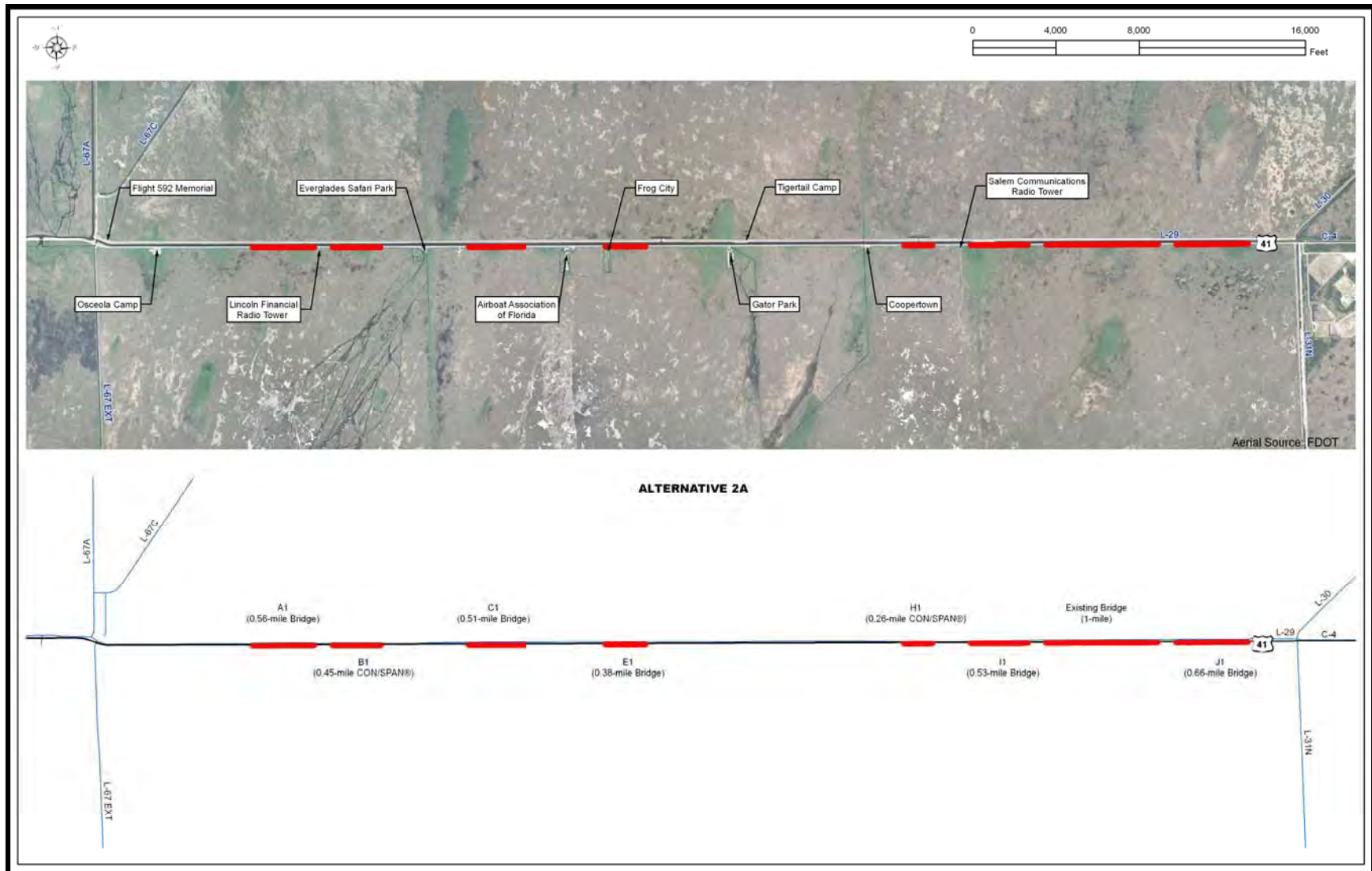


Figure 2-3 – Alternative 4

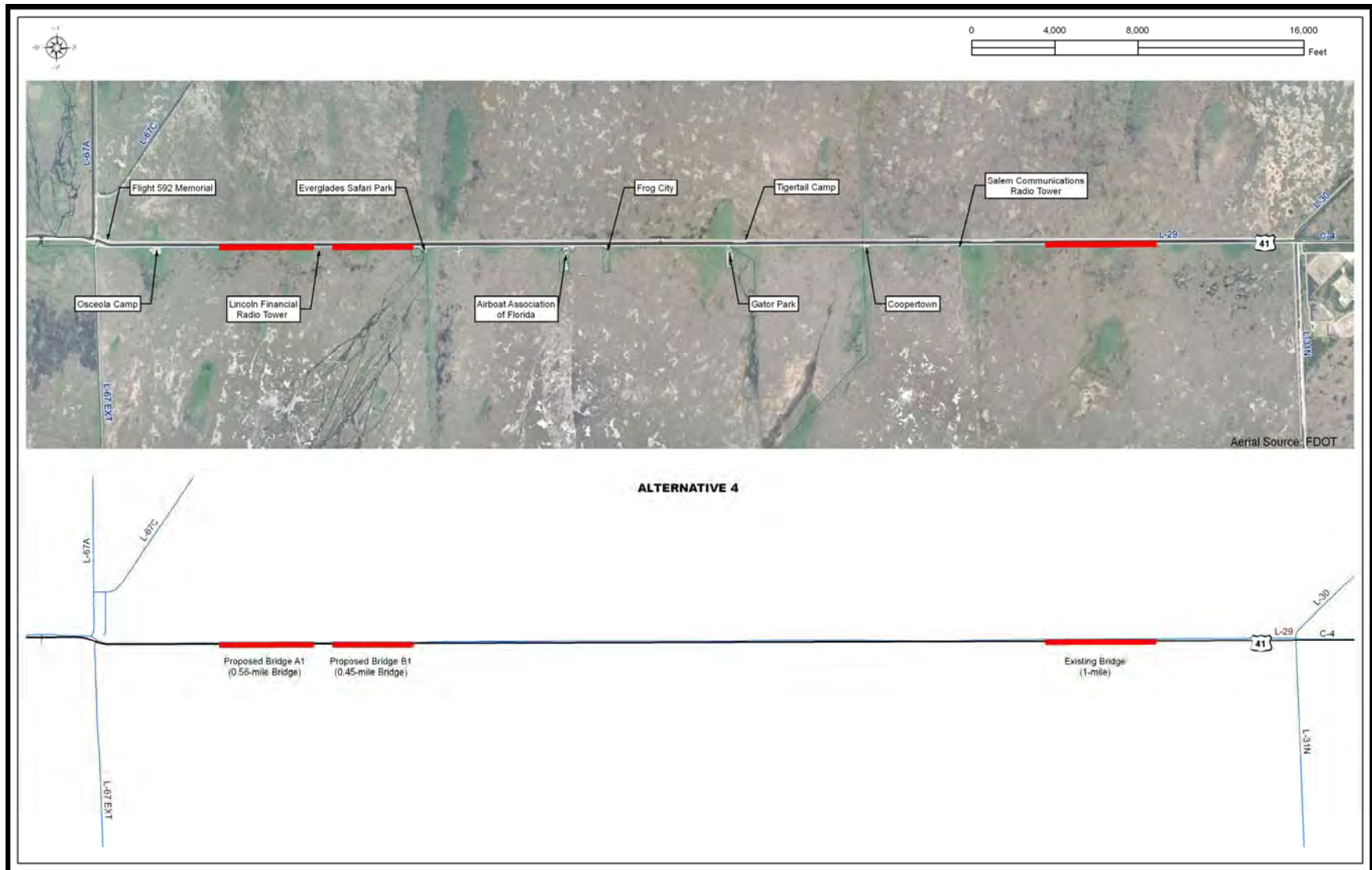


Figure 2-4 – Alternative 5

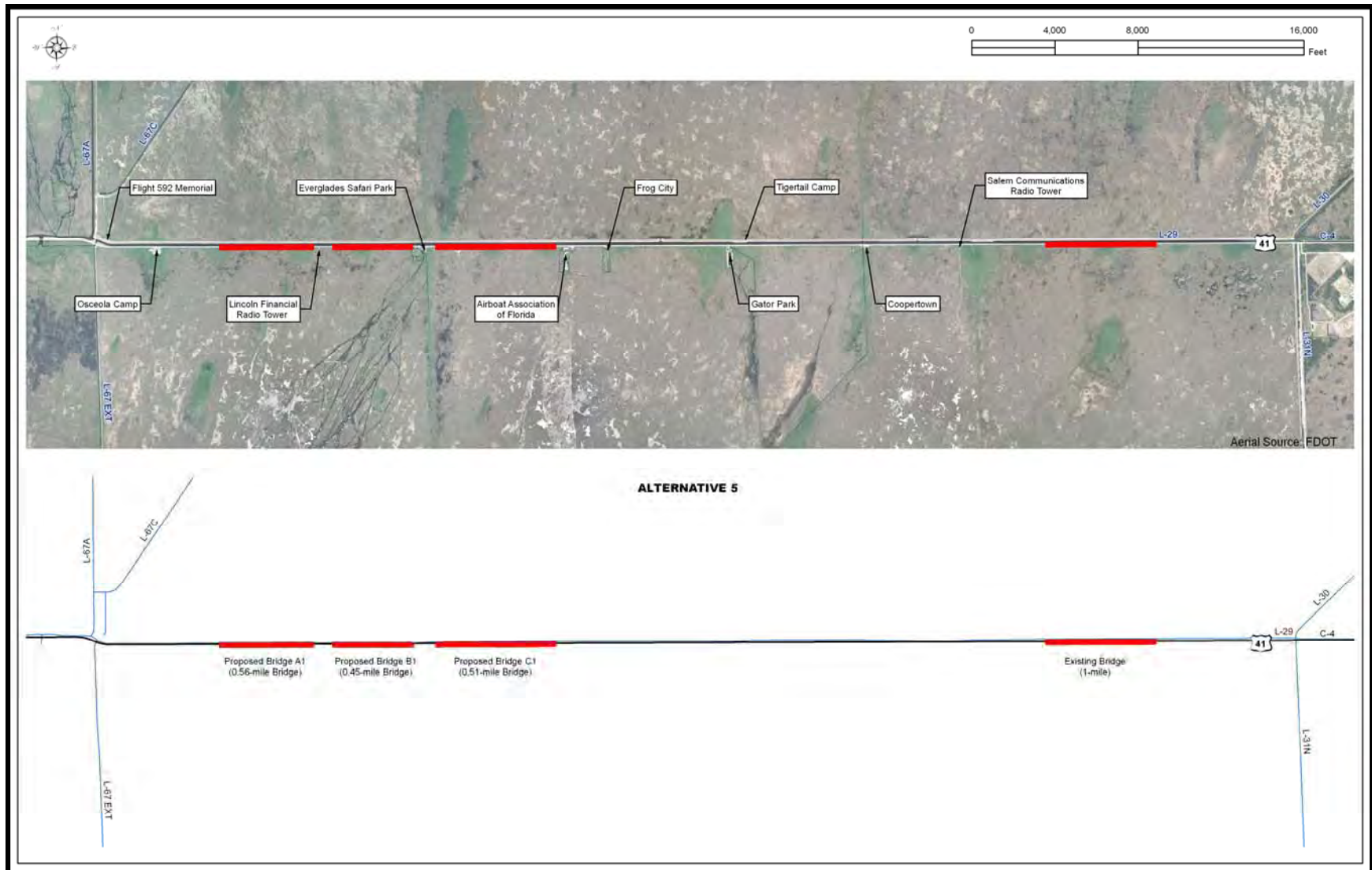


Figure 2-5 – Alternative 6e

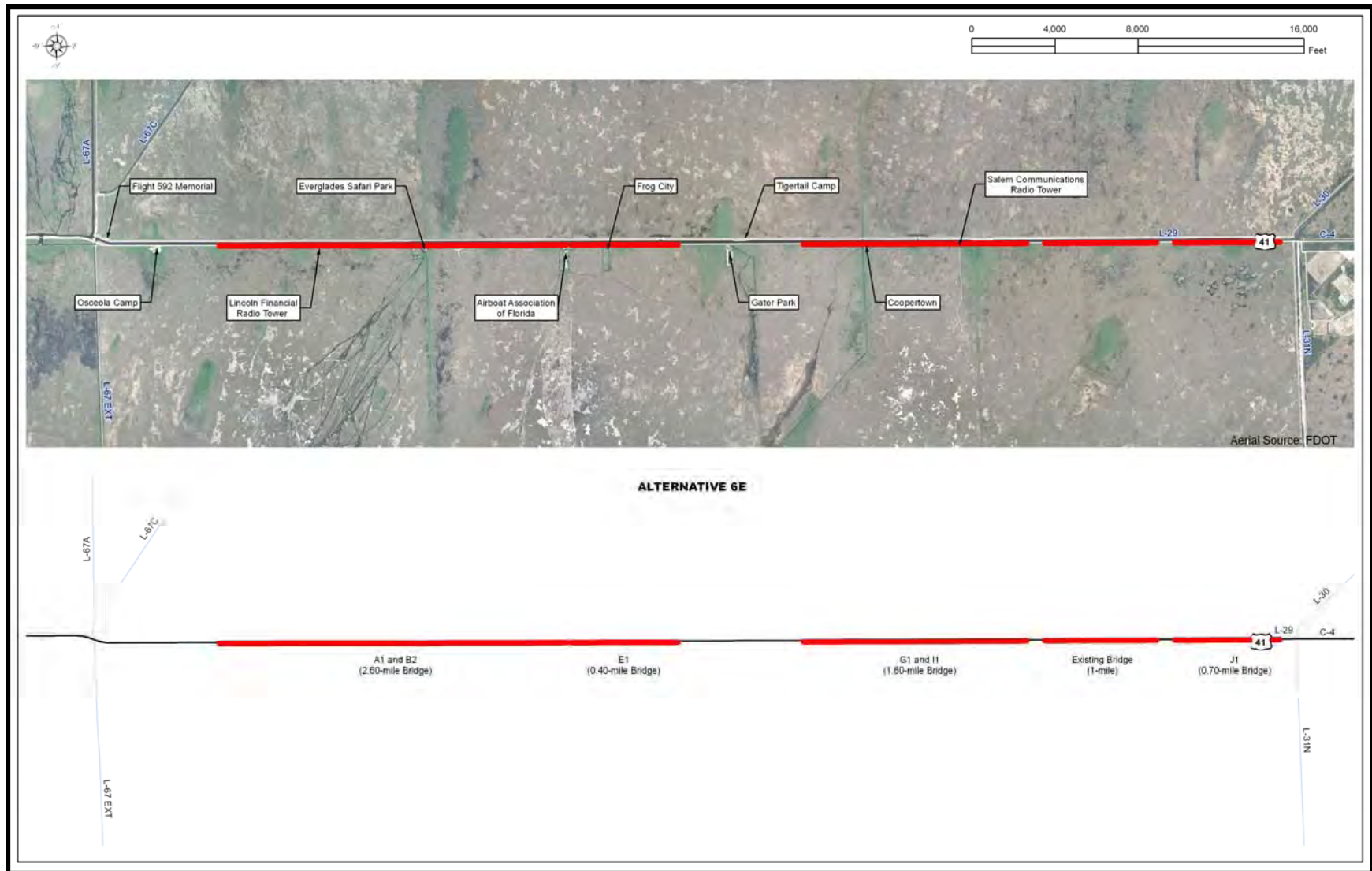


Table 2-11 – Analysis of How Alternatives Meet Project Objectives

Project Objective	No-Action (no additional bridging)	Alternative 1 (2.2 miles)	Alternative 2a (3.3 miles)	Alternative 4 (1.0 mile)	Alternative 5 (1.5 miles)	Alternative 6e (5.5 miles)
Restore More Natural Water Flow to ENP						
Construct additional bridging and road raising of the Tamiami Trail to provide for unconstrained flows to Northeast Shark River Slough and Florida Bay	This alternative does not meet project objective since it does not provide for additional bridging or road raising activities other than the 1.0-mile bridge from the 2008 LRR/EA. <i>Rank: Nil</i>	This alternative meets the project objective as 2.2 miles of additional bridging would be constructed and the remaining roadway would be raised to accommodate higher water levels in the L-29 Canal. <i>Rank: Moderate</i>	This alternative meets the project objective as 3.3 miles of additional bridging would be constructed and the remaining roadway would be raised to accommodate higher water levels in the L-29 Canal. <i>Rank: Moderate</i>	This alternative meets the project objective as 1.0 mile of additional bridging would be constructed and the remaining roadway would be raised to accommodate higher water levels in the L-29 Canal. <i>Rank: Moderate</i>	This alternative meets the project objective as 1.5 miles of additional bridging would be constructed and the remaining roadway would be raised to accommodate higher water levels in the L-29 Canal. <i>Rank: Moderate</i>	This alternative meets the project objective as 5.5 miles of additional bridging would be constructed and the remaining roadway would be raised to accommodate higher water levels in the L-29 Canal. <i>Rank: High</i>
Restore Ecological Connectivity						
Improve ecological connectivity by removing obstructions to sheet flow	This alternative does not meet project objective since it does not provide for additional ecological connectivity other than the 1.0-mile bridge from the 2008 LRR/EA. <i>Rank: Nil</i>	This alternative meets the project objective as the 2.2 miles of proposed bridging would remove obstructions to sheet flow and increase ecological connectivity. <i>Rank: Moderate</i>	This alternative meets the project objective as the 3.3 miles of proposed bridging would remove obstructions to sheet flow and increase ecological connectivity. <i>Rank: Moderate</i>	This alternative meets the project objective as the 1.0 mile of proposed bridging would remove obstructions to sheet flow and increase ecological connectivity. <i>Rank: Moderate</i>	This alternative meets the project objective as the 1.5 miles of proposed bridging would remove obstructions to sheet flow and increase ecological connectivity. <i>Rank: Moderate</i>	This alternative meets the project objective as the 5.5 miles of proposed bridging would remove obstructions to sheet flow and increase ecological connectivity. <i>Rank: High</i>



Table 2-11 – Analysis of How Alternatives Meet Project Objectives

Project Objective	No-Action (no additional bridging)	Alternative 1 (2.2 miles)	Alternative 2a (3.3 miles)	Alternative 4 (1.0 mile)	Alternative 5 (1.5 miles)	Alternative 6e (5.5 miles)
Enhance unobstructed movement of animals between the north and south of Tamiami Trail	This alternative does not meet the project objective since it does not provide for additional animal movement opportunities other than the 1.0-mile bridge from the 2008 LRR/EA. <i>Rank: Nil</i>	This alternative meets the project objective as the 2.2 miles of proposed bridging would provide for movement of animals under the bridged portions of Tamiami Trail and reduce wildlife mortality by 835 deaths per year. <i>Rank: Moderate</i>	This alternative meets the project objective as the 3.3 miles of proposed bridging would provide for movement of animals under the bridged portions of Tamiami Trail and reduce wildlife mortality by 1,122 deaths per year. <i>Rank: Moderate</i>	This alternative meets the project objective as the 1.0 mile of proposed bridging would provide for movement of animals under the bridged portions of Tamiami Trail and reduce wildlife mortality by 522 deaths per year. <i>Rank: Moderate</i>	This alternative meets the project objective as the 1.5 miles of proposed bridging would provide for movement of animals under the bridged portions of Tamiami Trail and reduce wildlife mortality by 653 deaths per year. <i>Rank: Moderate</i>	This alternative meets the project objective as the 5.5 miles of proposed bridging would provide for movement of animals under the bridged portions of Tamiami Trail and reduce wildlife mortality by 1,697 deaths per year. <i>Rank: High</i>
Restore slough vegetation and the deep water sloughs	This alternative does not meet the project objective since it does not provide for additional water deliveries which would benefit deep water sloughs and associated vegetation other than the 1.0-mile bridge from the 2008 LRR/EA. <i>Rank: Nil</i>	This alternative meets the project objective as the proposed alternative would allow for additional water deliveries that would benefit deep water sloughs and associated vegetation. <i>Rank: Moderate</i>	This alternative meets the project objective as the proposed alternative would allow for additional water deliveries that would benefit deep water sloughs and associated vegetation. <i>Rank: Moderate</i>	This alternative meets the project objective as the proposed alternative would allow for additional water deliveries that would benefit deep water sloughs and associated vegetation. <i>Rank: Moderate</i>	This alternative meets the project objective as the proposed alternative would allow for additional water deliveries that would benefit deep water sloughs and associated vegetation. <i>Rank: Moderate</i>	This alternative meets the project objective as the proposed alternative would allow for the most additional water deliveries that would benefit deep water sloughs and associated vegetation. <i>Rank: High</i>



Table 2-11 – Analysis of How Alternatives Meet Project Objectives

Project Objective	No-Action (no additional bridging)	Alternative 1 (2.2 miles)	Alternative 2a (3.3 miles)	Alternative 4 (1.0 mile)	Alternative 5 (1.5 miles)	Alternative 6e (5.5 miles)
Restore processes that produce and maintain ridge and slough communities in ENP east of the L-67 Extension	This alternative does not meet the project objective since it does not provide for additional water deliveries which would help to restore processes that produce and maintain ridge and slough communities in ENP east of the L-67 Extension. <i>Rank: Nil</i>	This alternative meets the project objective as the proposed alternative would allow for additional water deliveries that would help to restore processes that produce and maintain ridge and slough communities in ENP east of the L-67 Extension. <i>Rank: Moderate</i>	This alternative meets the project objective as the proposed alternative would allow for additional water deliveries that would help to restore processes that produce and maintain ridge and slough communities in ENP east of the L-67 Extension. <i>Rank: Moderate</i>	This alternative meets the project objective as the proposed alternative would allow for additional water deliveries that would help to restore processes that produce and maintain ridge and slough communities in ENP east of the L-67 Extension. <i>Rank: Moderate</i>	This alternative meets the project objective as the proposed alternative would allow for additional water deliveries that would help to restore processes that produce and maintain ridge and slough communities in ENP east of the L-67 Extension. <i>Rank: Moderate</i>	This alternative meets the project objective as the proposed alternative would allow for the most additional water deliveries that would help to restore processes that produce and maintain ridge and slough communities in ENP east of the L-67 Extension. <i>Rank: High</i>

Legend:
<i>Nil</i> - Does not meet the project objective to any degree
<i>Low</i> - Meets the project objective to a low degree
<i>Moderate</i> - Meets the project objective to a moderate degree
<i>High</i> - Meets the project objective to a high degree



Table 2-13 – Summary of Environmental Consequences by Alternative

Impact Topic	No-Action Alternative – 1.0 mile of bridging	Alternative 1 – 2.2 miles of bridging ¹³	Alternative 2a – 3.3 miles of bridging ¹³	Alternative 4 – 1.0 mile of bridging ¹³	Alternative 5 – 1.5 miles of bridging ¹³	Alternative 6e – 5.5 miles of bridging ¹³
Geology, Topography, and Soils	<p>Taking no action would cause no additional direct or indirect short- or long-term effects on geology, topography, or soils other than those already realized from construction of the 2008 LRR/EA preferred alternative (1-mile eastern bridge). The geology, topography, and soils within the vicinity of the project area would continue to be adversely impacted in the short- and long-term due to peat loss. No short- or long-term negative or beneficial effects to geology, topography, and soils would result from the selection of the No-Action Alternative.</p> <p>There would be no impairment to geology, topography, or soils as a result of the No-Action Alternative.</p>	<p>Effects to soils would be directly related to the short-term and long-term effects caused by construction, operations, and maintenance associated with the alternative. It is anticipated that the soil impacts resulting from temporary construction-related activities would be adverse, local, minor, and short-term. Long-term impacts resulting from implementing Alternative 1 are anticipated to be adverse, local, and minor.</p> <p>No impairment of soils is anticipated from construction and maintenance-related activities associated with the implementation of Alternative 1.</p>	Same as Alternative 1, with incremental differences due to bridge length.	Same as Alternative 1, with incremental differences due to bridge length.	Same as Alternative 1, with incremental differences due to bridge length.	Same as Alternative 1, with incremental differences due to bridge length.
Water Resources: Hydrology	<p>Under the No-Action Alternative, there would be no additional direct or indirect short- or long-term impacts on hydrology other than those already realized from construction of the 2008 LRR/EA preferred alternative (1-mile eastern bridge). The project area would continue to experience the unnatural altered hydrologic conditions that currently exist in Everglades National Park and Northeast Shark River Slough. No short- or long-term adverse or beneficial effects to hydrology would result from the selection of the No-Action Alternative.</p> <p>Consequently, there would be no impairment to hydrology as a result of the No-Action Alternative.</p>	<p>Alternative 1 will have a short-term, adverse, minor localized impact on hydrology associated with project construction. Alternative 1 will have a long-term, beneficial effect on hydrology based on its capacity to convey flows and relative low velocities, Consequently, there would be no impairment to hydrology as a result of implementation of Alternative 1.</p>	Same as Alternative 1, with incremental differences due to bridge length.	Same as Alternative 1, with incremental differences due to bridge length.	Same as Alternative 1, with incremental differences due to bridge length.	Same as Alternative 1, with incremental differences due to bridge length.

¹³ Bridge length does not include the one-mile bridge from the No-Action Alternative.



Table 2-13 – Summary of Environmental Consequences by Alternative

Impact Topic	No-Action Alternative – 1.0 mile of bridging	Alternative 1 – 2.2 miles of bridging ¹³	Alternative 2a – 3.3 miles of bridging ¹³	Alternative 4 – 1.0 mile of bridging ¹³	Alternative 5 – 1.5 miles of bridging ¹³	Alternative 6e – 5.5 miles of bridging ¹³
Water Resources: Water Quality	<p>If no action is taken, there would be no additional direct or indirect short- or long-term effects on water quality other than those already realized from construction of the 2008 LRR/EA preferred alternative (1-mile eastern bridge). The water quality within the vicinity of the project area would remain unchanged. No short- or long-term negative or beneficial effects to water quality would result from the selection of the No-Action Alternative.</p> <p>There would be no impairment to water quality as a result of the No-Action Alternative.</p>	<p>Water quality effects would be directly related to the short-term and long-term effects caused by construction, operations, and maintenance associated with Alternative 1. It is anticipated that the water quality impacts resulting from construction-related activities would be adverse, local, minor, and short-term. No long-term impacts to water quality are expected to result from implementing Alternative 1.</p> <p>No impairment of water quality resources or values would occur from the implementation of Alternative 1.</p>	<p>Same as Alternative 1, with incremental differences due to bridge length.</p>	<p>Same as Alternative 1, with incremental differences due to bridge length.</p>	<p>Same as Alternative 1, with incremental differences due to bridge length.</p>	<p>Same as Alternative 1, with incremental differences due to bridge length.</p>



Table 2-13 – Summary of Environmental Consequences by Alternative

Impact Topic	No-Action Alternative – 1.0 mile of bridging	Alternative 1 – 2.2 miles of bridging ¹³	Alternative 2a – 3.3 miles of bridging ¹³	Alternative 4 – 1.0 mile of bridging ¹³	Alternative 5 – 1.5 miles of bridging ¹³	Alternative 6e – 5.5 miles of bridging ¹³
Water Resources: Wetlands	<p>If no action is taken, there would be no additional direct or indirect short- or long-term effects on wetlands other than those already realized from construction of the 2008 LRR/EA preferred alternative (1-mile eastern bridge). The current unnatural altered hydrologic conditions within the vicinity of the project area would continue to have a negative impact on wetland values and functions within the WCAs, Everglades National Park, and Northeast Shark River Slough. No short- or long-term negative or beneficial effects to wetlands would result from the selection of the No-Action Alternative.</p> <p>There would be no impairment of wetland functions and values as a result of the No-Action Alternative.</p>	<p>Implementation of Alternative 1 would result in moderate, adverse, short-term, localized impacts to wetlands associated with construction of temporary work areas. Additionally, implementation of the action alternatives would result in moderate, adverse, long-term, localized impacts to wetlands associated with permanent dredging and filling of wetlands in conjunction with raising the crown of Tamiami Trail and construction of bridges. At present, a water operations plan for the L-29 Canal is being developed; however, since it has not been completed, full project benefits cannot yet be realized. Potential benefits that would occur once an operational plan is defined and executed include enhancement of degraded wetland habitats within the Northeast Shark River Slough system. It is highly likely that implementation of Alternative 1 in conjunction with the operational plan is self-mitigating, and that permanent and temporary wetland impacts associated with the construction of the proposed project would be offset by the enhancement to wetlands. However, long-term effects to wetlands resulting from operations remain unknown since an operational plan has not yet been developed. Since there is uncertainty as to the level of wetland improvements that would be achieved, an off-site mitigation plan would be implemented should anticipated project benefits not adequately offset the project's impacts to wetland value and functions. Potential off-site mitigation scenarios may include purchase of mitigation bank credits or performing mitigation elsewhere on park property.</p> <p>There would not be an impairment of wetland functions and values as a result of the implementation of Alternative 1.</p>	<p>Same as Alternative 1, with incremental differences due to bridge length.</p>	<p>Same as Alternative 1, with incremental differences due to bridge length.</p>	<p>Same as Alternative 1, with incremental differences due to bridge length.</p>	<p>Same as Alternative 1, with incremental differences due to bridge length.</p>



Table 2-13 – Summary of Environmental Consequences by Alternative

Impact Topic	No-Action Alternative – 1.0 mile of bridging	Alternative 1 – 2.2 miles of bridging ¹³	Alternative 2a – 3.3 miles of bridging ¹³	Alternative 4 – 1.0 mile of bridging ¹³	Alternative 5 – 1.5 miles of bridging ¹³	Alternative 6e – 5.5 miles of bridging ¹³
Water Resources: Floodplains	<p>If no action is taken, there would be no additional direct or indirect short- or long-term effects on floodplains other than those already realized from construction of the 2008 LRR/EA preferred alternative (1-mile eastern bridge). The current unnatural altered hydrologic conditions within the vicinity of the project area would continue to have a negative impact on floodplain functions and values within the WCAs, Everglades National Park, and Northeast Shark River Slough. No short- or long-term negative or beneficial effects to floodplains would result from the selection of the No-Action Alternative.</p> <p>Consequently, there would be no impairment to floodplain functions and values as a result of the No-Action Alternative.</p>	<p>Alternative 1 will have a short-term, adverse, minor, localized effect on floodplain values and functions associated with project construction including diminished ability of the floodplain to convey storm and flood events due to temporary fill and rerouting of water flow. However, long-term impacts to floodplain functions and values would be beneficial based on the additional capacity the floodplain would have to convey storm and flood events.</p> <p>There would not be an impairment of floodplain functions and values as a result of the implementation of Alternative 1.</p>	<p>Same as Alternative 1, with incremental differences due to bridge length.</p>	<p>Same as Alternative 1, with incremental differences due to bridge length.</p>	<p>Same as Alternative 1, with incremental differences due to bridge length.</p>	<p>Same as Alternative 1, with incremental differences due to bridge length.</p>



Table 2-13 – Summary of Environmental Consequences by Alternative

Impact Topic	No-Action Alternative – 1.0 mile of bridging	Alternative 1 – 2.2 miles of bridging ¹³	Alternative 2a – 3.3 miles of bridging ¹³	Alternative 4 – 1.0 mile of bridging ¹³	Alternative 5 – 1.5 miles of bridging ¹³	Alternative 6e – 5.5 miles of bridging ¹³
Wildlife and Vegetation/Habitat	<p>If no action is taken, there would be no additional direct or indirect short- or long-term impacts on wildlife or vegetation/habitats other than those already realized from construction of the 2008 LRR/EA preferred alternative (1-mile eastern bridge). The current unnatural altered hydrologic conditions within the vicinity of the project area would continue to have a negative impact on wildlife habitat and vegetation in Everglades National Park, and Northeast Shark River Slough and movement of wildlife between Northeast Shark River Slough and the WCAs would continue to be hindered by the presence of Tamiami Trail. No short- or long-term adverse or beneficial effects to wildlife and vegetation/habitats would result from the selection of the No-Action Alternative.</p> <p>Consequently, there would be no impairment to wildlife and vegetation/habitats as a result of the No-Action Alternative.</p>	<p>Short-term, negligible to minor, adverse, localized impacts to wildlife and vegetation/habitats would result from the construction of Alternative 1. Long-term beneficial effects to wildlife and habitat would result from the increased ecological connectivity provided through the implementation of Alternative 1. Consequently, there would be no impairment of wildlife and habitat as a result of the action alternatives.</p>	<p>Same as Alternative 1, with incremental differences due to bridge length.</p>	<p>Same as Alternative 1, with incremental differences due to bridge length.</p>	<p>Same as Alternative 1, with incremental differences due to bridge length.</p>	<p>Same as Alternative 1, with incremental differences due to bridge length.</p>



Table 2-13 – Summary of Environmental Consequences by Alternative

Impact Topic	No-Action Alternative – 1.0 mile of bridging	Alternative 1 – 2.2 miles of bridging ¹³	Alternative 2a – 3.3 miles of bridging ¹³	Alternative 4 – 1.0 mile of bridging ¹³	Alternative 5 – 1.5 miles of bridging ¹³	Alternative 6e – 5.5 miles of bridging ¹³
Land Use	<p>Under the No-Action Alternative, there would be no additional direct or indirect short- or long-term effects on land use other than those already realized from construction of the 2008 LRR/EA preferred alternative (1-mile eastern bridge). The current land uses along the project corridor consisting of a mix of transportation, preserve, recreational, and commercial uses would remain unchanged. No short- or long-term negative or beneficial effects to land use would result from the selection of the No-Action Alternative.</p> <p>There would be no impairment of land use as a result of the No-Action Alternative.</p>	<p>Implementation of Alternative 1 would have a minor, short-term, localized, adverse impact associated with project construction and a long-term, localized, adverse, minor impact on land use in association with the conversion of existing land uses to transportation corridor.</p> <p>There would not be an impairment of land use as a result of the implementation of Alternative 1.</p>	<p>Same as Alternative 1, with incremental differences due to bridge length.</p>	<p>Same as Alternative 1, with incremental differences due to bridge length.</p>	<p>Same as Alternative 1, with incremental differences due to bridge length.</p>	<p>Same as Alternative 1, with incremental differences due to bridge length.</p>



Table 2-13 – Summary of Environmental Consequences by Alternative

Impact Topic	No-Action Alternative – 1.0 mile of bridging	Alternative 1 – 2.2 miles of bridging ¹³	Alternative 2a – 3.3 miles of bridging ¹³	Alternative 4 – 1.0 mile of bridging ¹³	Alternative 5 – 1.5 miles of bridging ¹³	Alternative 6e – 5.5 miles of bridging ¹³
Special Status Species	<p>If no action is taken, there would be no additional direct or indirect short- or long-term impacts on special status species other than those already realized from construction of the 2008 LRR/EA preferred alternative (1-mile eastern bridge). The current unnatural altered hydrologic conditions within the vicinity of the project area would continue to have a negative impact on special status species in Everglades National Park and Northeast Shark River Slough and movement of wildlife between Northeast Shark River Slough and the WCAs would continue to be hindered by the presence of Tamiami Trail. No short- or long-term adverse or beneficial effects to special status species would result from the selection of the No-Action Alternative.</p> <p>Consequently, there would be no impairment to special status species as a result of the No-Action Alternative.</p>	<p>Under Alternative 1, short-term disturbances to special status species and their habitat would occur from construction-related noise and vibration that causes special status species to flee from construction areas and the close proximity. However, these adverse effects are expected to be limited to the timeframe of construction and wildlife is expected to fully return to the project area following completion of construction. Therefore, these adverse impacts to special status species are expected to be moderate, localized, and short-term. Long-term impacts to special status species would be adverse, localized, and range in intensity from negligible to major, dependent upon the species. This Alternative may affect but is not likely to adversely affect the Florida panther, West Indian manatee, eastern indigo snake, Cape Sable seaside sparrow, and snail kite. The Alternative may adversely affect the wood stork. Additionally, a water operations plan is being developed for the L-29 Canal; however, since it has not been completed, project benefits cannot yet be fully realized. Potential benefits that would occur once an operational plan is defined and executed include enhancement of degraded habitats within the Northeast Shark River Slough system, benefiting special status species. It is highly likely that implementation of Alternative 1 in conjunction with the operational plan is self-mitigating, and that permanent and temporary impacts to special status species and their habitats associated with the construction of the proposed project would be offset by the enhancement to special status species' habitats. However, long-term effects to habitats resulting from operations currently remain unknown. Since there is uncertainty as to the level of habitat improvements that would be achieved, an off-site mitigation plan would be implemented should anticipated project benefits not adequately offset the project's impacts to special status species' habitats. Consequently, there would be no impairment of special status species as a result of implementation of Alternative 1.</p>	<p>Same as Alternative 1, with incremental differences due to bridge length.</p>	<p>Same as Alternative 1, with incremental differences due to bridge length.</p>	<p>Same as Alternative 1, with incremental differences due to bridge length.</p>	<p>Same as Alternative 1, with incremental differences due to bridge length.</p>



Table 2-13 – Summary of Environmental Consequences by Alternative

Impact Topic	No-Action Alternative – 1.0 mile of bridging	Alternative 1 – 2.2 miles of bridging ¹³	Alternative 2a – 3.3 miles of bridging ¹³	Alternative 4 – 1.0 mile of bridging ¹³	Alternative 5 – 1.5 miles of bridging ¹³	Alternative 6e – 5.5 miles of bridging ¹³
Wilderness	<p>Under the No-Action Alternative, there would be no additional direct or indirect short- or long-term effects to wilderness other than those already realized from construction of the 2008 LRR/EA preferred alternative (1-mile eastern bridge). The current unnatural altered hydrologic conditions within the vicinity of the project area would continue to have a negative impact on the wilderness character and experience within the WCAs, Everglades National Park, and Northeast Shark River Slough. No short- or long-term negative or beneficial effects to wilderness would result from the selection of the No-Action Alternative.</p> <p>There would be no impairment of wilderness as a result of the No-Action Alternative.</p>	<p>Minor, short-term, localized, adverse impacts would occur from the implementation of Alternative 1 as a result of noise, vibrations, and dust generated during construction activities. Minor, long-term, localized, adverse effects to wilderness would also occur from the implementation of Alternative 1 as a result of direct footprint impacts to wilderness. Beneficial effects would result from improved connectivity and potential for improved hydrologic flow in the project area and Everglades National Park.</p> <p>There would be no impairment of wilderness as a result of Alternative 1.</p>	<p>Same as Alternative 1, with incremental differences due to bridge length.</p>	<p>Same as Alternative 1, with incremental differences due to bridge length.</p>	<p>Same as Alternative 1, with incremental differences due to bridge length.</p>	<p>Same as Alternative 1, with incremental differences due to bridge length.</p>
Cultural Resources	<p>Under the No-Action Alternative, there would be no additional direct or indirect short- or long-term impacts on cultural resources other than those already realized from construction of the 2008 LRR/EA preferred alternative (1-mile eastern bridge). No short- or long-term adverse or beneficial effects to cultural resources would result from the selection of the No-Action Alternative.</p> <p>Consequently, there would be no impairment of cultural resources as a result of the No-Action Alternative.</p>	<p>It is concluded that the proposed project would have minor, adverse, short-term effects on cultural resources associated with use of temporary construction easements. The project would additionally have minor to major adverse long-term effects on cultural resources associated with the construction and operation of the project.</p> <p>Consequently, there would be no impairment of cultural resources as a result of implementation of Alternative 1.</p>	<p>Same as Alternative 1, with incremental differences due to bridge length.</p>	<p>Same as Alternative 1, with incremental differences due to bridge length.</p>	<p>Same as Alternative 1, with incremental differences due to bridge length.</p>	<p>Same as Alternative 1, with incremental differences due to bridge length.</p>



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Visitor Use and Experience	<p>Under the No-Action Alternative, there would be no additional direct or indirect short- or long-term effects on visitor use and experience other than those already realized from construction of the 2008 LRR preferred alternative (1-mile eastern bridge). Visitor use activities (i.e. boating, airboating, fishing, wildlife observation, etc.) would be expected to continue as currently practiced within the study area. Additionally, no impacts would be expected to the number of visitors who currently patron Everglades National Park. No short- or long-term negative or beneficial effects to visitor use and experience would result from the selection of the No-Action Alternative.</p>	<p>Short-term impacts caused by construction of Alternative 1 would cause visitors utilizing the section of Tamiami Trail within the project corridor to experience minor to moderate inconveniences such as lane closures; reduced speed limits; reduced accessibility to visitor facilities/activities; construction-related noise and vibration; reduced quality of wildlife-related recreational activities caused by construction-related noise and vibration impacts that cause wildlife to flee from construction areas; construction-related dust and fumes; and the visual presence of construction vehicles and heavy equipment in construction zones. Visitors would also experience some long-term beneficial effects (i.e., increased wildlife, increased aesthetic qualities, etc.) from the implementation of Alternative 1. However, most aspects of visitor use and experience would experience no change or a negligible change due to the implementation of Alternative 1 proposed for the project. Therefore, minor to moderate, short-term, localized, adverse impacts and long-term beneficial effects to visitor use and experience would result from the implementation of Alternative 1.</p>	<p>Same as Alternative 1, with incremental differences due to bridge length.</p>	<p>Same as Alternative 1, with incremental differences due to bridge length.</p>	<p>Same as Alternative 1, with incremental differences due to bridge length.</p>	<p>Same as Alternative 1, with incremental differences due to bridge length.</p>



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Park Management and Operations	<p>Under the No-Action Alternative, there would be no additional direct or indirect short- or long-term effects on park management and operations other than those already realized from construction of the 2008 LRR preferred alternative (1-mile eastern bridge). Activities associated with park management and operations (e.g., education and interpretation, maintenance, and enforcement) would be expected to continue as currently practiced within Everglades National Park. No short- or long-term negative or beneficial effects to park management and operations would result from the selection of the No-Action Alternative.</p>	<p>Activities associated with park management and operations (e.g., education and interpretation, maintenance, and enforcement) would experience no long-term impact due to the implementation of Alternative 1. A minor, localized, adverse impact on park management might occur in the short-term due to oversight of construction activities that would be required as a result of implementation of Alternative 1.</p>	<p>Same as Alternative 1, with incremental differences due to bridge length.</p>	<p>Same as Alternative 1, with incremental differences due to bridge length.</p>	<p>Same as Alternative 1, with incremental differences due to bridge length.</p>	<p>Same as Alternative 1, with incremental differences due to bridge length.</p>



Table 2-13 – Summary of Environmental Consequences by Alternative

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Noise/Soundscapes	<p>Traffic levels along the Tamiami Trail are predicted to grow from the current level of 5,800 vehicles per day (vpd) to 7,200 vpd by 2038 regardless of project construction. Design Year highway noise levels at noise sensitive sites (Flight 592 Memorial, Osceola Camp, and Tiger Tail Camp) along the project corridor are predicted to only increase by an average of approximately 1 dBA from the existing conditions, far less than the 3 dBA minimum threshold where most people can detect a change in the sound environment. This slight noise level increase is due to naturally occurring growth in traffic volumes expected by 2038. No short-term impacts and localized, negligible, long-term, adverse impacts to soundscapes would result from the selection of the No-Action Alternative.</p> <p>Consequently, there would be no impairment to soundscapes as a result of the No-Action Alternative.</p>	<p>By following the NPS management practices and FDOT standards, no impairment or unacceptable impacts to noise sensitive sites in the project study area are expected to occur as a result of construction of this project. Likewise, considering the existing conditions and the long-established presence of traffic along the Tamiami Trail, the negligible increase in highway noise predicted to occur with the action alternatives is not expected cause operation and maintenance of this project to result in impairment or unacceptable impacts to nearby noise sensitive sites or the park's soundscape. Therefore it is concluded that the proposed project would cause short-term, moderate, adverse, localized, effects to the park's soundscape associated with project construction, however there would be no long term effects associated with the project's operation.</p> <p>Consequently, there would be no impairment to soundscapes as a result of implementation of Alternative 1.</p>	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.
Socioeconomics	<p>Under the No-Action Alternative, there would be no additional direct or indirect short- or long-term impacts on socioeconomics other than those already realized from construction of the 2008 LRR preferred alternative (1-mile eastern bridge). Commercial activities would be expected to continue as currently practiced within the study area. No short- or long-term adverse or beneficial effects to socioeconomics would result from the selection of the No-Action Alternative.</p>	<p>Implementation of Alternative 1 would have some positive effect on employment, gross output, and the gross regional product of Miami-Dade County; and to a lesser extent, the State of Florida, and any social impacts would be minimal. Therefore, the long-term impacts from the selection of Alternative 1 would be beneficial.</p>	Same as Alternative 1, with incremental differences due to bridge length	Same as Alternative 1, with incremental differences due to bridge length	Same as Alternative 1, with incremental differences due to bridge length	Same as Alternative 1, with incremental differences due to bridge length



Table 2-13 – Summary of Environmental Consequences by Alternative

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Transportation	Under the No-Action Alternative, there would be no additional direct or indirect short- or long-term impacts on transportation other than those already realized from construction of the 2008 LRR preferred alternative (1-mile eastern bridge). Transportation/traffic would be expected to remain unchanged. No short- or long-term adverse or beneficial effects to transportation would result from the selection of the No-Action Alternative.	Transportation impacts associated with Alternative 1 would be adverse, local, minor, and short-term and primarily associated with traffic delays related to construction activities. Mitigation of these effects would be through implementation of maintenance of traffic (MOT) plan. No long-term impacts associated with increases in traffic levels are expected.	Same as Alternative 1, with incremental differences due to bridge length.	Same as Alternative 1, with incremental differences due to bridge length.	Same as Alternative 1, with incremental differences due to bridge length.	Same as Alternative 1, with incremental differences due to bridge length.
Hazardous, Toxic, and Radioactive Waste	No short- or long-term adverse or beneficial effects resulting from the presence of hazardous, toxic or radioactive wastes would result from the selection of the No-Action Alternative.	The Implementation of this alternative may lead to a long-term, adverse, negligible to moderate, localized impact to the environment due to contamination by hazardous or toxic waste.	Same as Alternative 1.	The implementation of Action Alternative 4 may lead to a long-term, adverse, negligible, localized effect to the environment due to contamination by hazardous or toxic waste.	Same as Alternative 1.	Same as Alternative 1.



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**EVERGLADES NATIONAL PARK
TAMIAMI TRAIL MODIFICATIONS: NEXT STEPS
DRAFT ENVIRONMENTAL IMPACT STATEMENT**



**CHAPTER 3
AFFECTED ENVIRONMENT**

CHAPTER 3: AFFECTED ENVIRONMENT

This chapter of the Environmental Impact Statement describes existing environmental conditions in the areas potentially affected by the alternatives. This section addresses the following impact topics: geologic resources/soils, water resources (hydrology, wetlands, water quality, and floodplains), wildlife and vegetation, land use, special status species, wilderness/unique ecosystems, cultural resources, visitor use and experience, park management and operations, noise/soundscapes, socioeconomics, transportation, and hazardous/toxic/radioactive waste.

3.1 Geology, Topography, and Soils

Everglades National Park is located at the southern tip of the Florida peninsula. In general, this area consists of a very low, flat topography that is comprised mainly of limestone, which is relatively soft, permeable, and prone to erosion (Crisfield et al., 2005). The lower freshwater Everglades are defined by two subtle limestone topographic highs, a Pliocene ridge to the northwest and a Pleistocene ridge to the southeast. The mainland portion of Everglades National Park overlies the unconfined Surficial Aquifer System (SAS), which consists of Miocene to Holocene age siliciclastic and carbonate sediments and varies in thickness from 165 feet to 270 feet. It contains two named carbonate aquifers (Gray Limestone Aquifer and Biscayne Aquifer) and two layers of siliciclastic sediments. The Hawthorn Group forms the base of the SAS. The 550 to 800 foot thick sequence of low permeable sediments of the Hawthorn Group makes it an effective confining unit for the underlying Floridan Aquifer System. In South Florida, the Floridan Aquifer occurs between depths of 820 and 3,280 feet below the land surface and is artesian with a potentiometric surface of about 40 feet above the land surface. The Biscayne Aquifer forms the top of the SAS, and is the principle source of water supply for South Florida. The Biscayne Aquifer is an unconfined karst aquifer dominantly composed of highly porous units of the Fort Thompson and Miami Limestone Formations with the Key Largo formation inter-fingering in some areas. The Biscayne aquifer contains high permeability limestone and calcareous sand units and ranges in thickness from 0 to 80 feet, increasing in thickness toward the east. In many portions of Everglades National Park, the Biscayne Aquifer is overlain by marl and peat deposits (Price, 2003).

Throughout the park, marl, peat, sand, and rock outcroppings are the four most common soils and substrate types. The soils occurring within the northern region of the Everglades Expansion Area are mainly characterized as peat or marl. Peat is formed over decades under anaerobic conditions during long periods of inundation, in which the volume of decaying plant material exceeds the ability of microbes to decompose it. Peat deposits lie beneath the surface soils of about one million acres of the central Everglades, or one-third of ENP (NPS, 1997). The northeastern Everglades and Shark River Slough are typified by Loxahatchee peat, a peat type that occurs within the deepest marsh areas that contain remnants of slough vegetation, namely that of *Nymphaea odorata* (white water-lily) (Lodge, 2005). Once exposed to air, microbe populations increase and decomposition accelerates, leading to soil loss. Soil loss and soil subsidence has occurred throughout the Everglades, including the areas in the sawgrass marsh, which subsided from early drainage activities (Ingebritsen et al., 2005) and an associated increased occurrence of unnatural fires.

Marls are the most widespread soil type within the park and are mixtures of calcium-bearing fine sediments with calcite particles, sand, and/or shell fragments. Marls are formed by precipitation of calcite from large mats of submerged blue-green algae called periphyton. These soils were formed in relatively shallow waters with a shorter period of inundation (50 to 150 days each year) and therefore have higher rates of microbial activity and decomposition of organic matter.



These are the soils that cover the extensive peat deposits of the central Everglades (NPS, 1997) and dominate the short-hydroperiod wet prairies near the edges of the southern Everglades (Lodge, 2005).

The soils within the project area consist mainly of the Lauderhill-Dania-Pahokee Association, which is characterized by nearly level, poorly drained soils containing organic material eight to over 51 inches deep over limestone bedrock. These soils are typically black to dark brown, underlain by soft porous limestone, and are characterized by high subsidence, ponding, excess humus, and low strength.

Soils play an important role in the uptake of nutrients within oligotrophic wetland systems such as the Everglades. Soils become phosphorus enriched following the capacity of the biota to uptake phosphorus from the water column or detritus (Gaiser et al., 2005). Community structure has been shown to be altered by even minute phosphorus inputs to the system of 5 µg/L above ambient conditions; within a spikerush/periphyton community in central Shark River Slough, this caused changes in soils after three years (Gaiser et al., 2005; Gaiser et al., 2007).

Ross et al. (2003) reported tall sawgrass (*Cladium jamaicense*) stands in northern Shark River Slough that were associated with thicker soils than throughout the rest of the Shark River Slough, but within Northeast Shark River Slough soils thin from west to east, becoming highly calcareous in drier eastern areas. Gaiser et al. (2009) reported that most of the soils in the Northeast Shark River Slough could be considered organically-enriched mineral soils as given by the organic matter contents (OM%) averaging around 30% (**Table 3-1**). Reddy et al. (2009) described soils of the Shark River Slough as shallow to deep histosols (*euic, hyperthermic, lithic haplosaprists*) that are normally inundated year round. The organic matter content of the soil might be especially important to nutrient dynamics as the Pearson Product Moment Correlations showed that the OM% was significantly correlated to total phosphorous (TP) concentration when soil samples from all sites and events were combined for each depth increment and when the data was parsed by soil depth (Gaiser et al. 2009).

Table 3-1 – Selected physicochemical parameters measured in soils at different monitoring sites (Figure 3-1) in September 2006 and September 2008 in Northeast Shark River Slough (Gaiser et al. 2009)

Total Phosphorus (µg/g)	Mean ± SE	Data size	Min	Max
September 2006				
0-2 cm	248.83 ± 24.55	30	103.18	666.85
2-10 cm	219.97 ± 19.33	30	47.29	596.88
10-20 cm	178.90 ± 21.92	20	48.40	495.94
September 2008				
0-2 cm	249.09 ± 21.74	30	129.77	580.48
2-10 cm	216.62 ± 15.61	30	117.81	472.90
10-20 cm	137.83 ± 17.67	22	27.99	303.85
Organic Matter (%)	Mean ± SE	Data size	Min	Max
September 2006				
0-2 cm	32.60 ± 2.64	30	13.36	70.81
2-10 cm	30.51 ± 3.46	30	5.59	73.05
10-20 cm	27.81 ± 4.13	26	3.97	79.19
September 2008				
0-2 cm	36.79 ± 3.65	30	12.56	89.28
2-10 cm	32.15 ± 4.34	30	9.19	84.97
10-20 cm	32.18 ± 6.00	22	5.72	87.81

Soil depths are generally lowest on sites on the southeastern boundary of Northeast Shark River Slough. Soil depth ranged from 3 to more than 100 centimeters (cm) and was significantly correlated to water depth, being significantly shallower in the southeastern sites than sites to the



west and north of Northeast Shark River Slough (Gaiser et al., 2009). The TP concentration of soils tends to decrease with depth with surface soils having greater average TP concentration than at deeper depths (**Table 3-1**). Concentrations of TP in the 0 to 2 cm soil surface layer were higher in the northeastern and eastern portion of the study area during the 2006 sampling, but this pattern was not observed in the 2008 sampling (Gaiser et al. 2009). The TP concentrations in soil at two sites (2 and 4, **Figure 3-1**) located close to the Tamiami Trail in the northeast corner averaged ~400 µg/g (0-2 cm depth), ~280 µg/g (2-10 cm depth), and ~170 µg/g (10-20 cm depth). The northeastern corner of the study area (**Figure 3-1**) appears to have higher TP concentrations in the 2 to 10 cm soils in Northeast Shark River Slough (Gaiser et al. 2009).

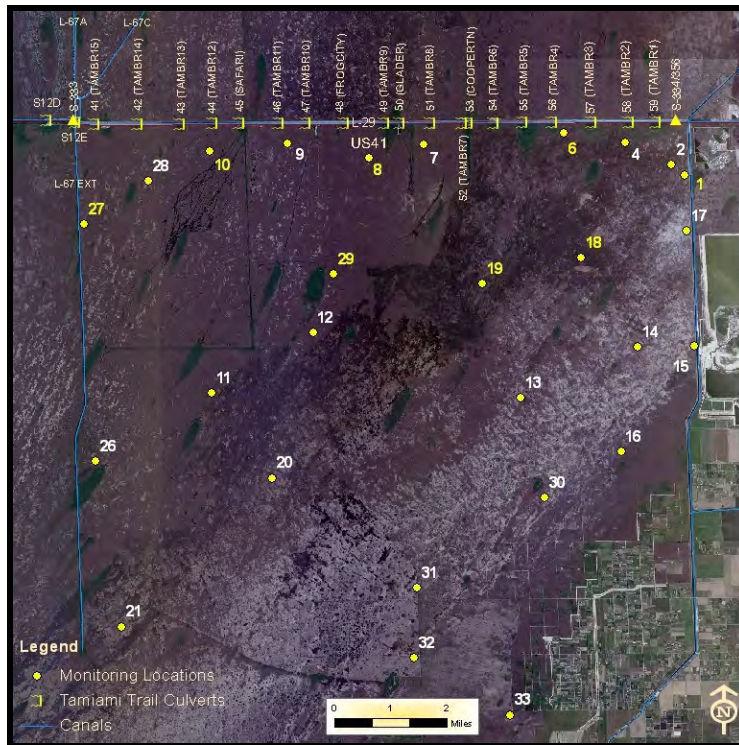


Figure 3-1 – Northeast Shark River Slough monitoring sites

Note: Yellow numbers show subset of sentinel sites (Gaiser et al. 2009)

Two transects were established in Shark River Slough to monitor soil nutrient enrichment (Reddy et al., 2009). Transect-2 was located south of the S-12D discharge structure, and Transect-3 was located south of Tamiami Bridge (**Figure 3-2**). Reddy et al. (2009) concluded from the soil survey at these transects that:

- Transect-2 exhibited phosphorus enrichment (soil TP exceeding 500 mg/kg) to about 3,000 m downstream of the L-29 canal (**Figure 3-3**);
- Transect-3 showed moderate phosphorus enrichment (soil TP exceeding 500 mg/kg) proximal to the outfall-29 canal, but not high respective of Transect-2 (**Figure 3-3**).





Figure 3-2 – Soil sampling locations downstream of L-29 Canal on two transects west (Transect-2) and east (Transect-3) of L-29 Canal (Reddy et al., 2009)

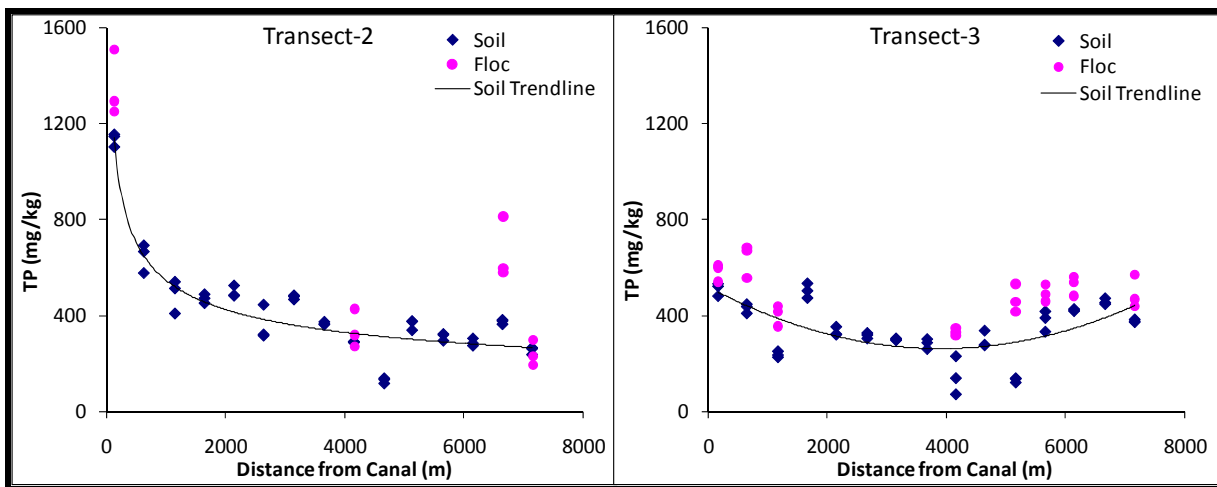


Figure 3-3 – TP in soil and floc for two transects in ENP proximal to L-67 Extension Canal (Reddy et al., 2009)

Since the Tamiami Trail was constructed, sediment has accumulated in the sloughs downstream of the road, due to the influx of high levels of sediments and nutrients that are being continuously funneled through the culvert sets.

The pre-drainage Everglades ridge and slough system was a network of discreet elevated sawgrass strands (ridges) with wide expanses of open water sloughs encompassing WCA-3B and Shark River Slough interspersed with tree islands (SCT, 2003; Gunderson, 1994; Gunderson and Loftus, 1993). The ridges and sloughs were organized in a pattern oriented parallel to the direction of flow; thus, it has been hypothesized that flow volumes in the pre-drainage ridge and slough system were largely responsible for maintaining the sharply discreet community and elevation differences between the ridges and sloughs (Sklar et al., 2000). The sloughs, deeper than the ridges, were the primary habitat for aquatic animals during dry periods,



and were the most important wading bird foraging habitats in the Everglades. The historic slough vegetation communities were characterized by floating, submerged, and some emergent species found in areas with the longest hydroperiods and deepest water that normally did not dry down.

The reduced water storage capacity of the managed Everglades and the compartmentalization of the northern and central ridge and slough system, have slowed flow rates, have created areas that are either overdrained or are more deeply flooded than was the case in the pre-drainage system, have substantially altered the effects of fire on the marsh communities, and have altered the rates and magnitude of flooding and drying events suppressing the natural processes and functions within Northeast Shark River Slough. Substantial increases in levels of total phosphorus in water and soil have converted both ridge and slough communities into extensive beds of cattails (*Typha* sp.) (Davis et al., 1994; Sklar et al., 2000). The paleoenvironmental seed record has shown that deep water slough plant communities such as those dominated by deep water slough species such as white water lily (*Nymphaea odorata*) within Northeast Shark River Slough have largely been replaced by vast stretches of sawgrass and other species thought to be more characteristic of the transitional ridge environment (Richards et al., 2009).

It is clear that the compartmentalization and related water management activities, which have altered flow and other hydrological parameters such as water levels, are resulting in the loss of ridge and slough landscape. A flattening of the landscape due to a decreased difference between ridge elevations and the elevations of the slough bottoms has occurred, and an associated blurring of the distinct, directional pattern of ridge and slough vegetation. Evidence for this loss arises from alterations in vegetation patterns over time and indications of altered topography. The post-drainage alterations in landscape topography show a clear trend from a highly organized, strongly directional pattern to a degraded, more random, and less directional pattern.

3.2 Water Resources

3.2.1 Hydrology

Historical and Current Conditions

The Everglades once covered nearly four thousand square miles from Lake Okeechobee to Florida Bay and the Gulf of Mexico. The original condition of the Everglades clearly showed that they were a flow-way, where shallow water derived from direct rainwater and from wet-season overflows from Lake Okeechobee moved southward as sheet flow, not channelized flow as in rivers and streams. Although the flow direction was understandably based on the slope of the terrain, the most impressive evidence of flow came from the shape of plant communities in the landscape. A directional pattern was observed by early explorers and seen on older aerial photographs to have defined most of the Everglades. The orientation of plant communities – deeper sloughs, sawgrass “ridges,” and tree islands with downstream “tails” – is called ridge and slough landscape. The Northeast Shark River Slough portion of Everglades National Park was fully part of this landscape. Today, ridge and slough landscape only remains in limited areas of the Everglades, and is highly degraded in Northeast Shark River Slough.

Historical Flow Patterns

The historic Everglades were part of a much larger drainage system, originating in south-central Florida in what is now known as the Upper Chain of Lakes near Kissimmee, Florida. The lake system formed the headwaters of the Kissimmee River, a 100-mile-long, meandering, low



gradient river that emptied into Lake Okeechobee. The lake, much larger than its present-day surface area of 1,750 km², would spill over its southern rim during high water events into the northern part of the Everglades, dominated by vast sawgrass plains. Eventually, the southward movement of water through the sawgrass plains formed the source of water for the ridge and slough landscape. In this sense, the historic Everglades may be viewed as the lower reaches of the Kissimmee River (SCT, 2003).

The central feature of the pre-drainage Everglades hydrology was a 30-mile-wide expanse of relatively shallow water moving downstream through the low-gradient (Northeast Shark River Slough) wetland landscape. The pattern of water flow was remarkable for its regional uniformity across such a broad expanse, and for the absence of any central drainage channel or of any dendritic drainage pattern. Pine flatwoods formed most of the eastern boundary of this flow, and the western boundary was defined by the Immokalee Rise and the relatively higher wetlands and uplands of what is now the Big Cypress National Preserve. Much of the flow discharged south and west through Shark River Slough, through the mangrove estuaries of the southwestern coast, into the Gulf of Mexico. South of and including the New River (Fort Lauderdale), the pine flatwoods were absent and the Atlantic Coastal Ridge became discontinuous, forming a series of islands separated by coastal rivers. These rivers thus resulted in a portion of the flow being discharged eastward into Biscayne Bay and the Atlantic Ocean. The remainder of the flow discharged southward through Taylor Slough into Florida Bay. Because of Florida's porous geology dominated by limestone overlain by thick peat deposits, the boundaries between surface water and ground water flow are not always distinct (SCT, 2003).

The Everglades ecosystem is thought to have been formed over the last 5,000 years as sea levels rose and precipitation increased, promoting water retention in a shallow inland basin, and the portion of the basin south of Lake Okeechobee filled in with peat. The result of peat accumulation in this bedrock basin was the formation of a peat surface, level in the east-west direction, and with a slight north-to-south downward slope. The concavity of the bedrock, coupled with the east-west levelness of the peat, resulted in thicker peat deposits in the middle of the basin and thinner deposits along the edges. By the 1880s, peat had accumulated to about 21 feet above sea level along the south shore of Lake Okeechobee, and had formed the northern edge of a north-to-south elevation gradient that is now less than 3 inches per mile. The southward flow of water down this gradient is thought to have formed to maintain the ridge and slough pattern so characteristic of the Everglades (SCT, 2003).

Everglades' plant and animal communities evolved under the conditions imposed by this flow, within a sub-tropical climate, and under the constraints of nutrient limitation. The habitat types that evolved included vast sawgrass plains south of Lake Okeechobee, in the region presently occupied by the Everglades Agricultural Area. South and east of the sawgrass plains was the ridge and slough habitat, including what are now Water Conservation Areas 1, 2, and 3, and Everglades National Park. Marl prairies – short hydroperiod marshes with marl sediments – occupied slightly higher elevations east and west of Shark River Slough. The mangrove zone was located from the Ten Thousand Islands south and east around the tip of Florida's peninsula to the shores of Biscayne Bay (SCT, 2003).

Drainage Activities

The first major efforts to drain the Everglades came with Hamilton Disston, an industrialist and real-estate developer. By the 1890s, he had drained over 50,000 acres of wetlands, opened the Kissimmee River for navigation, and linked the Caloosahatchee River to Lake Okeechobee. In addition, he is credited with excavating the first 11 miles of canal south of Lake Okeechobee in the direction of Miami – the precursor to the Miami Canal. By 1917, four major muck-scalped



canals traversed the Everglades from Lake Okeechobee to the Atlantic Ocean, short-circuiting the historic, north-to-south pattern of flow and greatly accelerating the removal of water from the Everglades. It has been hypothesized that flow magnitudes through the river of grass were significantly higher in the 1800s and early 1900s versus what has been monitored since 1939). Patterns of peat subsidence water tables measured in 1915, and continuously between 1927 and 1939, all suggest that these canals substantially lowered water levels in the northern Everglades, often below the peat surface (SCT, 2003).

Local efforts to surround Lake Okeechobee with a levee began in the early 1900s and were completed with the construction of a levee completely encircling the lake by the mid 1900s. All surface water inflow and outflow points (except one at Fisheating Creek) are now controlled by pumps and/or water control structures.

Major alterations of the Everglades began to take effect with flood control efforts in the second decade of the 1900s, initially designed to reduce water levels in Lake Okeechobee. By the 1910s, Miami was expanding, and plans to drain and develop parts of the Everglades were pursued (SCT, 2003). By 1926, six major canals diverted Okeechobee's waters to tide, lowering the lake and removing much of the Everglades headwaters that affected even the southern Everglades, home of the future Everglades National Park. Captain Frank Jaudon, seeking to drain what is now called Northeast Shark Slough, successfully lobbied for creation of Tamiami Trail. Objectors at the time raised what turned out to be a legitimate concern, that the road bed would act as a dam, blocking the southward flow of water out of what is now Water Conservation Area 3B. In 1928, the Tamiami Trail (U.S. Highway 41) and Tamiami Canal were completed. Wooden bridges were constructed completely across the Everglades to accommodate flow; this construction is believed to have been completed by 1939, which is when the first discharge measurements were taken. Concrete culvert sets in Northeast Shark River Slough were installed around 1952. The Tamiami Trail was to become the northern boundary of Everglades National Park. Photos from the 1930s show water occasionally spilling over the top, but aerial photos from 1940 suggest that in just 12 years, Tamiami Trail had created two separate landscape types, north and south, where once there had been a continuous landscape type. These early alterations of the hydrology of the Everglades had observed effects, noted in a 1938 reconnaissance report for the future national park, and in mapping of Everglades vegetation done based on 1940 aerial photographs (SCT, 2003). The construction of Tamiami Trail and WCA-3 impounded and altered the slough, effectively creating a barrier through the Everglades, between the northern Everglades and ENP.

Combined with droughts, notably in the early 1940s, the early drainage system excessively depleted waters of the Everglades, causing major soil fires and impairing freshwater supplies for people. Alternatively, the hurricanes in 1926, 1928, and 1947 showed the inadequacy of drainage works in protecting developing agricultural and urban lands from overwhelming floods. Of particular interest are the two hurricanes of 1947, which demonstrated that rainfall on the Everglades, without the full overflows of Lake Okeechobee, could still raise waters to excessive depths, estimated to have been six to eight feet deep over vast areas of the central Everglades. Accordingly, the Tamiami Trail was overtopped and impassible for weeks. After water had receded enough to allow access to the Tamiami Trail, an eye-witness account related how the water flowing under Tamiami Trail was causing large whirlpools while water was still flowing over the road.

The widespread severity of flooding in 1947 led to the C&SF Project. The C&SF project's many constructed features included three water conservation areas to conserve water and provide for Everglades wildlife. Water Conservation Area 3 was developed with its south-end levee along the Tamiami Trail. Completed in 1963, WCA-3 was divided into two parts – the huge western



part, WCA-3A, and the smaller eastern WCA-3B. Separated by a pair of levees, the L-67A and L-67C were designed to route water westward. Water Conservation Area 3B received relatively little water and has gradually deteriorated by the loss of its ridge and slough landscape character. Water Conservation Area 3A serves as an impoundment with regulated releases, altered flow, and water depths that have damaged important wildlife values. Much of the signature of ridge and slough landscape was retained, however, especially in lower-central WCA-3A.

Water Conservation Area 3A was constructed with four control gates along the Tamiami Trail to provide flows into Everglades National Park. Additionally, a 9-mile levee was constructed south from the Trail along the east side of the park, the “L-67 Extension,” to prevent water from moving eastward from the park into Northeast Shark River Slough and to carry water deeper into Everglades National Park. Until 1989, the Park only bordered the Tamiami Trail from the center of the Everglades west to the border with the Big Cypress Swamp at 40-mile Bend – the 10-mile-wide western side of the Shark River Slough. No provision was made to transfer water from WCA-3B to the east side of the Shark River Slough south of the Trail – the Northeast Shark River Slough. Some of the land ownership in the Northeast Shark River Slough was private, and surface flows reached the area only through culvert sets connecting with the Tamiami Canal under the Tamiami Trail. Northeast Shark River Slough remained over-drained as it had been for many years. Until the S-333 water control structure was operational in the early 1980s, there was no inflow or outflow for the section of Tamiami Canal from L-67 to L-30 – essentially, the canal was a lake and the only sources of water were seepage from WCA-3B and rainfall. The source of surface flows didn’t change after Northeast Shark River Slough became part of Park. The source of water to Tamiami Canal changed with addition of the S-333 water control structure.

In 1989, Everglades National Park was expanded by adding 107,600 acres of Northeast Shark River Slough, called the “East Everglades Expansion Area.” Plans to improve water flows into Northeast Shark River Slough began – a program called Modified Water Deliveries (MWD) or “Mod Waters.” While that work was developing, the separate and far broader Everglades restoration initiative, called the “Restudy,” began in 1992, and became the Comprehensive Everglades Restoration Plan (CERP) after acceptance by Congress in 2000. Research on flows in the pre-drainage Everglades, using the “Natural System Model” developed for CERP, showed that the eastern half of Shark River Slough, including Northeast Shark River Slough, had (on average) originally carried greater than 65% of the Everglades flows, with less than 35% on the western half. Conversely, the routing established by the C&SF project put 78% of modern flows to the west, and only 22% through Northeast Shark River Slough.

Current Surface Water Conditions

Levees and canals constructed during the last 50 years under the C&SF project have divided the former Everglades into areas designated for development and areas for fish and wildlife benefits, natural system preservation, and water storage. The natural areas consist of the three WCAs located north of Tamiami Trail and ENP to the south. Water flow in the vicinity of the project is primarily from WCA-3A through the S-12 structures directly into marsh in western Shark River Slough, and through the S-333 structure into the L-29 Canal and then through culvert sets into Northeast Shark River Slough.

The WCAs provide detention for water from the agricultural area and parts of the east coast region and for flood discharge from Lake Okeechobee to the sea. Detention of water helps prevent floodwaters from inundating the east coast urban areas; provides water supply and detention for east coast urban and agricultural areas and ENP; improves the water supply for east coast communities by recharging underground freshwater reservoirs; and may ameliorate



saltwater intrusion in coastal aquifers. While the WCAs may reduce the severity of the drainage of the Everglades caused by the major canal systems, thus reducing impacts to fish and wildlife caused by the major drainage systems, the levees surrounding the WCAs still function to impound the Everglades, precluding the historic flow patterns. The C&SF system makes it difficult to provide natural timing, volume, and distribution. In wet periods, water is impounded in the WCAs and then discharged to Everglades or coastal canals. During dry periods, water can flow through the canals to coastal areas and bypass the ENP wetlands.

The maintenance of water levels in the WCAs essentially represents the seasonal and monthly limits of storage. The levels vary from high stages in the late fall and winter to low stages at the beginning of the wet season. This permits the storage of runoff during the wet season and the release of stored water to ENP during the dry season and maintains elements of the habitat essential to fish and wildlife. The distribution of water for flood control and water supply varies seasonally. The schedules for the WCAs include a minimum water level below which water releases are not permitted unless water is supplied from another source. When water levels fall below the minimum levels, transfers of water from the Everglades Agricultural Area or the WCAs are made to meet water supply demands.

The primary source of water from the northern part of the C&SF system to Northeast Shark River Slough is WCA-3A. Water Conservation Area 3A is very large and thus primarily rain fed, though it also receives water deliveries from the north, as well as storm runoff from western Broward County. Water Conservation Area 3A discharges into the L-29 Canal through structure S-333, which is located at the extreme southeast corner of the WCA. Water in the L-29 Canal then passes under the Tamiami Trail into ENP through 19 sets of culverts (55 total culverts, three culverts per set in most locations).

Under existing conditions water does not flow directly from WCA-3B into the L-29 Canal. Although there are two discharge structures (S-355A and S-355B) along the L-29 Levee south of WCA-3B that could move water from WCA-3B into the canal, they are not operating at present because of low water stages in WCA-3B. Water stages in WCA-3B are much lower than stages in WCA-3A, due to a lack of inflows into WCA-3B and the reduction of seepage from 3A to 3B due to the design of L-67A and C levees. Water Conservation Area 3B loses seepage to the east by the L-30 borrow canal and to the south by the L-29 borrow canal.

Water deliveries to eastern ENP are controlled by stages in the L-29 Canal and ENP. Water can only flow into ENP when stages in the canal are higher than in the downstream marsh. However, canal stage is strictly controlled due to potential flooding within residential or agricultural areas of Miami-Dade County or potential damage to Tamiami Trail. The canal stage constraint is 7.5 feet NGVD. Higher water levels within the canal may erode the sub-base of the road and create a potential safety hazard. The structures are not operated to directly prevent the L-29 Canal from exceeding 7.5 feet NGVD; however, S-333 flows are controlled, in part, to prevent the water stage at gage G3273 from exceeding an elevation of 6.8 feet NGVD, which effectively prevents the L-29 Canal from exceeding 7.5 feet. In most cases, flows that would result in canal water levels above 7.5 feet NGVD are diverted or held for release at a different time. The management of stage levels is among the most important factors in determining the amount of water entering the ENP.

Water Supply and Demand

The South Florida Water Management District (SFWMD) is the agency responsible for regulating the regions dwindling supply of water and planning for meeting South Florida's future water demands. The SFWMD estimates that the South Florida region will experience a 31 percent increase in population between 2005 and 2025 with over 7 million people living in South



Florida in 2025 (SFWMD, 2006a). At present, major water use in the region is for public water supply, agriculture, recreation, and commercial and industrial. By 2025, it is estimated that public water supply demand will increase by 41% and recreational use will increase by 31%. Additionally, because of the increased population and new power generation technologies it is estimated that power generation use of the available water supply will jump by 2,180%. Overall, the SFWMD estimates a 24% increase in water demand by 2025 (SFWMD, 2006a). This increased demand will put additional strain on the region's stressed hydrologic resources. Drawdown of regional aquifers because of water supply demand can lead to lowered ground water tables, oxidation of hydric soils, and disruptions in the timing and durations of hydroperiods within existing wetlands.

At present, 90% of public water demand is met through a combination of traditional groundwater and surface water supplies, as well as alternative supplies such as brackish groundwater (SFWMD, 2006a). Much of the regions fresh groundwater comes from the surficial and Biscayne aquifers, which are recharged by surface waters from the Everglades. With the implementation of Everglades restoration projects and changes in operation levels to Lake Okeechobee it is unsure if available water supplies in the Everglades will be available to meet restoration and water supply goals. Because of uncertainty in the supply of groundwater the use of alternative water supplies is being advocated to meet future demands. At present, the SFWMD is planning on requiring that the majority of future water supply demands be met by alternative supply projects such as reclaimed water, reuse, and desalination.

3.2.2 Water Quality

During pre-drainage conditions, water from the Kissimmee Valley flowed south to Lake Okeechobee where it would periodically overflow its southern shoreline. The water would then continue its slow journey through the northern sawgrass plains to the central and southern Everglades and ultimately to Florida Bay (**Figure 3-4**). Only a few small rivers flowed eastward through the coastal ridge (USACE and SFWMD, 1999). Water through the Everglades principally flowed through the once interconnected ridge and slough topography that comprised the majority of modern-day WCA-1, WCA-2, WCA-3, and Shark River Slough (Lodge, 2005).

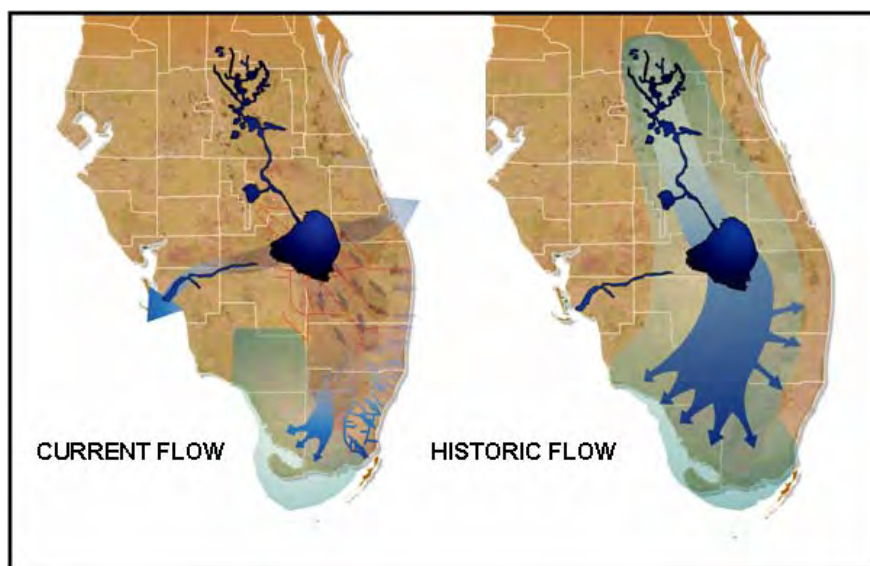


Figure 3-4 – Conceptual historic water flow through Everglades before human impact and current flow (USACE and SFWMD, 1999)



Shark River Slough historically flowed from the central portion of the Everglades generally south and southwesterly to Florida Bay. However, the timing, velocity, quantity, and direction of flow have been altered over the last century, most notably by implementation of the C&SF project. Completion of the Tamiami Trail in 1928 also impaired water flow into Shark River Slough and the southern Everglades. The cumulative effect of the completion of the Tamiami Trail and implementation of the C&SF project was a significant alteration in the natural hydro patterns that once characterized the Everglades and notably Shark River Slough.

Historically, the central and southern Everglades were a nutrient-limited, oligotrophic system (Lodge, 2005). During pre-drainage conditions, slow water movement throughout the Everglades watershed allowed the wetland's biotic and abiotic components to absorb nutrients and maintain consistent water quality. The C&SF project altered natural hydro patterns and other key ecosystem dynamics such as nutrient assimilation processes in the Everglades, thus affecting the source processes that drive water quality composition.

The majority of the surface water now delivered to Shark River Slough originates from surface water runoff and groundwater seepage from WCA-3A and WCA-3B (NPS, 2005). Major inflows into WCA-3A occur through the Miami Canal that drains the Everglades Agricultural Area (EAA), the S-9 pump station that drains urban areas east of the Everglades, and the S-11 structures that drain WCA-2a and the agricultural areas (Porter and Porter, 2002). The EAA is a region characterized by crop production and therefore, pesticides and nutrient laden fertilizers are regularly applied in this region. Source water flows into the L-29 Canal from WCA-3A occur primarily through the S-333 structure. Water discharges from the L-29 Canal through 19 culvert sets that passively flow beneath the Tamiami Trail into Northeast Shark River Slough and through the S-334 structure on the eastern end. Structures S-333 and S-334 are closed for much of the year. The S-355A, S-355B, and S-356 are Modified Waters Delivery structures that have undergone short tests, but they are not actively in use. The S-334, a gated structure at the east end of the L-29 Canal, is used to discharge water out of the canal.

To protect the water quality in ENP, it was designated an Outstanding Florida Water (OFW) requiring special consideration. An OFW has narrative criteria that do not allow the degradation of water quality conditions relative to a fixed point in time, which for the ENP is 1978/1979. Since Northeast Shark River Slough was not included in the ENP OFW designation until August 8, 1994, the base year for this portion of the park is 1993/1994.

The federal government, in 1988, sued the SFWMD and the FDEP (formerly FDER) for violations of state water quality standards, particularly phosphorus, in the Loxahatchee National Wildlife Refuge (LNWR) and ENP. In July 1991, the SFWMD, FDEP and U.S. Department of Justice signed a settlement agreement that was then approved by the judge and adopted as a consent decree. The settlement agreement and the consent decree required a series of programs to improve water quality and meet state standards in ENP and LNWR by July 2002. Among its provisions were commitments to construct a series of stormwater treatment areas and to implement a regulatory program requiring agricultural growers to use best management practices within the EAA, located to the north of the Everglades and south of Lake Okeechobee (Rizzardi, 2001). In 1994, the Everglades Protection Act was substantially rewritten; this created the Everglades Forever Act (EFA), F.S. [sections] 373.4592, that required compliance with all water quality standards in the Everglades by December 31, 2006 (Rizzardi, 2001).

Current water quality within the Everglades is affected by non-point (e.g., agricultural and urban stormwater runoff) and point (e.g., wastewater discharges) sources of contamination. Parameters of concern include:

- Nutrients – phosphorus, nitrite/nitrate, and ammonia/non-ionized ammonia;



- Physical parameters – pH, dissolved oxygen, specific conductance, turbidity, oil and grease, temperature, and salinity;
- Metals – mercury, copper, cadmium, lead, zinc, and arsenic;
- Pesticides – DDT and derivatives, atrazine, simazine, ametryn, endosulfan compounds, ethion, bromacil, 2,4-D, aldecarb, and fenamiphos;
- Biological – fecal coliforms, pathogens, and chlorophyll-a; and
- Other constituents – polycyclic aromatic hydrocarbons, dioxins and furans, sulfate, chloride, tributyltin, polychlorinated biphenyls, and volatile organic compounds.

Generally, the primary parameters of concern in the Everglades include nutrients, dissolved oxygen, sulfate, mercury, biochemical oxygen demand and pesticides.

Water quality is monitored at the S-333 structure and various Tamiami Trail culvert sets along the L-29 Canal at varying frequencies (**Figure 3-5**). Surface water TP, dissolved oxygen (DO), specific conductivity (SpC), pH, sulfate, total suspended solids (TSS) and turbidity monitoring data were downloaded from the DBHYDRO database of the SFWMD for the period January 2004 to September 2009 and analyzed to characterize the water quality discharged into Northeast Shark River Slough east of the L-67 Extension Canal. In figures presented herein, the monitoring stations are arranged corresponding to their location from the west (S-333) to the east end (S-334) along the L-29 canal to discern the variation in constituent concentrations with distance from the source discharge (S-333). As station S-356 is in very proximate location to S-334, where monitoring has been discontinued, the data for the two stations were merged for analysis and are represented herein as S-334/356.

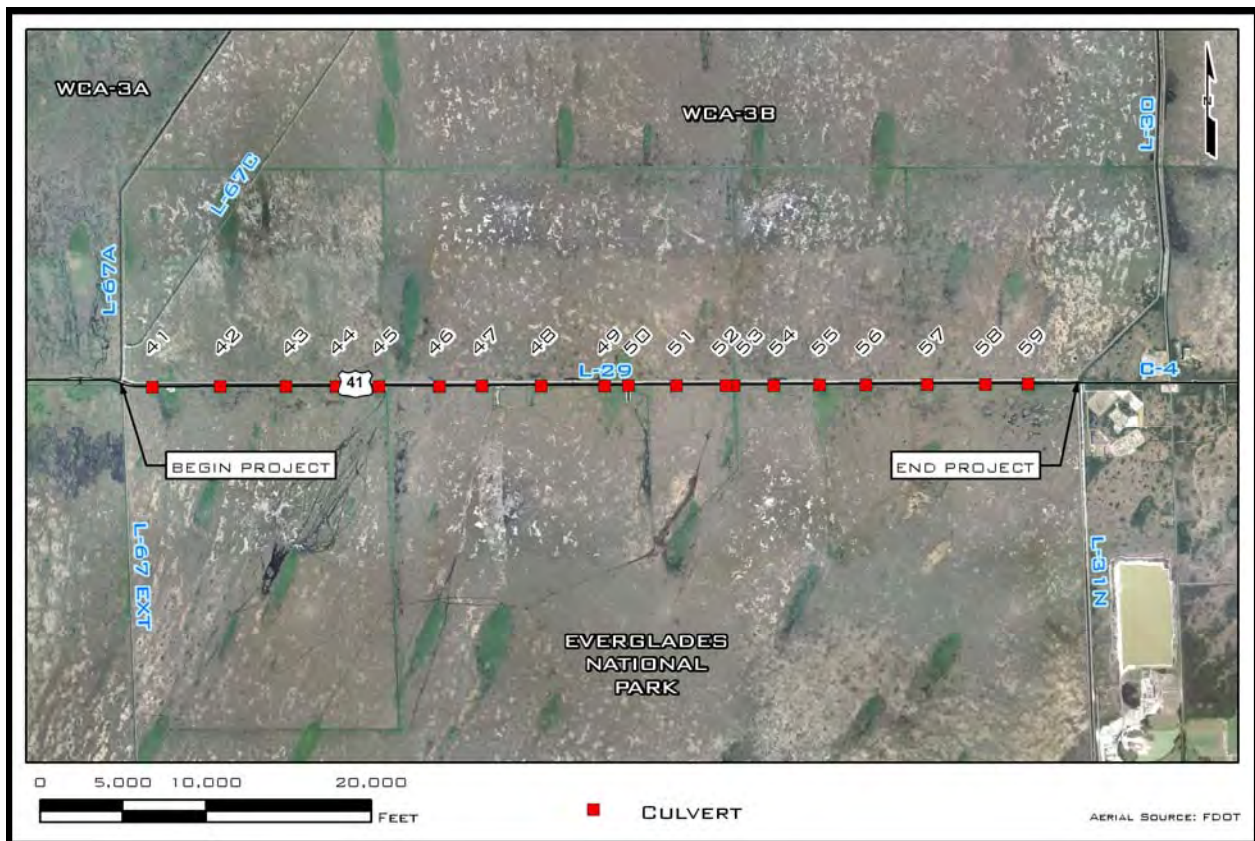


Figure 3-5 – Water quality monitoring stations and culverts along the L-29 Canal



Box plots are presented to visually depict and summarize the quality of water discharged into Northeast Shark River Slough. Box plots are univariate representations of quantitative data samples and sometimes called "box and whisker diagrams". The minimum, 1st quartile, median, mean, and 3rd quartile are displayed together with both limits (the ends of the "whiskers") beyond which values may be considered anomalous. The mean is displayed by a "•" symbol, and a black line inside the box corresponds to the median. Limits are estimated as 1.5*(Q3 – Q1) drawn from the edge of the box to the nearest point on both ends; where, Q1 is the 1st quartile and Q3 is the 3rd quartile. Values that are outside the [Q1 - 3 (Q3 – Q1); Q3 + 3 (Q3 – Q1)] interval are displayed with the * symbol. Values that are in the [Q1 - 3 (Q3 – Q1); Q1 – 1.5 (Q3 – Q1)] or the [Q3 + 1.5 (Q3 – Q1); Q3 + 3 (Q3 – Q1)] intervals are displayed with the "o" symbol.

Figure 3-6 summarizes TP concentrations recorded along the L-29 Canal for approximately six years since 2004. During this time period, a mean TP concentration of 0.013 mg/L (min: 0.005 mg/L; max: 0.037 mg/L) was recorded at the S-333 monitoring station; a mean TP concentration of 0.015 mg/L (min: 0.007 mg/L; max: 0.037 mg/L) was recorded at the adjacent Safari monitoring station. A mean TP concentration of 0.012 mg/L (min: 0.007 mg/L; max: 0.031 mg/L) was recorded at the eastern-most L-29 monitoring stations (S-334/356). The highest maximum TP concentration of 0.047 mg/L was recorded at the TAMBR5 monitoring station. The South Florida Environmental Report (SFER-09) in 2009 (SFWMD 2009) states that in ENP, the mean inflow TP concentration observed for WY2008 was higher than the previous historical periods. The likely cause of the elevated inflow TP concentration for the Park is the dry conditions in upstream areas resulting in oxidation of the sediment and subsequent release of bound phosphorus, which is supported by the higher outflow TP concentrations recorded for WCA-3 during WY2008 (SFWMD 2009).

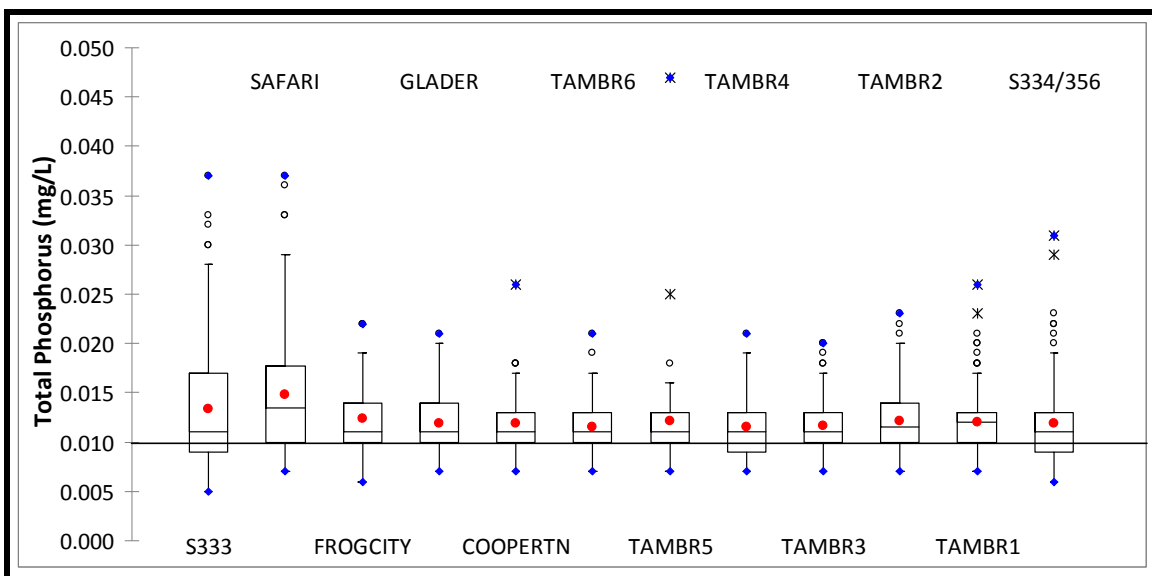


Figure 3-6 – Mean time series and box plots for total phosphorus for period January 2004 to September 2009

Table 3-2 provides an estimate of the Tamiami Trail culvert flows and the respective TP loads. A mean discharge of 105 K ac-ft with an average TP load of 1,565 kg/water year was observed.



Table 3-2 – Mean water year[‡] (2005-2009) discharge*, flows* and TP loads[§] for Tamiami Trail culverts

Culvert #	Name	Discharge K ac-ft	Flows cfs	TP loads Kgs
culvert_41	TAMBR15	0.91	1.25	14
culvert_42	TAMBR14	0.79	1.08	13
culvert_43	TAMBR13	0.92	1.28	16
culvert_44	TAMBR12	0.78	1.08	14
culvert_45	SAFARI	7.66	10.58	138
culvert_46	TAMBR11	1.14	1.57	20
culvert_47	TAMBR10	0.89	1.23	15
culvert_48	FROGCITY	1.24	1.71	19
culvert_49	TAMBR9	2.24	3.09	33
culvert_50	GLADER	6.69	9.24	97
culvert_51	TAMBR8	0.71	0.98	10
culvert_52	TAMBR7	0.04	0.06	1
culvert_53	COOPERTN	10.36	14.31	152
culvert_54	TAMBR6	3.85	5.32	55
culvert_55	TAMBR5	7.08	9.78	104
culvert_56	TAMBR4	5.79	8.00	83
culvert_57	TAMBR3	13.14	18.14	189
culvert_58	TAMBR2	16.35	22.58	239
culvert_59	TAMBR1	25.02	34.56	355
Total		105.59	145.85	1,565

[‡]: Water year is May 1st to April 30th.

*: Based on USGS unpublished data

[§]: Based on interpolated data for some culverts

The Settlement Agreement/Consent Decree (1995) specified that interim and long-term TP concentration limits for discharges into the ENP through SRS be met by October 1, 2003, and December 31, 2006, respectively. The 12-month flow-weighted means of TP concentrations at the end of water year (October 1 through September 30) (**Figure 3-7**) are evaluated for compliance with the Consent Decree limits. The long-term TP concentration limit for inflows to SRS through structures S-12A, S-12B, S-12C, S-12D, and S-333 represents the concentrations delivered during the Outstanding Florida Waters baseline period of March 1, 1978, to March 1, 1979, and is adjusted for variations in flow (SFWMD 2009). Inflow concentrations of TP through SRS are compared to the interim and long-term limits at the end of each water year. **Figure 3-7**



shows the 12-month flow-weighted mean TP concentrations at inflows (S-12A-D gated structures west of S-333 plus TAMB culverts) to the ENP through SRS at the end of each water year from 1991 to 2009 compared to the interim and long-term TP limits. The 12-month flow-weighted mean TP concentration for federal water year 2008 and 2009 was 10.2 ppb and 8.16 ppb, respectively. The corresponding long-term limit, which became effective on December 31, 2006, was also 10.2 ppb and 8.2 ppb, respectively (SFWMD 2009). The SRS TP concentrations were in compliance for federal water year 2008 and 2009. However, it should be noted that TP concentrations were equal or close to the limits and a slight increase would have resulted in non-compliance.

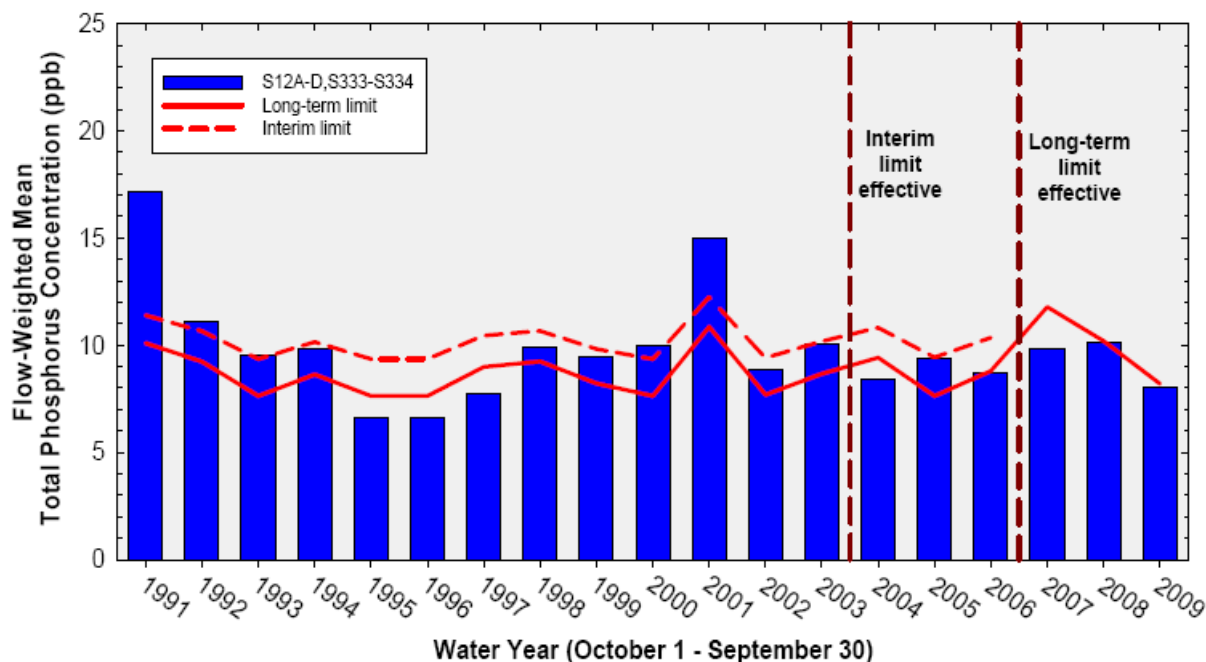


Figure 3-7 – The 12-month flow-weighted mean TP concentrations at inflows to the ENP through Shark River Slough at the end of each water year compared to the interim and long-term TP limits (SFWMD 2009)

The estimated TP threshold for the Everglades above which it causes an imbalance of the natural flora and fauna is approximately 0.010 mg/L (10 ppb). Results of the TP concentration analysis indicate average TP concentrations recorded in water quality discharges into Northeast Shark River Slough from the Tamiami Trail culvert monitoring stations January 2004 to September 2009 (**Figure 3-6**) are above this ecologically-meaningful threshold; the amount of time that discharges with TP concentrations are above this threshold is unknown since the data collected is from grab samples, not from continuously sampling autosampling equipment. In addition, the plant community composition directly downstream of some of the Tamiami Trail culvert sets show evidence of nutrient enrichment with cattails pluming in some of the immediate downstream culvert pool locations (**Figure 3-8**).





Figure 3-8 – Cattail plume south of the Culvert 43 (TAMBR13) discharge location
Photograph taken on July 22, 2009, by Alicia Logalbo (ENP)

Phosphorus inputs from Tamiami Trail culvert discharges appear to be impacting the downstream plant community composition in Northeast Shark River Slough. Downstream TP transport through oligotrophic, free-flowing wetlands occurs predominantly through the biota, notably the periphyton and the flocculent detrital components rather than through the water column itself (Gaiser et al., 2005). Thus, water quality sampling of TP will not measure the microbially bound phosphorus. Soils become phosphorus enriched following the capacity of the biota to uptake phosphorus from the water column or detritus. Community structure has been shown to be altered by even minute phosphorus inputs to the system of 5 µg/L above ambient conditions; within a spikerush/periphyton community in central Shark River Slough this caused changes in the periphyton and floc after two months, soils after three years, fish after four years, and macrophytes in the fifth year (Gaiser et al., 2005; Gaiser et al., 2007). Since phosphorus enrichment is being detected not only in the water column but also in the plant community composition itself, multiple indicators are providing evidence that the portion of Northeast Shark River Slough downstream of the Tamiami Trail culvert sets is showing signs of nutrient enrichment.

The DO in time series shows mean values at the monitoring locations along the L-29 Canal below the Class III water quality standard of 5.0 mg/L. TAMBR- 1 and 2 had the highest mean (4.7 mg/L) on the eastern end while FROGCITY had the lowest mean (3.7 mg/L) near the source water discharge location (S-333) (**Figure 3-9**). The minimum (0.17 mg/L) DO value was



observed at SAFARI monitoring station and the maximum DO (15.3 mg/L) was recorded at S-333 monitoring station. The mean SpC increased with distance from the S-333 at the TAMBR stations (**Figure 3-10**). However, the S-334/356 at the eastern edge of L-29 Canal showed the lowest mean (511 $\mu\text{S}/\text{cm}$) that was influenced by some low outlier values. The maximum SpC (873 $\mu\text{S}/\text{cm}$) was recorded at the GLADER monitoring station.

The mean pH varied between 7.27 (FROGCITY) and 7.49 (TAMBR1) at different locations with little fluctuation along the length of the L-29 canal (**Figure 3-11**). The highest variation in pH was observed at S-334/356 location (min: 6.98; max: 8.90).

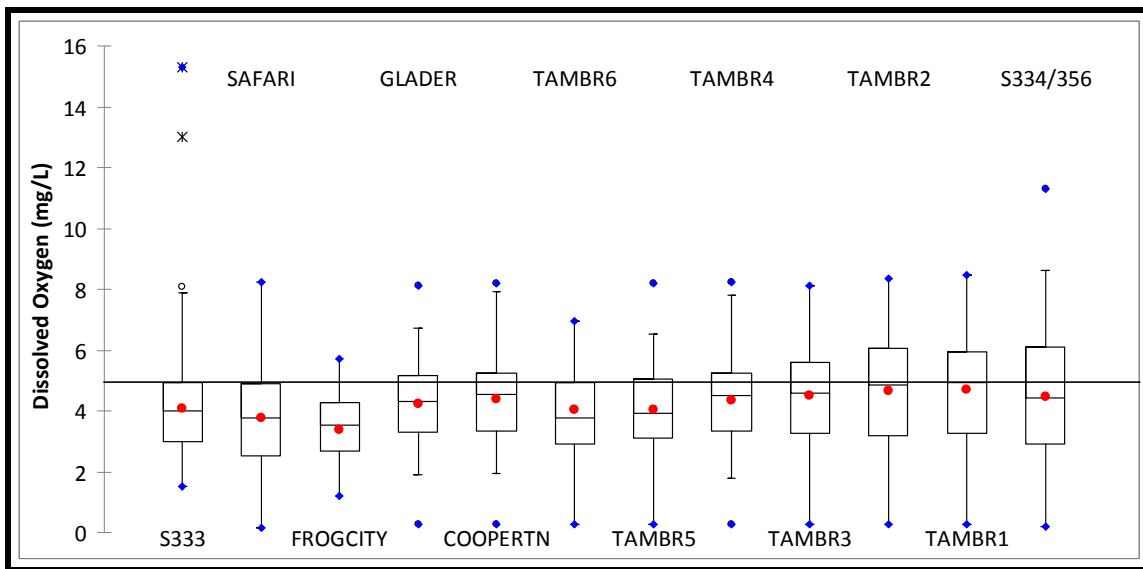


Figure 3-9 – Mean time series and box plots for dissolved oxygen for period January 2004 to September 2009

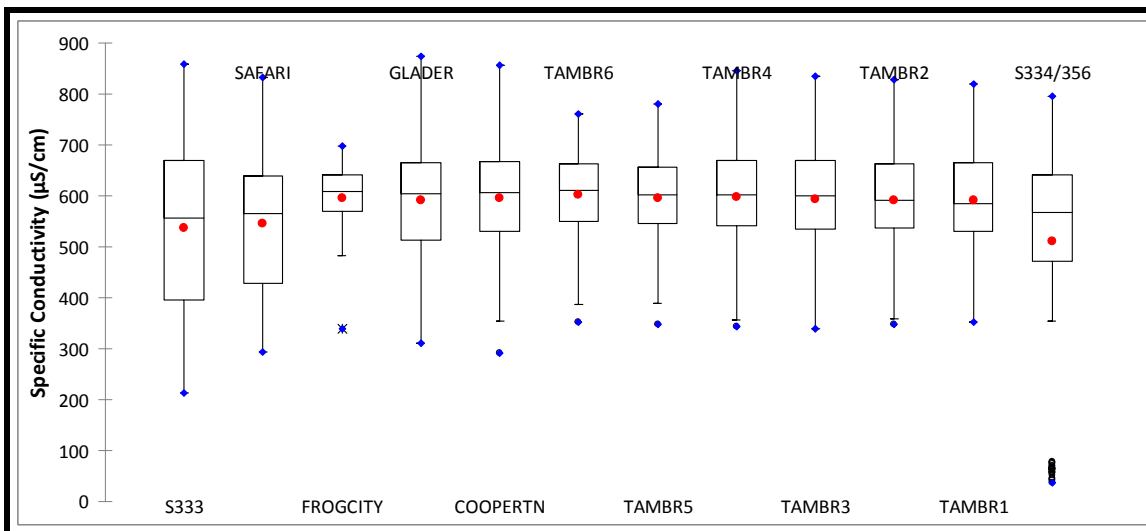


Figure 3-10 – Mean time series and box plots for specific conductivity for period January 2004 to September 2009



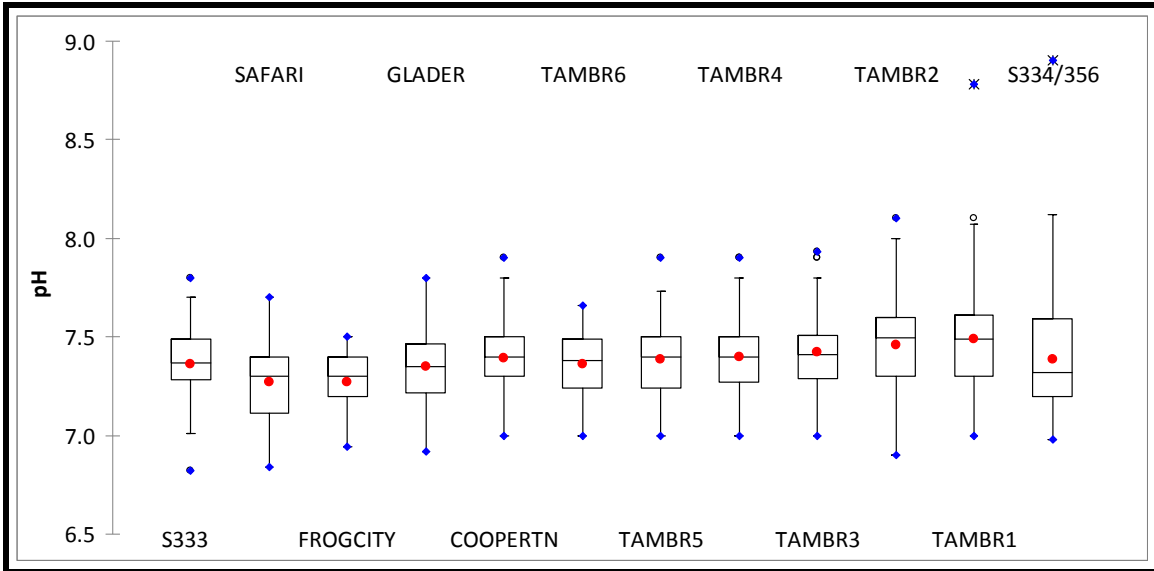


Figure 3-11 – Mean time series and box plots for pH for period January 2004 to September 2009

The concentrations of sulfate, TSS, and turbidity in surface waters recorded along the L-29 Canal monitoring stations are summarized in **Figure 3-12**. The TSS and turbidity concentrations showed an inverse pattern at the eastern end of the L-29 Canal (S-334/356) as compared to the western end L-29 Canal monitoring stations (S-333). The mean TSS concentrations lowered from S-333 to S-334/356 and were 2.4 and 1.6 mg/L, respectively. However, the mean turbidity increased from S-333 (1.7 NTU) to S-334/356 (1.9 NTU). The sulfate concentration showed a decline from west (S-333; mean: 12.8 mg/L, min: 0.05 mg/L, max: 35.8 mg/L) to east (S-334/356; mean: 7.3 mg/L, min: 0.05 mg/L, max: 28.6 mg/L) along the L-29 Canal monitoring stations.

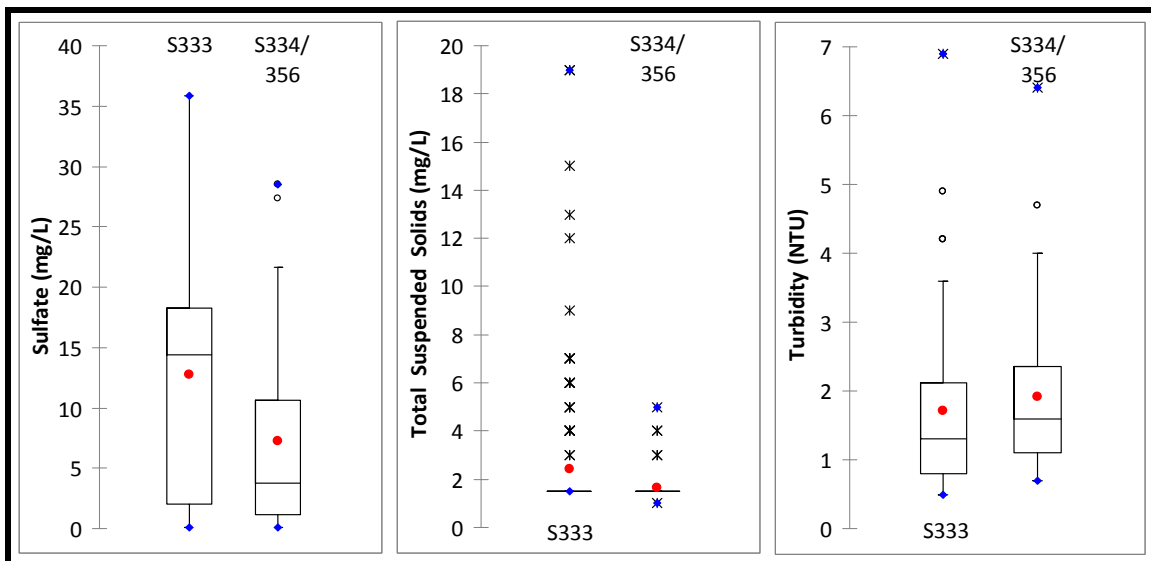


Figure 3-12 – Mean time series and box plots for sulfate, TSS and turbidity for period January 2004 to September 2009



High concentrations of sulfate cause environmental concern as sulfur is a key water quality parameter that affects the rate of methyl mercury production in aquatic ecosystems. As a biologically active element, sulfur has forms that are highly toxic (sulfide) or that may promote phosphate releases from sediments (sulfate) (SFER-09). Sulfur may exhibit detrimental effects beyond promoting mercury methylation, including sulfide toxicity to aquatic plants and animals, and phosphate and ammonium release from sediments (SFER-09). During recent years, since 2007, an increasing trend in sulfate concentration was recorded at the S-333 monitoring station (Figure 3-13), which is of concern due to concentrations of mercury observed in fishes in the Shark River Slough (Figure 3-14).

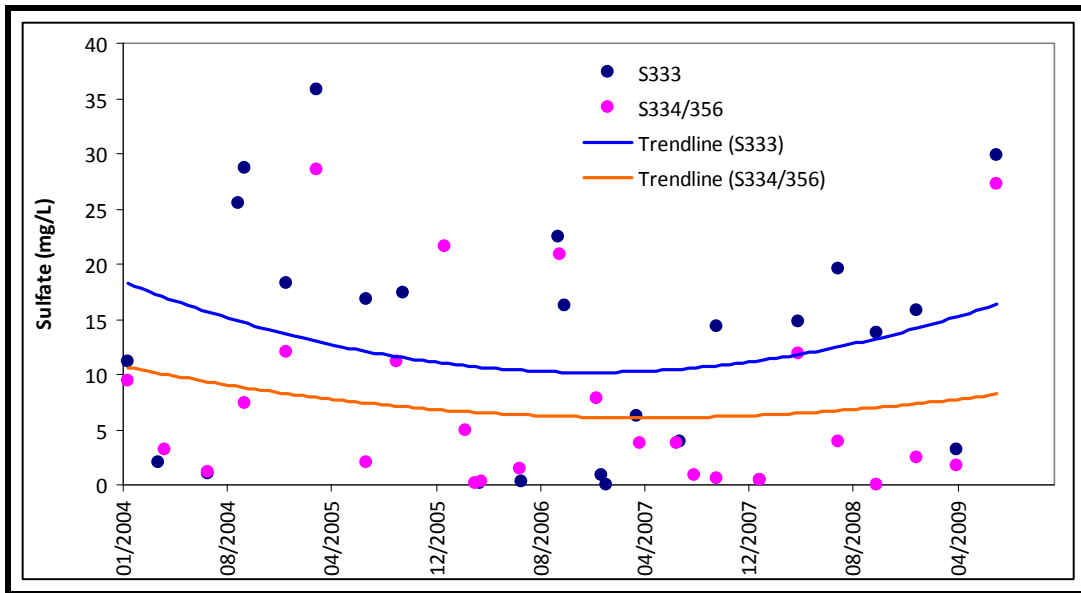


Figure 3-13 – Time series and trends for sulfate at S-333 and S-334/356 for period January 2004 to September 2009

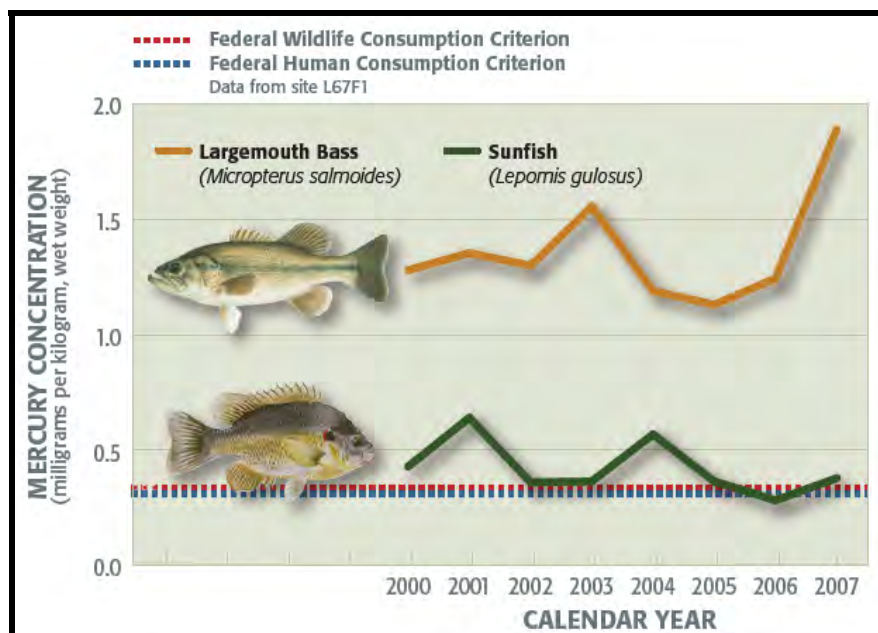


Figure 3-14 – Mercury in fish from ENP (SFER-09)



Surface water concentrations of arsenic, cadmium, copper, iron, lead, and mercury were evaluated from January 1997 to September 2009 at the L-29 Canal monitoring stations east of the L-67 Extension. **Table 3-3** summarizes the data for metals and **Figure 3-15** provides the time series and box plots for copper, mercury, and methyl mercury. The mean concentration of copper and mercury drops with distance from source water discharge (S-333) but methyl mercury show higher mean concentration with distance from the source water (S-333) (**Figure 3-15**).

Methyl mercury is a highly toxic form of mercury that bioaccumulates in aquatic food chains. SFER-09 reported that mercury levels in sunfish and largemouth bass from ENP have generally increased over the past decade and are presently at elevated concentrations exceeding both federal predator protection and human health criteria, particularly in the methyl mercury “hot spot” – Shark River Slough – in ENP (SFER-09) (**Figure 3-14**). For Shark River Slough, annual mercury medians for largemouth bass from age cohorts one and two exceeded the USEPA guidance criterion for protection of fish-eating wildlife of 0.346 µg/g for TL 4 fish for all years sampled. Over 99% of age cohort one and two largemouth bass exceeded the USEPA wildlife criterion from 1993 through 2008. These findings continue to suggest that piscivorous avian and mammalian wildlife may experience methyl mercury exposures above the acceptable dose in broad areas of the Everglades Protection Area (EPA), which encompasses WCA-1, WCA-2, WCA-3, and ENP (SFER-09). SFER-09 also observed that in the Shark River Slough mosquitofish (*Gambusia holbrooki*), sunfish, and largemouth bass continue to have higher mercury levels than fish elsewhere across the EPA. New data (from 2007 and 2008) for common snook (*Centropomus undecimalis*) from Shark River Slough indicate that these fish have higher mercury levels than snook elsewhere in ENP, with mean concentrations of 1.6 µg/g and 0.5 µg/g, respectively (SFER-09).

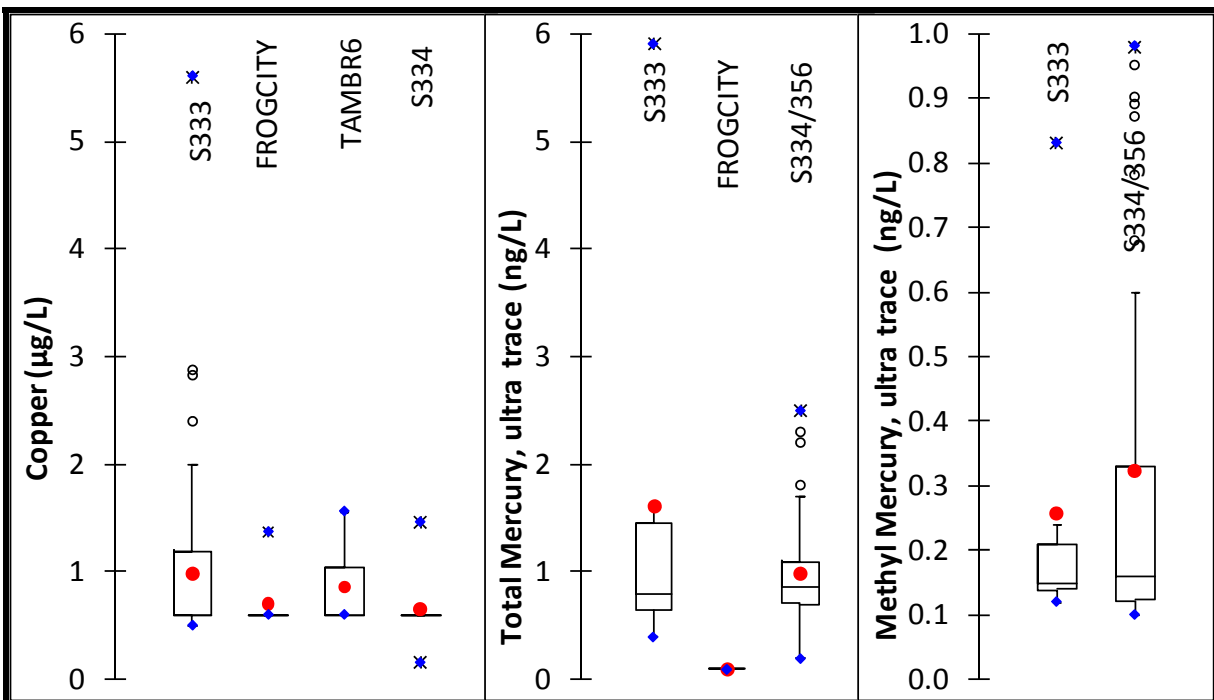


Figure 3-15 – Mean time series and box plots for copper, mercury and methyl mercury for period January 2004 to September 2009



Table 3-3 – Summary of metal concentrations in L-29 Canal monitoring stations at the S-333, FROGCITY, TAMBR6, and S-334 since 1997

Station	S333	FROGCITY	TAMBR6	S334	Station	S333	FROGCITY	TAMBR6	S334
Arsenic (µg/L)					Lead (µg/L)				
POR	Jan. 1997- Jan. 2001	Jul. 1997- Jul. 2000	Jul. 1997- May 2000		POR	Jan. 1997- Jan. 2001	Jul. 1997- Jul. 2000	Jul. 1997- Jul. 2000	
Sample size	44	7	7		Sample size	44	7	7	
Minimum	0.75	0.75	0.75		Minimum	0.40	0.40	0.40	
Maximum	2.60	0.75	0.75		Maximum	1.60	1.70	0.40	
Median	0.75	0.75	0.75		Median	0.40	0.40	0.40	
Mean	0.95	0.75	0.75		Mean	0.46	0.65	0.40	
Cadmium (µg/L)					Mercury, ultra trace (ng/L)				
POR	Jan. 1997- Jan. 2007	Jul. 1997- Jul. 2000	Jul. 1997- May 2000	Jan. 1998- May 2004	POR	Oct. 2007- Jul. 2009	Jul. 1997- Jan. 2001		May 1997- Jul. 2009
Sample size	56	7	7	7	Sample size	7	6		39
Minimum	0.15	0.15	0.15	0.12	Minimum	0.40	0.10		0.20
Maximum	1.50	0.76	0.44	0.40	Maximum	5.90	0.10		2.50
Median	0.15	0.15	0.15	0.15	Median	0.80	0.10		0.86
Mean	0.22	0.24	0.19	0.18	Mean	1.61	0.10		0.98
Copper (µg/L)					Methyl Mercury, ultra trace (ng/L)				
POR	Jan. 1997- Jan. 2007	Jul. 1997- Jul. 2000	Jul. 1997- May 2000	Jan. 1998- May 2004	POR	Oct. 2007- April 2009			Nov. 1997- April 2009
Sample size	57	7	7	7	Sample size	7			38
Minimum	0.50	0.60	0.60	0.16	Minimum	0.12			0.10
Maximum	5.60	1.37	1.56	1.46	Maximum	0.83			0.98
Median	0.60	0.60	0.60	0.60	Median	0.15			0.16
Mean	0.99	0.71	0.87	0.66	Mean	0.26			0.32
Iron (µg/L)					Zinc (µg/L)				
POR	Jan. 1997- Jul. 2007	April 1997- Jul. 2001	April 1997- Jul. 2001	Oct. 1997- Jan. 2006	POR	Jan. 1997- Jan. 2007	Jul. 1997- Jul. 2000	Jul. 1997- Jul. 2000	Jan. 1998- Jul. 2000
Sample size	107	18	18	19	Sample size	57	7	7	6
Minimum	1	25	26	7	Minimum	1.4	2.0	2.0	2.0
Maximum	334	966	734	994	Maximum	8.0	23.0	15.0	2.0
Median	59	218	169	187	Median	2.0	2.0	2.0	2.0
Mean	69	296	262	265	Mean	2.9	5.0	3.9	2.0

POR: Period of Record

As part of the SFWMD's quarterly ambient monitoring program, unfiltered water and sediment samples are collected and analyzed for over 70 pesticides and/or products of their degradation (Pfeuffer, 2008). The SFWMD pesticide monitoring network includes stations designated in the Everglades Settlement Agreement, the Lake Okeechobee Protection Act Permit, and the non-Everglades Construction Project permit (Pfeuffer, 2008). Water Conservation Area 1 and the ENP are also designated as OFW, to which anti-degradation standards apply. Surface water and sediment are sampled quarterly and semiannually, respectively, upstream at each structure identified in the permit or agreement (Pfeuffer, 2008). The compounds and concentrations found are typical of those expected from an area of intensive historical and contemporary agricultural activity. **Table 3-4** summarizes only those pesticides found above the method detection limit since March 2008 monitoring at the S-333, S-334 and S-356 stations. The frequency of detection of atrazine is particularly noticeable.



Table 3-4 – Summary of pesticide residues ($\mu\text{g/L}$) above the method detection limit found in surface water samples collected by SFWMD in March 2008 to Aug. 2009

Date	Site	Flow	ametryn	atrazine	atrazine desethyl	metribuzin	simazine	Number of compounds detected at site
03/18/2008	S333	Y	0.031 §	0.82	0.047	-	0.016 §	4
	S356	N	0.032 §	0.53	0.035 §	-	0.014 §	4
06/16/2008	S333	Y	-	-	-	0.023 §	-	1
	S356	N	-	0.020 §	-	-	-	1
09/16/2008	S333	N	-	0.01 §	-	-	-	1
	S356	N	-	-	-	-	-	0
12/08/2008	S333	Y	-	-	-	-	-	0
	S356-334	Y	-	-	-	-	-	0
02/24/2009	S333	Y	-	-	-	-	-	0
	S356-334	N	-	-	-	-	-	0
04/28/2009	S333	N	-	0.039	-	-	-	1
	S356-334	N	-	0.038	-	-	-	1
08/04/2009	S333	Y	-	0.018 §	-	-	-	1
	S356-334	Y	-	0.022 §	-	-	-	1

(Pfeuffer 2008; Pfeuffer, 2009)

N: no and Y: yes

-: denotes that the result is below the MDL

§: value reported is less than the practical quantitation limit, and greater than or equal to the MDL.

In 2006, the SFWMD implemented the S-12D Flow-way Maintenance Plan (**Figure 3-16**) in the upstream inflow channel and the distribution canal downstream of the S-12D structure covering ~11 acres (estimated) of area (Rodgers et al., 2006). The plan objectives included among others:

- Removal of vegetation within the Old Tamiami canal from S-12E to the FP&L access road;
- Treatment and removal of invasive, non-native vegetation growing along the north and south bank of Old Tamiami Trail from S-12E to the FP&L access road; and
- Dredging in the upstream and downstream channels of S-12D, in conformance with the design specifications of that flow way.



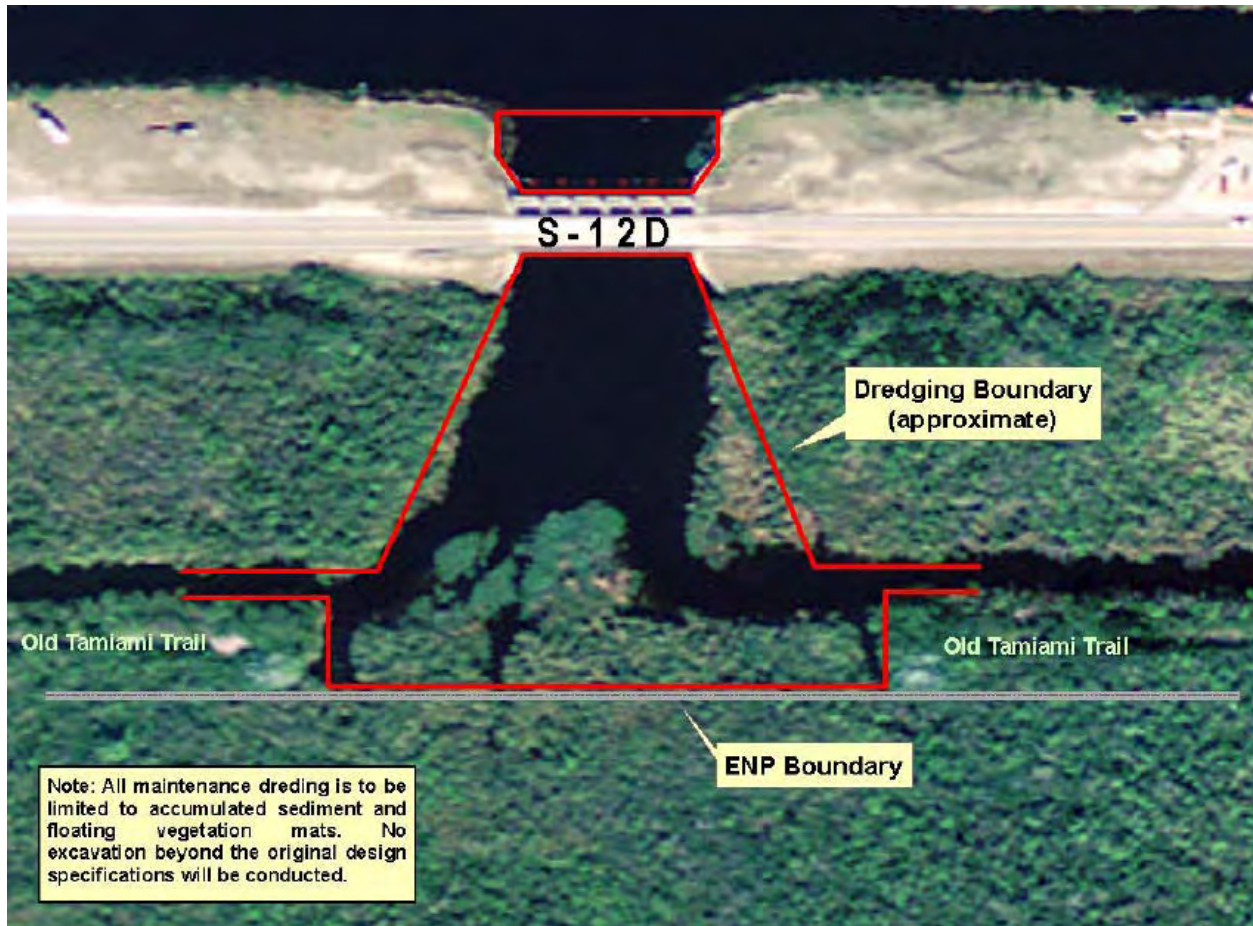


Figure 3-16 – Approximate S-12D Flow Maintenance dredging boundary (SFWMD, 2010)

Dredging involved excavation of accumulated sediment and vegetation within the boundaries of the dredging area (**Figure 3-16**). To address potential downstream water quality impacts, a continuous Aquadam barrier was installed at the downstream limits of the dredging area and extended across the entire getaway channel. Surface water quality monitoring and in situ measurements for baseline conditions were initiated concurrent with maintenance activities. Sampling and in situ measurements continued for approximately one year (SFWMD, 2010). Water quality monitoring data (personal communication, Julianne LaRock and Shi Xue, SFWMD, 11/19/2009) collected adjacent to and downstream of the S-12D structure (Fig. 3.16b) from January 2007 to December 2007 were analyzed to examine the effect of S-12D Flow-way Maintenance Project.

Surface water TP concentration as high as 19 $\mu\text{g/L}$ was recorded at the S12D0.5 monitoring station six months after the project initiation that lowered to $\sim 7\text{-}9$ $\mu\text{g/L}$ during later (\sim Dec. 2007) sampling (**Figure 3-17**). The sampling at one (S12D1.0) and three (S12D3.0) miles downstream done during the later period (\sim December 2007) showed a maximum TP concentration of 7 and 6 $\mu\text{g/L}$ respectively. Other TP sampling near the project area initially (\sim Jan. 2007) showed an initial disturbance effect with concentrations as high as $\sim 250\text{-}350$ $\mu\text{g/L}$ (S12DDE and S12DDW) during January 2007 sampling. These levels dropped in the final sampling (\sim Dec. 2007) to $\sim 11\text{-}15$ $\mu\text{g/L}$ (**Figure 3-17**). A similar pattern was exhibited in the concentrations of TSS and turbidity at these monitoring locations with high values of 53 mg/L and 44 NTU, respectively, at site DDE during January 2007 sampling. These values of TSS and turbidity lowered to 1.1 mg/L and 3 NTU, respectively, during December 2007 sampling. Overall, the monitoring data indicate that



the surface water TP concentrations were temporarily elevated following the vegetation and soil excavation south of the S-12D structure but the surface water TP concentrations then declined over time and eventually approached background levels after approximately a one year time period. SFWMD (2010) reported based on time series analysis of water quality monitoring parameters and statistical comparison of monitoring data before, during and after dredging the following impacts:

- Total phosphorus concentrations increased temporarily during the dredging project followed by a decreasing trend after the dredging was completed. There was no significant difference in TP before and one year after dredging.
- Ca, hardness, Ortho-P, TSS and turbidity values increased during the first six months of 2007 followed by decreasing values during the second six months. There was no significant difference between the values of Ca, hardness, Ortho-P, and TSS before the dredging and in the second six months after dredging.
- DO concentrations were higher after dredging.
- No impact was observed for Cl, TKN, Mg, NO_x, pH, K, Na, specific conductance, sulfate, and temperature.

Northeast Shark River Slough Marsh

Baseline monitoring sites were established (**Figure 3-18**) in the Northeast quadrant of Shark River Slough to characterize the water quality and other ecological indicators prior to implementation of MWD and CERP restoration projects (Gaiser et al., 2009). Thirty census sites (**Figure 3-18**) were sampled during the wet seasons of 2006, 2007, and 2008. A subset of eight of these sites was selected for monitoring three times annually for the latter two years. Census surveys indicated effects from impeded inflow in the northern and eastern boundaries of Northeast Shark River Slough and elevated TP concentrations at sites nearest to the Tamiami Trail. The southeastern boundary region had the shallowest water depths. The water column had TP averaging 9 µg/L in Northeast Shark River Slough except for sites along the northern boundary that were enriched (~13 µg/L) above this characteristically low ambient level (Gaiser et al., 2009).

The periphyton cover and biovolume were high, averaging 70% and 3,000 ml/m² over the entire study area (**Figure 3-18**), respectively. Periphyton was most abundant in the wet northeastern and western boundary (along the L-67 Extension Levee) of the study area and sparse in the driest sites along the southeastern boundary. The TP concentrations in periphyton averaged 150 µg/g, with higher enriched eutrophic TP levels (>200 µg/g) observed at three sites on the northwestern edge of Northeast Shark River Slough exhibiting strong and consistent relationships to water depth and phosphorus availability (Gaiser et al., 2009).

The plant communities observed were a mix of wet prairie and slough taxa, with the former occurring predominantly along the southeastern boundary and the latter along the deeper western edge of Northeast Shark River Slough. The plant densities averaged 150 stems/m² with highest values occurring in spikerush (*Eleocharis spp.*) that dominated the slough habitat. The TP concentrations in the plant community resembled spatial patterns similar to those of soil, with the highest values occurring along the northern boundary of Northeast Shark River Slough (Gaiser et al., 2009).



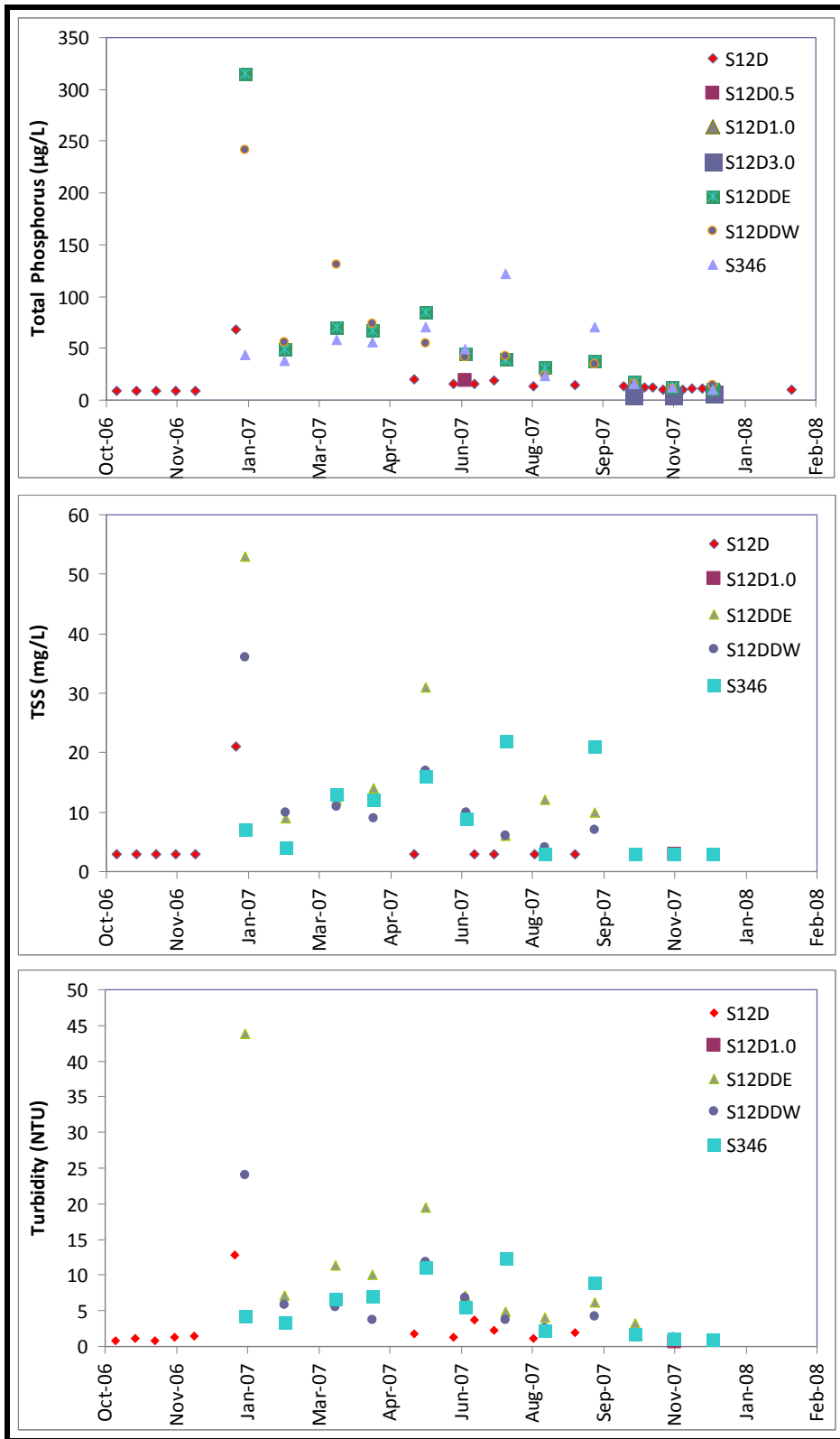


Figure 3-17 – S-12D Flow-way Maintenance Project – TP, TSS, and turbidity monitoring data



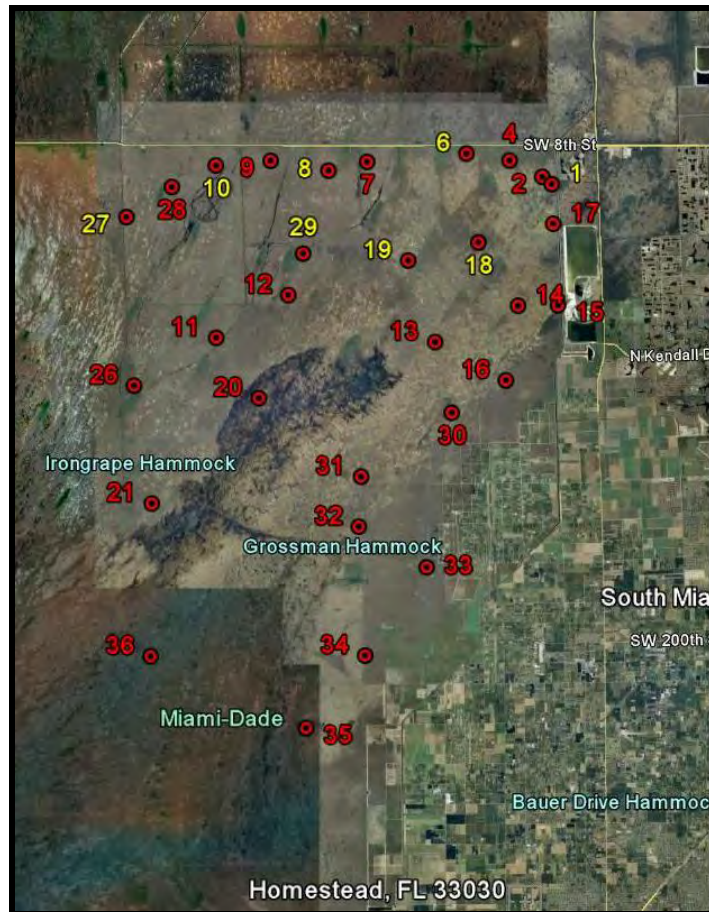


Figure 3-18 – Northeast Shark River Slough monitoring sites (Gaiser et al., 2009)

Note: Yellow numbers show subset of sentinel sites.

A total of 59 species of aquatic consumers were observed, with densities and richness increasing with water depth and periphyton TP and organic content. Exotic fish species were only a small proportion of the total fishes captured (Gaiser et al., 2009). The most sensitive metrics of water depth were soil depth, plant composition, and consumer densities and the most sensitive metrics of phosphorous enrichment were periphyton organic content, plant biomass, and consumer biomass and composition (Gaiser et al., 2009).

The TAMB stations are located at the northern border of the Park along the Tamiami Trail, east of the S-333 structure. Water discharged through the TAMB culverts is a mixture of canal water delivered by the S-333 structure (majority) and seepage from WCA-3B. Thus, there is a water-quality gradient along the L-29 Canal. The major findings from this analysis are:

- The mean surface water TP recorded at the S-333 monitoring station was 0.013 $\mu\text{g/L}$ and the lower mean values of TP (~ 12 $\mu\text{g/L}$) at other locations in L-29 Canal may reflect contributions from marsh seepage and rainfall.
- The water column had TP averaging 9 $\mu\text{g/L}$ in Northeast Shark River Slough except for sites along the northern boundary that were enriched (~ 13 $\mu\text{g/L}$) above this characteristically low ambient level (Gaiser et al., 2009).
- The TP concentrations in periphyton averaged 150 $\mu\text{g/g}$, with higher enriched eutrophic TP levels (>200 $\mu\text{g/g}$) observed at three sites on the northwestern edge of Northeast



Shark River Slough exhibiting strong and consistent relationships to water depth and phosphorus availability (Gaiser et al., 2009).

- DO concentrations were low and below the state Class III water-quality criterion at the culvert sites, although it may satisfy the “site-specific” DO criterion (SFERTF, 2008) at some sites within the natural marsh.
- The mean pH varied between 7.3 and 7.5. The lower pHs are observed around stations SAFARI (culvert_45) and FROGCITY (culvert_48).
- The SpC showed increase from 537 $\mu\text{S}/\text{cm}$ at S333 to ~595 $\mu\text{S}/\text{cm}$ at mid to eastern edge of L-29 canal. An increasing west-east trend was observed, with exception of S-334/356 that exhibited lower mean due to some extreme low outlier values.
- The sulfate concentration recorded at the S-333 station had a mean of 12.8 mg/L (January 2004 to September 2009). However, an increasing trend was observed during last 3 years (**Figure 3-13**). High concentrations of sulfate cause environmental concern as sulfur is a key water quality issue that affects the rate of methyl mercury production in aquatic ecosystems.
- Several pesticides- ametryn, metribuzin, simazine, atrazine, atrazine-desethyl were detected (**Table 3-4**) during SFWMD quarterly ambient monitoring program. The frequency of detection of atrazine was particularly noticeable.

3.2.3 Wetlands

The historic Everglades were a broad, shallow wetland with water flowing very slowly over 3,900 square miles from Lake Okeechobee to the mangrove zone at the southern tip of Florida. The flow that naturally occurred over this region was influenced by rainfall and a relatively low surface relief and provided the necessary conditions for the development of the Everglades ecosystem (USACE, 2008).

Everglades National Park was authorized by Congress on May 10, 1934, and dedicated by Harry S. Truman on December 6, 1947. The enabling legislation provided the fundamental purpose of the park as being:

...permanently reserved as a wilderness, and no development of the project or plan for the entertainment of visitors shall be undertaken which will interfere with the preservation intact of the unique flora and fauna and the essential primitive natural conditions now prevailing in this area.

The original 460,000 acres in 1947 was expanded to 1.4 million acres by 1958. Recognizing Everglades National Park as a nationally and internationally significant resource, Congress passed the “Everglades National Park Protection and Expansion Act” (PL 101-229) in 1989. Section 101(b) states that the purpose of the Act is to:

...increase the level of protection of the outstanding natural values of Everglades National Park and to enhance and restore the ecological values, natural hydrologic conditions, and public enjoyment of such area...

This law authorized the acquisition of additional land, including the portion of the project area just south of Tamiami Trail, to benefit the natural resources of Everglades National Park. With this addition, Everglades National Park is now approximately 1.5 million acres in size, making it the third largest unit of the National Park System in the lower 48 states (USACE, 2008).



Because Everglades National Park possesses "outstanding universal values," it was designated by the United Nations Educational, Scientific, and Cultural Organization as an International Biosphere Reserve in 1976 and subsequently as a World Heritage Site in 1979. The site includes historic Everglades that have been limited in manmade influences and, for the most part, avoids agricultural land. In 1987, the Ramsar Convention designated Everglades National Park as a Wetland of International Importance (USACE, 2005).

The majority of the land in Everglades National Park is classified as wetland habitat, an integral component of the Everglades National Park landscape. The Everglades ecosystem is thought to have been formed over the last 5,000 years as sea levels rose and precipitation increased, promoting water retention in a shallow inland basin, and the portion of the basin south of Lake Okeechobee filled in with peat (Gleason and Stone, 1984). The result of peat accumulation in this bedrock basin was the formation of a peat surface, level in the east-west direction, and with a slight north-to-south downward slope. The concavity of the bedrock, coupled with the east-west levelness of the peat, resulted in thicker peat deposits in the middle of the basin and thinner deposits along the edges. By the 1880s, peat had accumulated to about 21 feet above sea level along the south shore of Lake Okeechobee (Meigs, 1879), and had formed the northern edge of a north-to-south elevation gradient that is now less than three inches per mile. The southward flow of water down this gradient is thought to have formed to maintain the ridge and slough pattern so characteristic of the Everglades (Kushlan, 1993). Wetlands of the greater Everglades ecosystem include a mosaic of vegetation types, including tree-islands, mangrove forests, cypress swamps, marl prairies, sawgrass marshes, and sloughs (see **Figure 3-19**) that extend from the Kissimmee River basin to Florida Bay.



Figure 3-19 – Everglades Slough



Prior to drainage and development, the ecosystem was characterized by its large spatial extent, a diversity of habitats, and a hydrologic regime featuring dynamic storage of water and unconfined sheet flow over much of the ecosystem south of Lake Okeechobee. The single most distinctive hydrologic feature of the historical ecosystem was the uninterrupted slow flow of shallow water from the sawgrass plains south of Lake Okeechobee through a rich mosaic of these wetlands to the ocean (Florida Bay/Gulf of Mexico). Drainage and compartmentalization efforts during the 20th century for flood control and water supply purposes interrupted this flow, as well as altering water levels, distribution, and seasonal timing (SCT, 2003). Eastern portions of Everglades National Park are often too dry and prone to fire, whereas western portions of the park experience extended periods of high water and water ponds in the WCAs north of the Park. The altered hydrologic system contributed to a decline in the functional value of the wetland systems in the greater Everglades system. Although serving as a critical transportation connection across southern Florida, the Tamiami Trail, which was completed in 1928, is an impediment to flow, slowing and blocking water flow south into Northeast Shark River Slough and the southern Everglades, adversely affecting the Park's natural resources. Additional blockage of direct flows occurred with the 1962 construction of the L-28 and L-29 levees which enclosed WCA-3. The WCA-3 was then separated by the L-67A and L-67C levees into independent units, WCAs 3A and 3B, in an effort to reduce ground water seepage through the porous Biscayne aquifer. Enlargement of the L-29 Canal as part of the central and C&SF project also contributed to flow restriction. The western unit, WCA-3A (approximately 786 square miles), scheduled for higher water levels, serves as a major water supply reservoir. The eastern unit, WCA-3B (approximately 128 square miles), with lower water levels, reduces the head difference to the developed areas to the east. The northern end of the impoundment WCA is shallow and quick to dry, while the southern end is almost permanently inundated. This same gradient exists to a lesser extent from the west (where flow of water into the adjoining Big Cypress National Preserve is unimpeded) to the east (Gunderson, 1994).

Compartmentalization, reduced water deliveries, altered distribution, and alterations of the cyclical patterns of water deliveries have reduced downstream sheet flows and suppressed the natural processes and functions within Northeast Shark River Slough. The L-29 Canal and adjacent levee create a damming effect severely restricting water deliveries into Everglades National Park. Stage restrictions within the L-29 Canal due to roadbed limitations further contribute to reduced water deliveries, affecting plant communities within the slough (NPS, 2008). Nearly 50 percent of the Everglades wetlands have been lost to draining for agricultural and economical development (SFERTF, 2008). The project area, which encompasses a portion of Northeast Shark River Slough, is largely devoid of the historical flows. Without benefit of natural surface water flows from the north and largely dependent on the rainfall within this portion of the basin, the area is plagued with altered hydrology. Persistent drought and fire have also altered the ecosystem. Thus, the existing condition of the wetlands, and their associated functions, in and near the project area are severely degraded from natural conditions. It is estimated that approximately 250,000 acres of the Park are infested with exotic species (SFERTF, 2008). Exotic plant infestations in Everglades National Park may be exacerbated by soil disturbance, increased nutrients, and hydrological modification. Although the ecosystem has been adversely affected by development and long-term water management activities, the remaining portions of the Everglades ecosystem are still defined as wetlands, by both the NPS and by the USACE (NPS, 2008).

The proposed Tamiami Trail project corridor is located at the northeastern extent of Everglades National Park stretching from the L-31N Canal (eastern terminus) west to the L-67 Extension Canal (western terminus) for approximately 10.7 miles. The wetland systems in the vicinity of the project corridor include the Northeast Shark River Slough to the south and the L-29 Canal to



the north followed by the WCA-3B (see **Figure 3-20**). These wetland systems are hydrologically connected via a series of 19 culverts beneath the roadway. The culvert opening size and the level of water in the L-29 Canal affect the ability to move water across the Tamiami Trail. The 19 sets of drainage culverts (see **Figure 3-21**) beneath the Tamiami Trail continue to provide flow to the project area during much of the year (based on the stage of water in the L- 29 Canal). Wetland vegetation is present downstream of all the culvert sets. In addition, some exotic vegetation is present at most of the outlets, with the majority of vegetation cover by native species. Although the flows are altered from the natural pattern, the hydrology, soils, and vegetation of the project area are indicative of a wetland environment (NPS 2008). Surface waters located within the project corridor includes the L-29 Canal, L-67 Extension Canal, L-31N Canal, L-30 Canal, L-67A Canal, Blue Shanty Canal, and several unnamed narrow canals/linear waterways running south from the roadway corridor into Everglades National Park.

Figure 3-22 shows the approximate limits and wetland/surface water classifications of each distinct wetland/surface water type along the project corridor, based on the available Florida Land Use, Cover, and Forms Classification System (FLUCCS) Geographic Information System (GIS) data layers (SFWMD, 2004).



Figure 3-20 – View of the Tamiami Trail Project Corridor (Facing West)





Figure 3-21 – One of 19 Sets of Existing Culverts (Facing South from L-29 Levee)

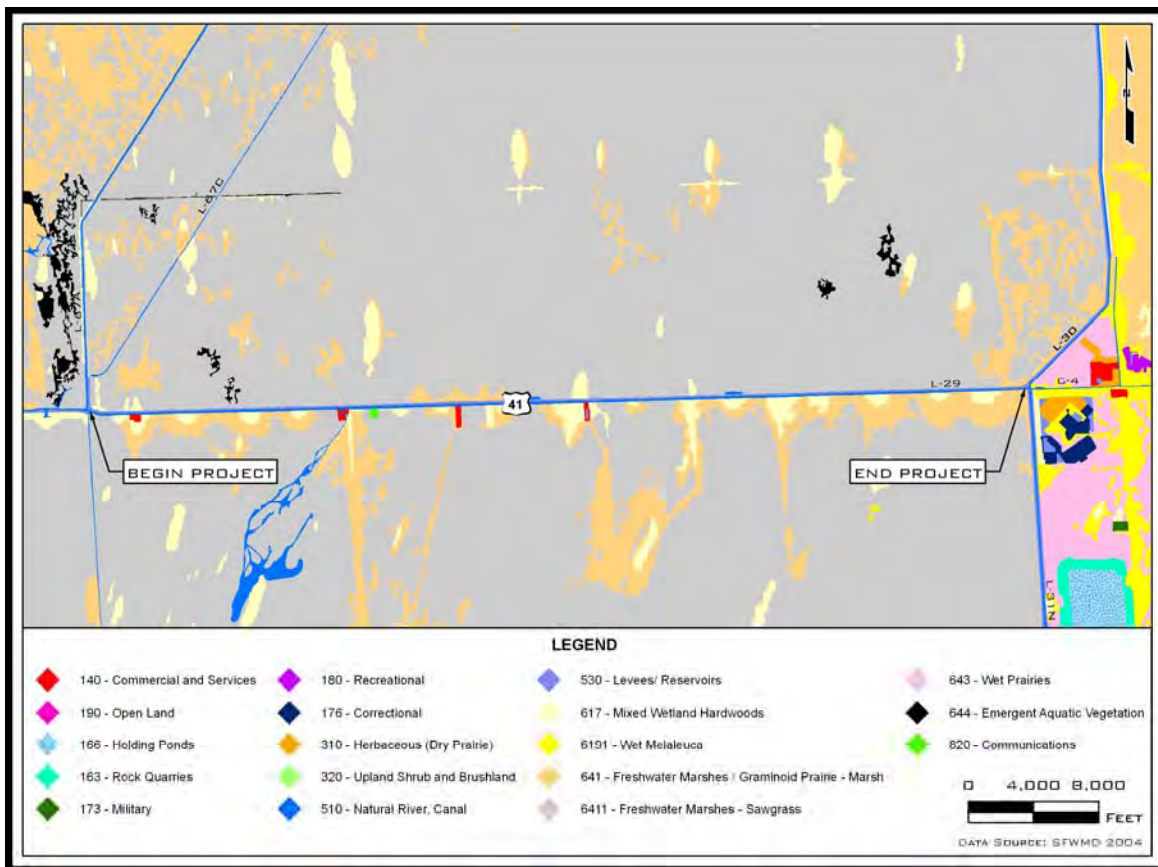


Figure 3-22 – Approximate limits and classifications of wetlands/surface waters along the project corridor



Detailed characterizations of wetland/surface water areas located within and adjacent to the Tamiami Trail project corridor are as follows:

Northeast Shark River Slough – South of Tamiami Trail (FLUCFCS – 610, 618, 6411, 6412, 6417,)

USFWS – PEM1C (Palustrine, Emergent, Persistent, Seasonally Flooded), PSS3/1C (Palustrine, Scrub-Shrub, Broad-Leaved Evergreen/Broad-Leaved Deciduous, Seasonally Flooded), PEM1F (Palustrine, Emergent, Persistent, Semipermanently Flooded), PSS1/EM1F (Palustrine, Scrub-Shrub, Broad-Leaved Deciduous/Emergent, Persistent, Semipermanently Flooded), PSS3C (Palustrine, Scrub-Shrub, Broad-Leaved Evergreen, Seasonally Flooded),

Vegetation within the immediate project area has been impacted by human disturbances such as the Tamiami Trail roadbed and culvert construction/maintenance activities and nutrient loading from the releases of the S-333 control structure located in the L-29 Canal near the western terminus of the project corridor. Flows into the project area are channelized through the 19 sets of culverts beneath Tamiami Trail forming distinct “vegetation halos” or transitional vegetation progression just downstream of most of the culvert sets (evident upon visual examination of aerial photographs – see **Figure 3-23**). These vegetation halos appear to have become exacerbated over time (have become larger evidenced through a review of historical aerial photography) by the influx of high levels of sediments and nutrients that are being continuously funneled through the culvert sets.



Figure 3-23 – Vegetation Halo South of Tamiami Trail at a Culvert



Vegetation assemblages within the vegetation halos south of the Tamiami Trail culvert sets vary depending on site conditions. Some of the halos contain a distinct plume of an overgrown woody wetland community dominated by pond apple (*Annona glabra*) and Carolina willow (*Salix caroliniana*) directly south of the culvert sets. Cattail (*Typha* sp.) is also a common component of these areas immediately downstream of the culvert sets and at the downstream edge of the vegetation halos. Lesser components included swamp bay (*Persea palustris*), dahoon (*Ilex cassine*), wax myrtle (*Myrica cerifera*), myrsine (*Rapanea punctata*), giant leather fern (*Achrostichum danaeifolium*), strangler fig (*Ficus aurea*), sea-myrtle (*Baccharis halimifolia*), cocoplum (*Chrysobalanus icaco*), and Peruvian primrosewillow (*Ludwigia peruviana*) (**Figure 3-24**). The vegetation eventually transitions into a more uniform sawgrass community downstream within Northeast Shark River Slough. Exotic invasive vegetation species are largely restricted to the open water pools immediately downstream of the culvert sets including hydrilla (*Hydrilla verticillata*), water lettuce (*Pistia stratiotes*), torpedo grass (*Panicum repens*) and Peruvian primrosewillow. In addition, Brazilian-pepper (*Schinus terebinthifolius*) occurs in varying densities in disturbed, drier soils adjacent to the road and in the forested wetland areas where it grows on the bases of native trees. Old World climbing fern (*Lygodium microphyllum*) also occurs in low densities in the forested wetland areas (NPS, 2008).



Figure 3-24 – Typical view of the vegetation assemblage at culvert just south of the Tamiami Trail Roadway Corridor (Facing South)



Along the south side of the Tamiami Trail roadway between the vegetation halos at the culvert sets, the habitat consists of a narrow fringe of woody hardwoods dominated by pond apple and Carolina willow with Brazilian-pepper in the more elevated areas. The narrow woody fringe transitions to freshwater marsh dominated by cattail and sawgrass within approximately 10 to 40 feet from the roadway. Lesser components of the woody fringe include swamp bay, dahoon, wax myrtle, myrsine, giant leather fern, and Peruvian primrosewillow (**Figure 3-25**).



Figure 3-25 – View of the narrow fringe of woody hardwoods along the south side of the Tamiami Trail Roadway Corridor (Facing West)

Just south of the narrow woody hardwood fringe along the roadway, the habitat transitions to the sawgrass prairie/marsh community typical of Northeast Shark River Slough (the northeastern portion of the greater Shark River Slough) (**Figure 3-26**). Historically, Shark River Slough was a 30-mile-wide expanse of relatively shallow water moving downstream through the low-gradient wetland landscape. The pattern of water flow was regionally uniform across a broad expanse and lacked any central drainage channel or dendritic drainage pattern. The slough collected flows from the eastern portion of the Everglades, including the western side of the Atlantic Coastal Ridge and moved that water to the southwest through the mangrove estuaries of the southwestern coast into the Gulf of Mexico. Marl prairies, fire-maintained marshes that are intermittently flooded, flank both sides of Shark River Slough. A unique feature of the marl prairies is the high species richness of the plant communities. Sawgrass (*Cladium jamaicense*) and muhly grass (*Muhlenbergia capillaris*) dominate, although more than 100 species of mostly herbaceous plants have been reported. Higher elevation tropical hammock and pine forests occur as islands within the prairie landscape. These tree islands support plants of West Indian origin that are unique to South Florida and contain the highest number of rare plant species in South Florida (USACE, 2005).





Figure 3-26 – View of the Northeast Shark River Slough just south of the Tamiami Trail Roadway Corridor (Facing South)

The dominant habitats within Northeast Shark River Slough are emergent wetlands [sawgrass prairie/marsh, ridge and slough habitat (freshwater marsh), and forested and open water habitats (mixed wetlands – hardwoods and shrubs)]. The primary functions of these wetlands include surface and subsurface water storage, support of the biogeochemical processes (nutrient cycling, peat accretion, etc.), support of characteristic plant community, and providing habitat for native fish and wildlife. These functions appear to be retained, although degraded, following the drainage and compartmentalization efforts. The vegetation in the slough consists of a mosaic of mixed-species patches of several more or less distinct types including sawgrass, muhly grass, spikerush (*Eleocharis* spp.), bayheads, and cattails, interwoven by monotypic stands of sawgrass, which in places exceeds two meters in height. The boundaries between these units are generally abrupt and are controlled by topography, hydrology, soil depth, and fire, to name a few (Davis, 1943; Craighead, 1971; and Herndon et al., 1991).

The deep water slough vegetation community is typically dominated by submerged and floating aquatic plants such as bladderworts (*Utricularia* spp.), white waterlily (*Nymphaea odorata*), big floating heart (*Nymphoides aquatica*), and spatterdock (*Nuphar advena*) (Lodge, 2005). In the USEPA ecosystem assessment of the Everglades (R-EMAP), Stober (2001) noted plant associations across the deep water slough Everglades dominated by white waterlily. However, Stober (2001) only noted one sampling location in ENP sloughs containing white waterlily; the lack of white waterlily is thought to result from inadequate water depths and hydroperiods caused by artificial draining of the marsh community. This is consistent with vegetation surveys conducted by Davis (1943), Gunderson (1994), and Olmstead and Armentano (1997). White



waterlily is more abundant in deeper slough habitats of the Loxahatchee National Wildlife Refuge and WCA-2 and WCA-3 of the Greater Everglades, less subject to drydown events (Stober, 2001). Paleoecological seed data indicates that native ENP slough communities were once dominated by white waterlily and banana lily prior to the widespread artificial draining of slough communities (Saunders et al., 2007). Thus, white water lily is considered an ecological indicator of restoration progress in the degraded slough habitat within the Everglades. Field studies indicate that white water lily slough vegetation communities are characterized by a near continuous hydroperiod, minimal dry down events, and average annual water depths ranging from approximately 0.8 ft – 3.5 ft (Richards et al, 2009; Givnish et al., 2008; Stober et al, 2001; Powers et al., 2005; Goodrick, 1984; David, 1996; Zaffke, 1983) During experimental mesocosm experiments, white water lily exhibited a negative response to dry down conditions (to ground surface) evidenced by reduced leaf production, cessation of flowering, and miniaturized leaves (Richards et al, 2009). White water lily flower production was highest at the deepest experimental mesocosm depth treatment of 2.5 ft; flower production was 60% higher at this depth as compared to the shallowest treatment of 0.49 ft (Saunders et al, 2008). Mesocosm experiments also showed significantly higher white water lily total leaf biomass in the deeper water treatments of 2.5 ft and 1.48 ft as compared to the shallowest treatment of 0.49 ft (Richards et al, 2009). Comprehensive compilation of historical evidence indicates that pre-drainage water depths in Everglades sloughs had an average annual depth of approximately 2 ft (McVoy et al., in press). Based on compilation of the field, mesocosm, and historical evidence, white water lily slough vegetation communities are characterized by a nearly continuous hydroperiod, few dry down events average annual dry season depths of approximately 1.5 – 2.0 ft and average annual wet season depths of approximately 2.0 – 3.0 ft (RECOVER, 2009). A representative list of species observed within the slough follows in **Table 3-5**.

The pre-drainage Everglades ridge and slough system was a network of discreet elevated sawgrass strands (ridges) with wide expanses of open water sloughs encompassing WCA-3B and Shark River Slough dominated by white waterlily, spikerush, and beakrush (*Rhynchospora* spp.) interspersed with tree islands (SCT, 2003; Gunderson, 1994; and Gunderson and Loftus, 1993). The ridges and sloughs were organized in a pattern oriented parallel to the direction of flow; thus, it has been hypothesized that flow volumes in the pre-drainage ridge and slough system were largely responsible for maintaining the sharply discreet community and elevation differences between the ridges and sloughs (Sklar et al., 2000). The sloughs, deeper than the ridges, were the primary habitat for aquatic animals during dry periods, and were the most important wading bird foraging habitats in the Everglades. The historic slough vegetation communities were characterized by floating, submerged, and some emergent species found in areas with the longest hydroperiods and deepest water that normally did not dry down.

The reduced water storage capacity of the managed Everglades, and the compartmentalization of the northern and central ridge and slough system, have slowed flow rates, have created areas that are either overdrained or are more deeply flooded than was the case in the pre-drainage system, have substantially altered the affects of fire on the marsh communities, and have altered the rates and magnitude of flooding and drying events suppressing the natural processes and functions within Northeast Shark River Slough. As a result, sawgrass has invaded sloughs and wet prairies, beakrush communities have been lost, woody plants have invaded marsh communities, and the extent and species composition of marsh communities has become extensively altered. Substantial increases in levels of total phosphorus in water and soil have converted both ridge and slough communities into extensive beds of cattails (Davis et al., 1994; Sklar et al., 2000). The paleoenvironmental seed record has shown that deep water slough plant communities such as those dominated by deep water slough species such as white waterlily within Northeast Shark River Slough have largely been replaced by vast stretches of



sawgrass following compartmentalization and other water management practices (Saunders et al., 2008). [While the relevant sampling points for the Saunders et al. (2008) site were located south of the affected environment, it is reasonable to assume this would also apply to the affected environment since the Northeast Shark River Slough was historically a connected expanse of ridge and slough habitat] (NPS, 2008).

Table 3-5 – Representative Plants Found in the Northeast Shark River Slough with the Potential to Occur in the Project Area

Common Name	Scientific Name	Habitat
Pond apple	<i>Annona glabra</i>	Slough
Pickernelweed	<i>Pontederia cordata</i>	Slough
Spatterdock	<i>Nuphar advena</i>	Slough
American white waterlily	<i>Nymphaea odorata</i>	Slough
Blue waterhyssop	<i>Bacopa caroliniana</i>	Slough
Leafy bladderwort	<i>Utricularia foliosa</i>	Slough
Marsh mermaidweed	<i>Proserpinaca palustris</i>	Slough/sawgrass marsh
Giant leather fern	<i>Acrostichum danaeifolium</i>	Sawgrass marsh
Southern shield fern	<i>Thelypteris kunthii</i>	Sawgrass marsh
Sawgrass	<i>Cladium jamaicense</i>	Marl/wet prairie, sawgrass marsh
Southern cattail	<i>Typha domingensis</i>	Sawgrass marsh, disturbed areas
Southern beaksedge	<i>Rhynchospora microcarpa</i>	Marl/wet prairie
Knotted spikerush	<i>Eleocharis interstincta</i>	Marl/wet prairie
Maidencane	<i>Panicum hemitomon</i>	Marl/wet prairie
Carolina willow	<i>Salix caroliniana</i>	Disturbed areas, wet prairie
Gulf Coast spikerush	<i>Eleocharis cellulosa</i>	Wet prairie, marsh
Tracy's beakrush	<i>Rhynchospora tracyi</i>	Sawgrass marsh
Muhly grass	<i>Muhlenbergia capillaris</i>	Marsh
Spreading beaksedge	<i>Rhynchospora divergens</i>	Marl/ wet prairie
Bluejoint panicgrass	<i>Panicum tenerum</i>	Marl/ wet prairie
Alligator lily	<i>Hymenocallis palmeri</i>	Sawgrass marsh
Florida little bluestem	<i>Schizachyrium rhizomatum</i>	Marl/ wet prairie
Spadeleaf	<i>Centella asiatica</i>	Sawgrass marsh
Kissimmeegrass	<i>Paspalidium geminatum</i>	Slough
Bulltongue arrowhead	<i>Sagittaria lancifolia</i>	Slough, sawgrass marsh, wet prairie
Gulfdune paspalum	<i>Paspalum monostachyum</i>	Marl/ wet prairie
Southern cutgrass	<i>Leersia hexandra</i>	Marsh
Wand goldenrod	<i>Solidago stricta</i>	Wet prairie



Common Name	Scientific Name	Habitat
Rosy camphorweed	<i>Pluchea baccharis</i>	Marl, wet prairie, sawgrass marsh
Arrowfeather threeawn	<i>Aristida purpurascens</i>	Marl/ wet prairie
Meadow jointvetch	<i>Aeschynomene pratensis</i>	Sawgrass marsh
Water cowbane	<i>Oxypolis filiformis</i>	Wet prairie
Falsefennel	<i>Eupatorium leptophyllum</i>	Marl/ wet prairie
Green arrow arum	<i>Peltandra virginica</i>	Sawgrass marsh
Big floatingheart	<i>Nymphoides aquatica</i>	Slough
Perennial saltmarsh aster	<i>Symphyotrichum tenuifolium</i>	Wet prairie
Turkey tangle fogfruit	<i>Phyla nodiflora</i>	Marsh
Glade lobelia	<i>Lobelia glandulosa</i>	Slough
Smallfruit primrosewillow	<i>Ludwigia microcarpa</i>	Slough

(NPS, 2008)

L-29 Canal – North of Tamiami Trail (FLUCFCS – 510)

USFWS – R2UBHx (Riverine, Lower Perennial, Unconsolidated Bottom, Permanently Flooded, Excavated)

The L-29 Canal exists along the north side of the entire length of the Tamiami Trail project corridor (**Figure 3-27**). The canal and right-of-way are maintained by the SFWMD and kept clear of most woody vegetation. Scattered small stands of cattail and common reed occur along the banks along with transgressive individuals of pond apple despite periodic suppression activities by the SFWMD. The canal is predominantly open water with spatterdock often occurring sporadically in an approximate 10 to 15 wide zone along the south bank. Submerged vegetation is dominated by hydrilla, an invasive exotic species. The canal is a conveyor and equalizer for water flows prior to passage into ENP (USACE, 2005). Water deliveries to eastern ENP are controlled by the stage in L-29 Canal, as pressure from the water within the canal (hydraulic head) is required to force water through the culvert sets and into the Park. As canal stage increases, more water is forced beneath the road. However, canal stage is strictly controlled due to potential flooding within residential or agricultural areas of Miami-Dade County or potential damage to Tamiami Trail (USACE, 2005). Stage restrictions within the L-29 Canal due to roadbed limitations and operational limitations further contribute to reduced water deliveries, affecting plant communities and topographic structure within Northeast Shark River Slough.

Water Conservation Area 3B (FLUCFCS – 610, 618, 6411, 6412, 6417)

USFWS – PEM1Fh (Palustrine, Emergent, Persistent, Semipermanently Flooded, Diked/Impounded), PEM1Ch (Palustrine, Emergent, Persistent, Seasonally Flooded, Diked/Impounded), PSS1/EM1Fh (Palustrine, Scrub-Shrub, Broad-Leaved Deciduous/Emergent, Persistent, Semipermanently Flooded, Diked/Impounded), PSS3/1Ch (Palustrine, Scrub-Shrub, Broad-Leaved Evergreen/Broad-Leaved Deciduous, Seasonally Flooded, Diked/Impounded)

WCA-3B, located to the north of the L-29 Levee along the entire length of the project corridor, is managed by USFWS as the Francis S. Taylor Wildlife Management Area. The area is



predominantly a region composed of sawgrass ridges, deepwater sloughs, cattail marshes, wet prairies, and scattered tree/shrub islands and has historically been used to assist in the management of water levels and flow quantities (**Figure 3-28**). A cypress forest fringes its western border extending south to Tamiami Trail. The area provides nesting and foraging habitat for many terrestrial and aquatic species. The tree/shrub islands are composed of tropical hardwood species rising slightly above the elevation of the sawgrass ridges. Although seemingly small, the two to three foot difference in elevation between ridge surface and slough bottom was highly significant in the pre-drainage Everglades. During the typical annual rise and fall of wet and dry season water levels, this elevation difference allowed sloughs to remain water-filled throughout the year, while adjacent ridges would be exposed a few months of the year. In the pre-drainage system, native species were adapted to the multiple habitats provided by the tree islands, ridges, and sloughs. Aquatic organisms depended on the sloughs as extensive areas that would remain inundated throughout all but exceptionally dry years (USACE, 2005). The larger tear-drop shaped tree islands were typically developed where there was bedrock near the surface over which peat had accumulated. Smaller, circular tree islands likely formed on floating “batteries” of peat that were colonized by hardwoods. Common plant species include swamp bay, sweetbay (*Magnolia virginiana*), dahoon holly, wax myrtle, Carolina willow, red maple (*Acer rubrum*), strangler fig, and pond apple. A dense shrub layer is typically found beneath the canopy commonly of cocoplum, but can include other tropical hardwood species.



Figure 3-27 – L-29 Canal along the Tamiami Trail Project Corridor (Facing West)





Figure 3-28 – View of WCA-3B from the L-29 Levee (Facing North)

3.3.4 Floodplains

Historically the Everglades have served as a natural flood retention/detention area. With the broad flat topography, the Everglades were able to convey most major storm and high water events away from uplands towards Florida Bay. As development increased in southeastern Florida the drainage of wetlands and conveyance of water away from natural flow ways has altered the Everglades' natural ability to serve flood protection functions.

The Flood Control Act of 1965 authorized a plan to provide seasonal flood protection in Southwest Dade County (now known as Miami-Dade County). The plan consisted of levees, canals, water control structures, and pumping stations capable of removing 15 inches of runoff per month in addition to seepage into the area following a 10-year flood. The project was officially de-authorized after Congress expanded ENP to include most of the area that would have been protected.

The WCAs provide a detention reservoir for excess water from the agricultural area and parts of the Lower East Coast region and for flood discharge from Lake Okeechobee. Currently, stages in the L-29 Canal are artificially controlled to provide a target elevation of 7.5 feet or below. The design stage upstream of the L-29 Canal and downstream of Tamiami Trail is nine feet. Prior to the construction of the C&SF project features, flow in the Everglades was uncontrolled, and stages varied greatly and at times overtopped Tamiami Trail. Now that flows are constrained by



water control features much of the area south of Tamiami Trail has been impacted by lack of natural flows and the natural character of the ecosystem has experienced drastic changes.

The floodplain within the Tamiami Trail project study area has been altered by the construction of the WCA-3B reservoir, various canals and flood control structures, Tamiami Trail, and the filling of the floodplain for use by business and recreational facilities. While this amount of construction within a floodplain would normally raise water levels in the adjacent areas, the management of water resources by the SFWMD keeps water levels in the project area artificially low during much of the year.

Floodplains adjacent to the project area have been mapped as a Flood Hazard Area, Zone A, which are areas where no base flood elevations or flood depths have been set.

3.3 Wildlife and Vegetation / Habitat

The Everglades consist of a low, flat plain that supports a variety of distinct and dynamic ecosystems. These landscapes assemblages each support their own community of plants and wildlife, including approximately 350 birds, more than 40 mammals, over 50 reptiles, and 15 amphibians (NPS, 2010). Not all of these animals or plant communities occur in the project area. Therefore, the following sections focus on the wildlife, including aquatic species, and vegetation that has the potential to occur within the proposed project area.

Wildlife

Man-made impacts including the construction of regional flood control and water management projects and transportation corridors have significantly altered wildlife habitat within the Everglades ecosystem. Within the proposed project area, the construction of Tamiami Trail and the L-29 Canal and Levee has not only altered the natural flow of water but altered the natural movement of wildlife species between habitat components. Additionally, the significant alteration of hydrology in the area has led alteration of historic wildlife habitat in the Northeast Shark River Slough ecosystem. For example, deep water slough communities of floating aquatic species have been largely replaced by sawgrass marsh.

Historic wildlife habitats directly adjacent to Tamiami Trail have also been altered by anthropomorphic changes in hydrology. The placement of culvert sets underneath Tamiami Trail has led to areas directly adjacent to the road being consistently flooded, causing a habitat to form which consists of a mixed component of native and non-native vegetation. Further south of the roadway, drier conditions now support shrub and forested habitats rather than freshwater marsh or wet prairie. These changes in habitats have altered associated wildlife species diversity and composition.

Mammals within the Everglades ecosystem have adapted over time to marshland habitats. An example is the white-tailed deer, which are distinguished from other regional deer populations by their small relative size (Kushlan, 1990). Everglades marshes also provide habitat to the endangered Florida panther (*Felis concolor coryi*) and the rare Everglades mink (*Mustela vison*) (both discussed in Section 3.5). Other mammals that may occur within the project area include rats, mice, rabbits, and otters. The West Indian manatee (discussed in Section 3.5) has a small probability of utilizing the L-29 Canal, with only one manatee reported within the project area in the past 20 years.

There are approximately 300 bird species that are commonly found in the Everglades (Lodge, 2005). The freshwater marsh and prairie ecosystem adjacent to the proposed project area is especially attractive to raptors such as the Everglades snail kite (discussed in Section 3.5) and various species of wading birds. There are approximately 18 species of wading birds that commonly utilize Everglades marsh habitats (Lodge, 2005). Herons and egrets such as the



great blue heron (*Ardea herodias*), great egret (*Ardea albus*), white ibis (*Eudocimus albus*), and tricolored heron (*Egretta tricolor*) all use the marsh habitat for foraging on fish and invertebrates. Several species of wading birds including tricolored herons and great egrets have active rookeries located just south of the project area. Wood storks (discussed in Section 3.5) also commonly forage in freshwater marshes and have rookeries located in close proximity to the project site. The tree and shrub habitat downstream of Tamiami Trail also provides nesting, roosting, and loafing habitat for numerous species of birds.

The deep-water habitats found within the project area are habitat to a number of reptiles and amphibians. Leopard frogs (*Rana utricularia*) and pig frogs (*Rana grylio*) along with striped mud turtles (*Kinosternon baurii*) and red bellied cooters are found in the deep-water habitats below the Tamiami Trail culvert sets. The American alligator (*Alligator mississippiensis*) (discussed in Section 3.5) utilizes the L-29 Canal as well as deeper waters found south of Tamiami Trail. Its role in forming “gator holes” is important in maintaining ponded areas during the dry season that support a number of other species (Kushlan, 1990).

There are approximately 28 native fish species that may occur within the project area (Trexler et al., 2000) Most fish species that utilize Everglades marsh systems are minnow-sized, which provides an advantage during dry periods when water availability is low (Kushlan, 1990). Fish species that utilize marsh habitat include mosquitofish (*Gambusia holbrooki*), least killifish (*Heteranda Formosa*), and the sailfin molly (*Poecilia latipinna*). Larger sized fish occur in canals and deep-water areas associated with culvert sets. These fish species include bullhead (*Ameiurus spp.*), Florida gar (*Lepisosteus platyrhincus*), bluegill (*Lepomis macrochirus*), and sunfish (*Lepomis spp.*). These large fish support the recreational fishery in the L-29 Canal and culvert pools along Tamiami Trail.

There are also more than 50 exotic fish species found in the Everglades and South Florida (Trexler et al., 2000). Some of the more common exotic fish species include Oscars (*Astronotus ocellatus*), Mayan cichlids (*Cichlasoma urothalamus*), peacock bass (*Cichla ocellaris*) and tilapia (*Tilapia spp.*). Introduced fish species prefer habitats with warmer water temperatures and longer hydroperiods such as canals and culvert holes. Marsh habitats connected to canals tend to have more exotic fish than marshes not connected by canals and culvert holes, and canal fish communities tend to be dominated by non-native fish species (Trexler et al., 2000).

The interaction between native and non-native fish depends on local environmental conditions that can include habitat patches and water temperature. Environmental disturbances such as hurricanes and tropical storms can elevate water levels in the park and increase distribution of non-native fish throughout the park (Trexler et al., 2000). No native fish extinctions or widespread fish community disruptions resulting from introduction of exotic fish have been noted; however, over time, it is possible that exotic fish species could adversely impact native fish species structure (Trexler et al., 2000).

Some of the more common fish and wildlife species that may utilize these habitats are listed in **Table 3-6**.

Table 3-6 – Wildlife Known/With the Potential to Occur Within the Project Area

Common Name	Scientific Name
Mammals	
Nine-banded armadillo	<i>Dasypus novemcinctus</i>
River otter	<i>Lutra canadensis</i>
Bobcat	<i>Lynx rufus</i>



Common Name	Scientific Name
White-tailed deer	<i>Odocoileus virginianus</i>
Marsh rice rat	<i>Oryzomys palustris</i>
Cotton mouse	<i>Peromyscus gossypinus</i>
Gray fox	<i>Procyon lotor</i>
Raccoon	<i>Procyon lotor</i>
Everglades Mink	<i>Mustela vison</i>
Marsh rabbit	<i>Sylvilagus palustris</i>
Birds	
Red-winged blackbird	<i>Agelaius phoeniceus</i>
American anhinga	<i>Anhinga anhinga</i>
Great egret	<i>Ardea albus</i>
Great blue heron	<i>Ardea herodias</i>
Cattle egret	<i>Bubulcus ibis</i>
Short-tailed hawk	<i>Buteo brachyurus</i>
Red-shouldered hawk	<i>Buteo lineatus</i>
Swainson's hawk	<i>Buteo regalis</i>
Green heron	<i>Butorides virescens</i>
Common snipe	<i>Capella gallinago</i>
Turkey vulture	<i>Cathartes aura</i>
Willet	<i>Catoptrophorus semipalmatus</i>
Killdeer	<i>Charadrius vociferus</i>
Common nighthawk	<i>Chordeiles minor</i>
Northern harrier/Marsh hawk	<i>Circus cyaneus</i>
Common flicker	<i>Colaptes auratus</i>
Black vulture	<i>Coragyps atratus</i>
Swallow-tailed kite	<i>Elanoides forficatus</i>
Merlin	<i>Falco columbarius</i>
American kestrel	<i>Falco sparverius</i>
American coot	<i>Fulica Americana</i>
Gallinule	<i>Gallinula chloropus</i>
Common yellowthroat	<i>Geothlypis trichas</i>
Loggerhead shrike	<i>Lanius ludovicianus</i>
Laughing gull	<i>Larus atricilla</i>
Ring-billed gull	<i>Larus delawarensis</i>



Common Name	Scientific Name
Hooded merganser	<i>Lophodytes cucullatus</i>
Belted kingfisher	<i>Megaceryle alcyon</i>
Yellow-crowned night heron	<i>Nyctanassa violacea</i>
Black-crowned night-heron	<i>Nycticorax nycticorax</i>
Eastern screech-owl	<i>Otus asio</i>
Double-crested cormorant	<i>Phalacrocorax auritus</i>
Glossy ibis	<i>Plegadis falcinellus</i>
Pied-bill grebe	<i>Podilymbus podiceps</i>
King rail	<i>Rallus elegans</i>
Forster's tern	<i>Sterna forsteri</i>
Eastern meadowlark	<i>Sturnella magna</i>
Lesser yellow-legs	<i>Tringa flavipes</i>
Greater yellow-legs	<i>Tringa melanoleuca</i>
Gray kingbird	<i>Tyrannus dominicensis</i>
Reptiles and Amphibians	
Florida cricket frog	<i>Acris gryllus</i>
Florida cottonmouth	<i>Aghistrodon psivorus</i>
American alligator	<i>Alligator mississippiensis</i>
Green anole	<i>Anolis carolinensis</i>
Brown anole	<i>Anolis sagrei</i>
Florida softshell turtle	<i>Apalone ferox</i>
Oak toad	<i>Bufo quercicus</i>
Black racer	<i>Coluber constrictor</i>
Eastern diamondback	<i>Crotalus adamanteus</i>
Corn snake	<i>Elaphe guttata guttata</i>
Rat snake	<i>Elaphe obsoleta rossalleni</i>
Greenhouse frog	<i>Eleutherodactylus planirostris</i>
Southeastern five-lined skink	<i>Eumeces inexpectatus</i>
Eastern mud snake	<i>Farancia abacura</i>
Eastern narrow-mouth toad	<i>Gastrophyne carolinesis</i>
Green treefrog	<i>Hyla cinerea</i>
Squirrel treefrog	<i>Hyla squirella</i>
Striped mud turtle	<i>Kinosternon baurii</i>
Diamondback terrapin	<i>Malaclemys terrapin</i>



Common Name	Scientific Name
Florida water snake	<i>Nerodia fasciata</i>
Florida green water snake	<i>Nerodia floridana</i>
Brown water snake	<i>Nerodia taxispilota</i>
Peninsula newt	<i>Notophthalmus viridescens</i>
Cuban treefrog	<i>Osteopilus septentrionalis</i>
Everglades dwarf siren	<i>Pseudobranchius striatus</i>
Little grass frog	<i>Pseudacrisocularis</i>
Florida red-bellied cooter	<i>Pseudemys nelsoni</i>
Pig frog	<i>Rana grylio</i>
Southern leopard frog	<i>Rana utricularia</i>
Ground skink	<i>Scincella lateralis</i>
South Florida swamp snake	<i>Seminatrix pygaea</i>
Greater siren	<i>Siren lacertian</i>
Dusky pigmy rattlesnake	<i>Sistrurus miliarius</i>
Peninsula ribbon snake	<i>Thamnophis sauritus</i>
Eastern garter snake	<i>Thamnophis sirtalis</i>
Fish	
Bullhead	<i>Ameiurus</i> spp.
Bowfin	<i>Amia calva</i>
Sheepshead minnow	<i>Cyprinodon variegatus</i>
Everglades pygmy sunfish	<i>Elassoma evergladei</i>
Lake chubsucker	<i>Erimyzon sucetta</i>
Marsh killifish	<i>Fundulus confluentus</i>
Mosquitofish	<i>Gambusia holbrooki</i>
Least killifish	<i>Heteranda formosa</i>
Catfish	<i>Ictalurus</i> spp.
Flagfish	<i>Jordanella floridae</i>
Brook silverside	<i>Labidesthes sicculus</i>
Florida gar	<i>Lepisosteus platyrhincus</i>
Bluegill	<i>Lepomis macrochirus</i>
Redear sunfish	<i>Lepomis microlophus</i>
Sunfish	<i>Lepomis</i> spp.
Bluefin killifish	<i>Lucania goodei</i>
Rainwater killifish	<i>Lucania parva</i>



Common Name	Scientific Name
Largemouth bass	<i>Micropterus salmoides</i>
Coastal shiner	<i>Notropis petersoni</i>
Sailfin molly	<i>Poecilia latipinna</i>
Pike killfish	<i>Belonesox belizanus</i>

(NPS, 2010; Florida Museum of Natural History, 2010)

Vegetation

Prior to flood control and drainage activities, Northeast Shark River Slough was dominated by large expanses of open water slough and elevated sawgrass marshes that were interspersed with tree islands (SCT, 2003). This unique ridge and slough system was organized in a pattern oriented parallel to the direction of flow. In the past, the slough systems were dominated by floating submerged species, and emergent species that tolerated long hydroperiods and deep waters, while the ridge systems were characterized by vast expanses of sawgrass. Outside of the ridge and slough areas are large areas of marl prairies, which are known for their high species richness.

Because of reduced water flows into Northeast Shark River Slough and ENP, historic vegetation assemblages have been changing. The deepwater slough systems that once were dominated by floating aquatics such as white water lily have been replaced by vast stretches of sawgrass. The marl prairies that were once dominated by sawgrass and muhly have now shifted to sawgrass and black sedge (*Schoenus nigricans*).

Vegetation along the project corridor contains a mixture of native and exotic species in a variety of plant assemblages. Vegetation type and composition within the project study area has been heavily influenced by past anthropomorphic disturbances, including the construction of Tamiami Trail and the construction of upstream water control structures. "Vegetation halos" are located downstream of culvert locations along Tamiami Trail and have been influenced by directed water flows through the culvert sets (see Section 3.3.3).

Cattail is often found in deep water pools directly downstream of the culvert sets along with invasive aquatic species such as torpedo grass (*Panicum repens*), water lettuce (*Pistia stratiotes*), hydrilla (*Hydrilla verticillata*), and Peruvian primrosewillow (*Ludwigia peruviana*).

Depending on specific site conditions, some vegetation halos contain forested wetland components comprised of pond apple, swamp bay, coco plum (*Chrysobaianus icaco*) and Carolina willow. Exotic vegetation components of these forested areas include Brazilian-pepper that grows along the roadside and at the bases of native trees and Old World climbing fern, which is found in these forested areas at low densities.

Further downstream the vegetation transitions into a freshwater slough assemblage of deeper permanent flow channels vegetated with floating aquatics and sawgrass surrounded by higher ridges of sawgrass and other herbaceous vegetation.

A more detailed description of wetland habitats and vegetation is found in Section 3.3.3.

3.4 Land Use

The existing land use within the study boundaries varies from preserve lands to commercial uses. Vast portions of South Florida remain natural, although much of it is disturbed land. The dominant natural features are the Everglades National Park and Biscayne National Park, along



with Biscayne and Florida Bay and remnant freshwater and coastal wetland and upland systems within and adjacent to the developed areas along the coast. For the most part, urban development is concentrated along the lower east coast of Miami-Dade County.

Land use in Miami-Dade was compiled based on 2004 to 2005 GIS data attributed according to the Florida Land Use, Cover, and Forms Classification System (FLUCCS). The most significant land use and cover categories in Miami-Dade County are wetlands, urbanized development, water resources, and agriculture. Almost 60 percent of the land cover in Miami-Dade County is classified as wetland. These areas make up the ENP and Water Conservation Areas in the western part of the county. Urban development constitutes 16 percent of Miami-Dade's land use, and while starting to move westward, is still concentrated on the coast.

For analysis purposes, land use in the project area was compiled for zones that extends for three to seven miles from the project area and was based on 2004/2005 GIS data according to the Florida Land Use, Cover, and Forms Classification System (FLUCCS).

Table 3-7 – Land Use in Miami-Dade County and the Project Area

Land Use	Miami-Dade		ZONE-1		ZONE-2		ZONE-3	
	Total Acres	1,461,378	Total Acres	60,106	Total Acres	120,266	Total Acres	196,499
	Acres	%	Acres	%	Acres	%	Acres	%
Urban Development	238,047	16.3%	731	1.2%	5,862	4.9%	18,072	9.2%
Agriculture	77,349	5.3%	-	0.0%	1,035	0.9%	3,766	1.9%
Rangeland, Shrub and Brushland, Abandoned Groves	19,268	1.3%	102	0.2%	168	0.1%	240	0.1%
Upland Hardwood Forests, Melaleuca, Australian Pine, etc.	15,640	1.1%	-	0.0%	154	0.1%	264	0.1%
Reservoirs, Lakes, Canals	221,789	15.2%	662	1.1%	1,616	1.3%	2,352	1.2%
Wetlands, Wetland Hardwood Forest, Marshes, etc.	856,904	58.6%	58,216	96.9%	110,995	92.3%	170,475	86.8%
Barren Land, Levees	2,582	0.2%	350	0.6%	479	0.4%	661	0.3%
Roads, Communications, Power Lines	29,799	2.0%	45	0.1%	111	0.1%	933	0.5%

(SFWMD, 2004-2005)

* Zone 1 = 3 miles from Project Area, Zone 2 = 5 miles from Project Area, Zone 3 = 7 miles from Project Area

Approximately 98% of the land area within 3 miles of the project area is wetlands that are within the boundaries of the ENP or WCAs. These wetlands are an important part of the Everglades ecosystem and are comprised of a variety of wetland habitat types (See Section 3.2.3) Within some of these wetlands are a complex network of canals, levees and control structures that serve to control water levels in the WCA system that is located north of Tamiami Trail.

Urban development is the next most common land use in all zones and within the project corridor. Within the project corridor this land use is primarily represented by commercial and recreational facilities. Four commercial airboat operators currently operate along the Tamiami Trail. Three operators, Coopertown Airboat Rides and Restaurant, Everglades Safari Park and



Gator Park operate from facilities located on the south side of Tamiami Trail. The other operator, Airboat USA launches from a public airboat ramp immediately east of Coopertown Airboat Rides. The Airboat Association of Florida (AAF) is a recreational association with facilities on the south side of the Tamiami Trail about three miles east of the western end of the project area. The Miccosukee Tribe has two residential properties within the project area, Osceola Camp, located on the south side of the Tamiami Trail, west of the Airboat Association of Florida and Tiger Tail Camp, located on the north side of the Tamiami Trail just east of Gator Park and west of Coopertown.

Road and communication use are another important feature within the general project area. Beside wetlands, Tamiami Trail itself is the next most prevalent land use along the project corridor. Of all upland land uses along the project corridor Tamiami Trail accounts for more than 95% of all uplands within the project area. Additionally, there are two active radio tower sites located within the project area, one operated by the SFWMD, and one owned by Salem Communications.

3.5 Special Status Species

This section provides a summary of the Federally-listed threatened and endangered species (T&E) and state-listed/species of special concern found at Everglades National Park that may occur in the Tamiami Trail study area. The following references were consulted for incorporation of applicable information: Everglades National Park; the Draft South Florida and Caribbean Parks Exotic Plant Management Plan and Preliminary Draft EIS; Section 7, Endangered Species Act (ESA) consultation with the USFWS and National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NOAA-NMFS); USFWS Endangered Species website; USFWS Critical Habitat Portal; NOAA-NMFS, Office of Protected Resources Web site; the Florida Fish and Wildlife Commission Web site; and the Florida Department of Agriculture and Consumer Services (FDACS) Web site.

Animals and plants Federally classified as endangered or threatened are protected under the Endangered Species Act of 1973, as amended. According to the Endangered Species Act of 1973, "endangered species" means any plant or animal species in danger of extinction throughout all or a substantial part of its range. A "threatened species" is any species likely to become an endangered species in the foreseeable future throughout all or a substantial part of its range. "Proposed Species" are animal or plant species proposed in the Federal Register to be listed under Section 4 of the ESA. "Candidate Species" are species for which the USFWS and NOAA-NMFS has sufficient information on their biological status and threats to propose them as endangered or threatened under the ESA. Everglades National Park provides habitat for a number of Federally-listed threatened and endangered animal species, including candidate species.

Federally-listed threatened and endangered animal species having the potential to occur in and around the project study area are described in **Table 3-8**. [Note: The bald eagle (*Haliaeetus leucocephalus*) was delisted in 2007; The American alligator (*Alligator mississippiensis*), Federally-listed due to similarity of appearance, is discussed in the "Other Protected Species" section below].



Table 3-8 – Federally-Listed Threatened and Endangered Species with Potential to Occur in the Tamiami Trail Project Area

Common Name	Scientific Name	Federal Status	Designated Critical Habitat in Park
Mammals			
Florida panther	<i>Puma concolor coryi</i>	Endangered	No Federally designated critical habitat
West Indian manatee	<i>Trichechus manatus</i>	Endangered	Portions of Everglades National Park are within federally designated critical habitat. The Tamiami Trail project area is not within critical habitat.
Reptiles			
Snail kite	<i>Rostrhamus sociabilis plumbeus</i>	Endangered	Portions of Everglades National Park are within designated critical habitat, including the Tamiami Trail project area
Eastern indigo snake	<i>Drymarchon corais couperi</i>	Threatened	No Federally designated critical habitat
Birds			
Cape Sable seaside sparrow	<i>Ammodramus maritimus mirabilis</i>	Endangered	No Federally designated critical habitat
Wood stork	<i>Mycteria americana</i>	Endangered	No Federally designated critical habitat

(NPS, 2010)

Florida Panther

The Florida panther was listed as endangered under the ESA in 1967. The Florida panther is a large, pale brown or buff cat with white underparts and tail tip. Mature males weigh between 100 to 150 pounds and would reach 7 feet from nose to tip of tail. Females are smaller – from 50 to 100 pounds and up to 6 feet in length. They subsist on mammalian prey consisting of white-tailed deer, wild hogs, and raccoon and, in some areas, small game. The Florida panther primarily utilizes upper dry land habitats such as hardwood hammocks, pine flatwoods, and thicket swamps near wetlands. Although it does not like extremely wet places, it would wade across waterways if necessary to find food and drier land. A panther’s home range covers 20 to over 450 square miles, with a historic range from eastern Texas through the southeastern states. The only known self-sustaining population occurs in South Florida, generally within the Big Cypress Swamp region. It is estimated that approximately 100 individuals of this subspecies remain in the wild population in South Florida (USFWS, 2008).

Per the USFWS *Florida Panther Recovery Plan, Third Revision* (2008):

Three priority zones were identified as important for panther habitat conservation: (1) Primary Zone – lands essential to the long-term viability and persistence of the panther in the wild; (2) Secondary Zone - lands contiguous with the Primary Zone, currently used by few panthers, but which could accommodate expansion of the panther population south of the Caloosahatchee River; and (3) Dispersal Zone - the area which may facilitate future panther expansion north of the Caloosahatchee River (Kautz et al. 2006). The Primary Zone is currently occupied and supports the breeding population of panthers. Although panthers move through the Secondary and Dispersal Zones, they are not currently occupied by resident panthers. Some areas of the Secondary Zone would require restoration to support panthers. These zones vary in size, ownership, and land cover composition.



The Primary Zone is 3,548 m² (9,189 km²) in size, 73% of which is publicly owned, and includes portions of the [Big Cypress National Preserve], ENP, Fakahatchee Strand Preserve State Park, [Florida Panther National Wildlife Refuge], Okaloacoochee Slough State Forest, and Picayune Strand State Forest. This zone's composition is 45% forest, 41% freshwater marsh, 7.6% agriculture lands, 2.6% prairie and shrub lands, and 0.52% urban lands. The Secondary Zone is 1,269 m² (3,287 km²) in size, 38% of which is public land. This zone's composition is 43% freshwater marsh, 36% agriculture, 11% forest, 6.1% prairie and shrub lands, and 2.3% low-density residential areas and open urban lands. The Dispersal Zone is 44 m² (113 km²) in size, all of which is privately owned. This zone's composition is 49% agriculture (primarily improved pasture and citrus groves), 29% forest (wetland and upland), 8.8% prairie and shrub land, 7.5% freshwater marsh, and 5.1% barren and urban lands (Kautz et al. 2006).

Refer to **Figure 3-29** for a map depicting the Primary, Secondary, and Dispersal zones for the Florida Panther, as designated by the USFWS.

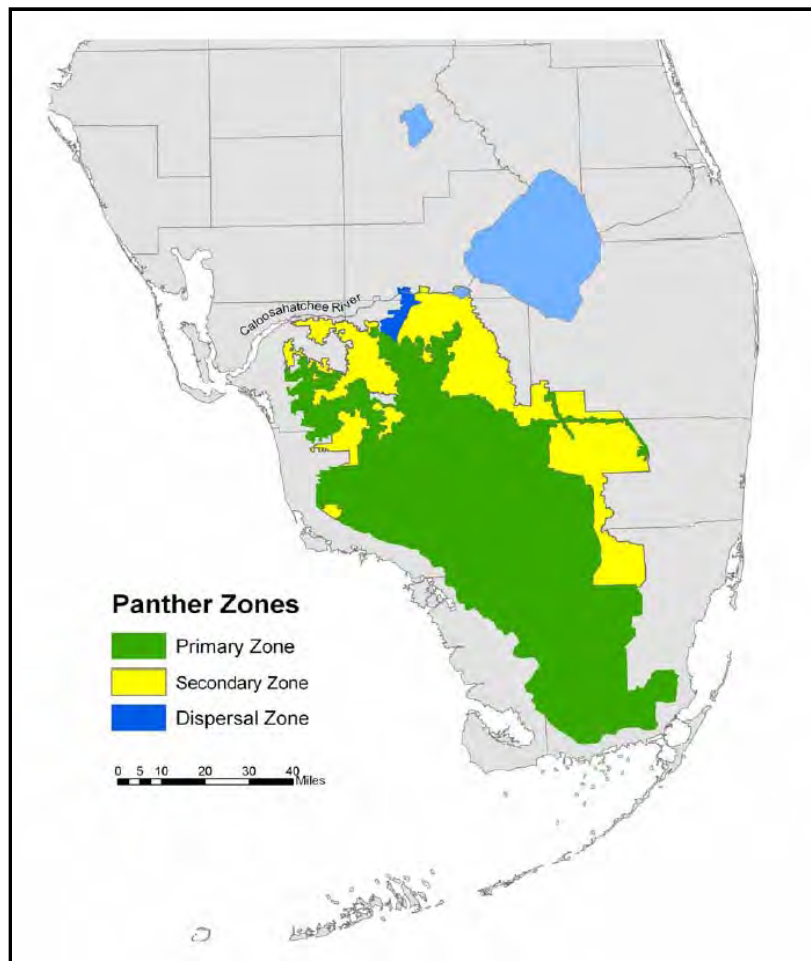


Figure 3-29 – USFWS Designated Florida Panther Priority Habitat Zones (Kautz et al., 2006)

The USFWS also developed Standard Local Operating Procedures for Endangered Species (SLOPES) for the Florida panther (April 18, 2000). According to the SLOPES, the USFWS designated a Panther Consultation Area in South Florida that extends from Monroe and Miami-



Dade Counties north to Charlotte and Glades Counties, including portions of Collier, Broward, Palm Beach, Lee, and Hendry Counties. Within the designated Panther Consultation Area (PCA) are Panther Preservation Areas (PPA) ranked as Priority 1 and 2. Also included are areas otherwise designated as Conservation Lands, such as national preserves (Big Cypress), national parks (Everglades National Park), state parks (Collier-Seminole), SFWMD Water Conservations Areas (WCA-1, -2, -3), etc. Throughout the occupied range of the panther, the ENP population represents at least 11 percent of the panther population known to the USFWS. According to radio collar telemetry data, two panthers in ENP have been documented crossing the Shark River Slough into Big Cypress National Preserve; however, no Florida panther activity has been recorded in the project area in the past six years. **Figure 3-30** shows panther radio collar telemetry data points collected between 1981 and 2009 in relation to the project area.

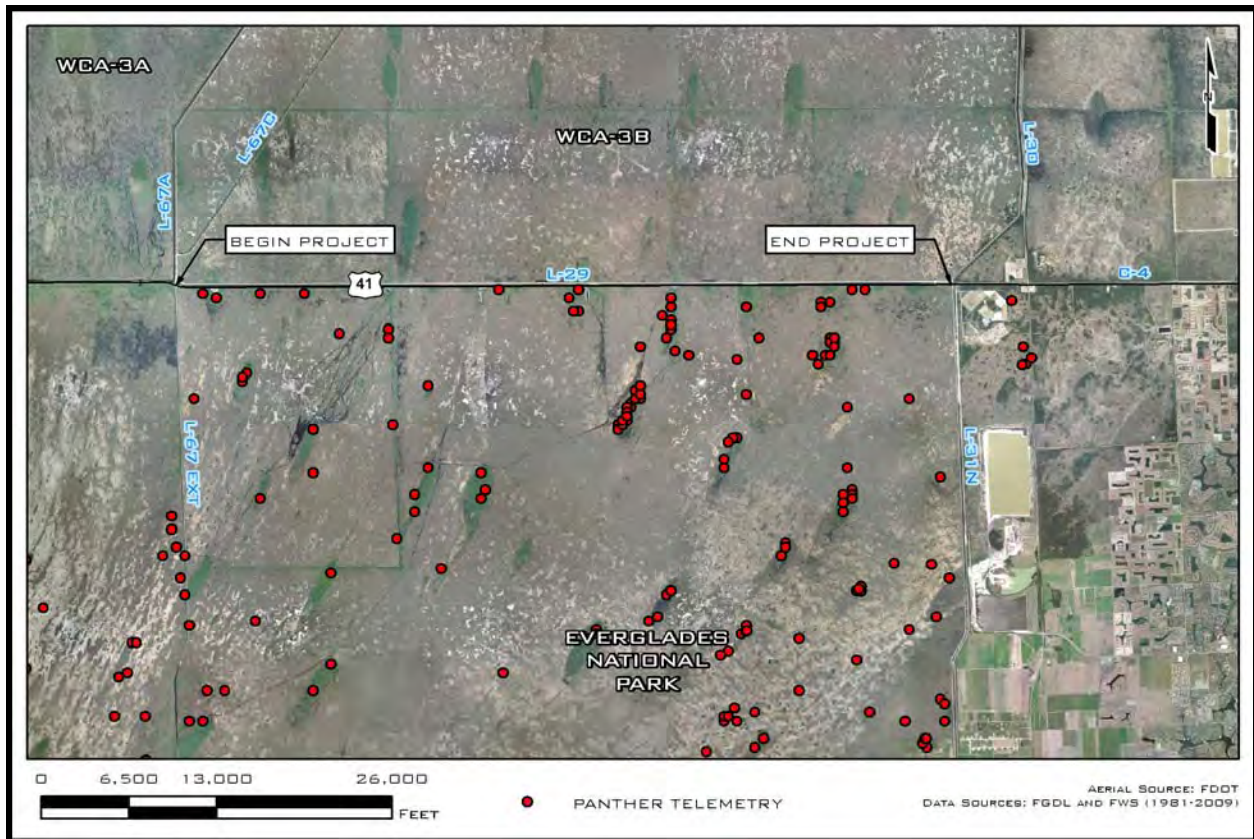


Figure 3-30 – Florida Panther Radio Collar Telemetry Data Points

West Indian Manatee

The West Indian manatee, listed as endangered under the ESA, is a fully aquatic herbivorous mammal. Manatees have large, seal-shaped bodies with paired flippers and a round, paddle-shaped tail. They are typically grey in color (color can range from black to light brown) and occasionally spotted with barnacles or colored by patches of green or red algae. The muzzle is heavily whiskered and coarse, single hairs are sparsely distributed throughout the body. Adult manatees, on average, are about nine feet long (3 meters) and weigh about 1,000 pounds (200 kilograms). At birth, calves are between three and four feet long (1 meter) and weigh between 40 and 60 pounds (30 kilograms). The West Indian manatee is typically found in coastal or estuarine waters, bays, rivers, and lakes, but may be found in inland canals during winter months. Manatees are grazers and require sheltered coves for feeding, resting, and calving.



The manatee occurs in ENP's marine and estuarine systems and spends approximately five hours a day feeding. Submerged aquatic vegetation, such as seagrasses, is a major component of the manatee's diet, and although manatees appear to tolerate marine and hypersaline conditions, they are most frequently found in fresh or brackish waters. Changes in freshwater flow on salinity patterns, submerged vegetation, and the overall quality of the foraging habitat in Florida Bay and elsewhere in the Park are, along with water temperature, important influences on the distribution and abundance of manatees in the area. Increases in salinity are generally considered to result in less favorable conditions for manatees, although manatees move freely through a wide range of salinities. Manatees may or may not need freshwater to survive, but are frequently reported drinking freshwater from natural sources as well as hoses, sewage outfalls, and culverts in marine and estuarine areas. For the period of record of over 20 years, there has been only one record of a manatee utilizing the L-29 Canal adjacent to Tamiami Trail.

Snail Kite

The snail kite, listed as endangered under the ESA in 1967, is a medium-sized hawk with a wingspan of about 45 inches. The adult males are slate gray with black head and wing tips, a white patch at the base of a square tail, and red legs. The female has a buff-colored body, heavily streaked with dark lines, a white line above the eye, a white tail patch, yellow legs, and red eyes. Immature snail kites resemble the females, only they are darker in color and their eyes are brown. Their beaks are slender and very hooked. Snail kites require long hydroperiod wetlands that remain inundated throughout the year. This preference is associated with the freshwater apple snail (*Pomacea paludosa*), its primary food source, which requires nearly continuous flooding of wetlands for greater than one year. Suitable habitats for the snail kite include freshwater marsh and shallow vegetated lake margins where apple snails can be found. Preferred nesting habitat includes small trees and shrubs such as willow, bald cypress, pond cypress, sweet bay, dahoon holly, southern bayberry, and elderberry. During dry periods when suitable shrubs and trees experience dry conditions, herbaceous species such as sawgrass, cattail, bulrush, and common reed are used for nest sites. Critical habitat for the snail kite was designated in 1977 and includes WCA-1, -2, and -3A, and portions of ENP, as well as Lake Okeechobee shorelines and portions of the St. Johns marsh.

The USFWS drafted management guidelines for the snail kite in 2006. According to the USFWS, snail kite nesting does not occur randomly within wetland systems. Instead, there are generally areas within wetlands, where snail kite nesting is concentrated. The density of kite nests, frequency of nesting within each area, and the sizes of these "priority snail kite nesting areas" are highly variable, but identifying these areas may help to focus management actions. In most years, the majority of kite nesting is anticipated to occur within the priority management zones, though new nesting areas may become active.

Since the mid-1990s, the geographic range of the snail kite has been reduced to the Everglades, Lake Okeechobee, Loxahatchee Slough, the Kissimmee River, and the Upper St. Johns River watersheds (Cattau et al, 2008). During 1992-2001 the majority of successful snail kite reproduction occurred in WCA-3A (Cattau et al, 2009). However, no snail kites were fledged out of WCA-3A in 2001, 2005, 2007, or 2008; only two snail kites from the same nest fledged out of WCA-3A in 2009 (Cattau et al, 2009). During 1985 – 1995 Lake Okeechobee once provided a productive breeding site for snail kite nesting but this area no longer constitutes productive breeding grounds (Cattau et al., 2009). Since the loss of the productive snail kite breeding grounds in Lake Okeechobee and WCA-3A, the majority of the snail kite nesting has most recently occurred in the Kissimmee Chain of Lakes, namely Lake Tohopekaligo (Toho); this area accounted for the majority of the successful nesting attempts from 2005-2009 (Cattau et al., 2009).



Reproductive declines throughout the geographic range of the snail kite have been attributed to natural disturbances such as droughts, anthropogenic water management practices, and long-term habitat degradation. Another contributing factor linked to the lack of successful nesting and fledgling success is the aging snail kite population that is known to be less reproductively viable and less capable of responding to poor environmental conditions such as drought (Cattau et al, 2009). The spread of the exotic apple snail may also limit juvenile snail kite survival and contribute to overall population declines (Cattau et al, 2009). Snail kite recovery is thought to be dependent upon maintaining hydrologic conditions that support nesting and foraging conditions and provide suitable conditions for its primary prey, the native apple snail. The long-term recovery of this species will be dependent on reducing habitat fragmentation, and improving environmental and ultimately habitat conditions throughout the remaining range of its habitat from the Kissimmee Chain of Lakes to Everglades National Park.

The USFWS *Draft Snail Kite Management Guidelines* (2006) dictate that nest protection buffers be established around every active snail kite nest. These buffer zones would be in effect from when kites begin nest building through the time when breeding activity is no longer observed at the site. Because kites can re-nest, and often re-nest in the same area as previous attempts, buffer zones may remain in place past the time when fledglings leave the area if adult kites continue to show breeding activity, including courtship, in the general area (USFWS, 2006).

- No-entry Buffer Zone - A 500-foot (~150 meter) radius no-entry buffer zone would be established around all active nests that are discovered. The purpose of this buffer zone is to protect kites from direct disturbance that may affect the fate of nesting (USFWS, 2006).
- Limited Activity Buffer Zone - A 1,640-foot (500 meter) radius limited-activity buffer zone would be established around all active kite nests. This buffer zone is intended to maintain and protect foraging opportunities and habitat conditions around each nest to allow the nest to succeed. The goal is to maintain habitat conditions for the entire nesting period similar to those that were present when the birds selected the site (USFWS, 2006).

Figure 3-31 depicts recent snail kite nesting locations and protection zones in relation to the proposed project area.



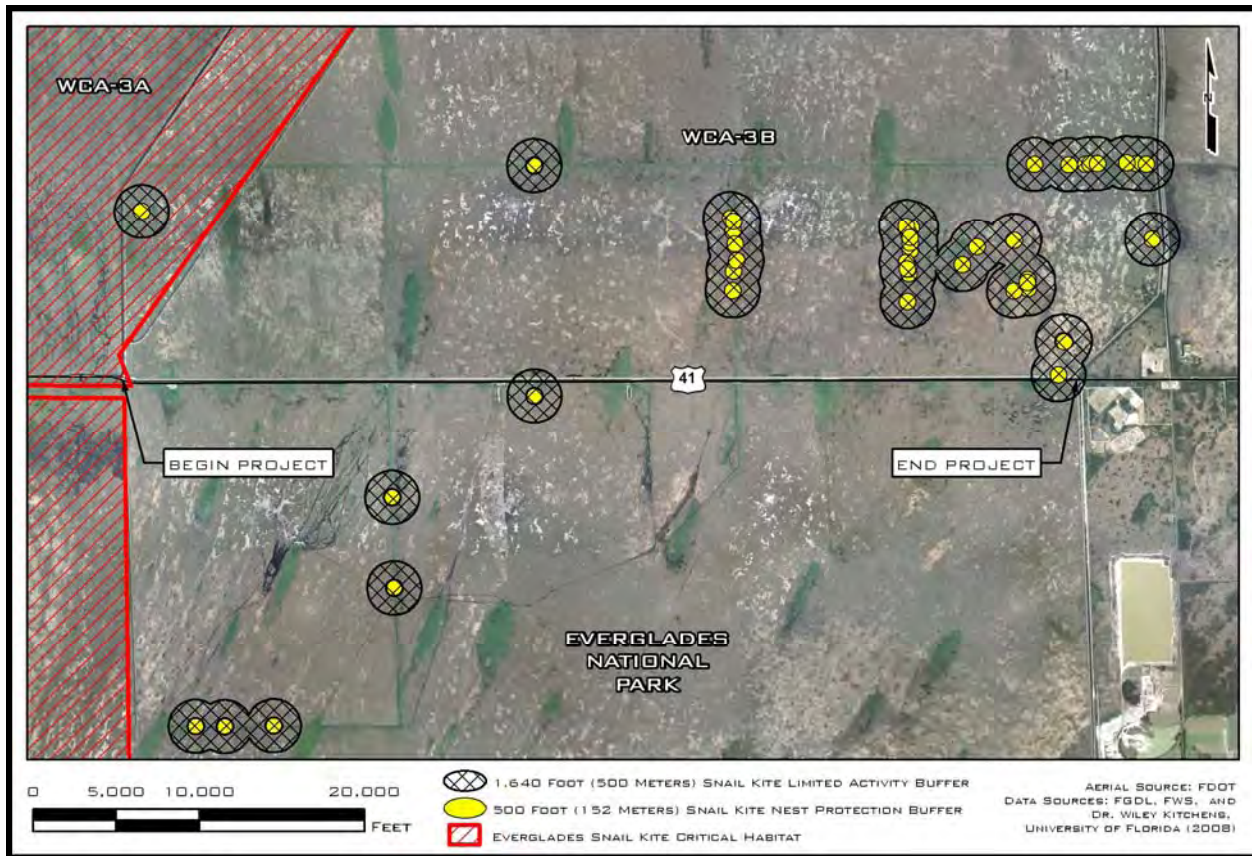


Figure 3-31 – Snail Kite Nesting Locations and Protection Zones

Eastern Indigo Snake

The Eastern Indigo snake is a large, non-poisonous snake that may reach up to eight feet in length. The snake gets its name from its shiny, blue-black color. Its diet consists mainly of other snakes, amphibians, small mammals, and occasionally birds and sea turtles. This species occurs throughout Florida and along the coastal plain of Georgia. The eastern indigo snake is found in a variety of habitats and would readily utilize disturbed areas and populated residential areas; however, their preferred habitat is dry pineland bordered by water. The project area consists of large expanses of wetland, which are not particularly attractive as habitat to this snake. The decline in populations is attributed to loss of habitat to agriculture, and also collecting for the pet trade. The species has also suffered from mortality during gassing of gopher tortoise burrows for rattlesnake collection. Little is known about the specific habits and niche of the Eastern indigo snake in the Park. This species is generally found in and near hardwood hammocks, and has shown no preference for disturbed sites. Eastern indigo snake protection measures have also established by the USFWS for all construction activities.

Cape Sable Seaside Sparrow

The Cape Sable seaside sparrow is one of eight extant subspecies of seaside sparrow in North America. Its distribution is limited to the short-hydroperiod wetlands at the bottom of the greater Everglades system, on the southern tip of mainland Florida. In the 1930s, Cape Sable was the only known breeding range for the sparrow. Areas on Cape Sable that were occupied by Cape Sable seaside sparrow in the 1930s have experienced a shift in vegetative communities from freshwater vegetation to mangroves, bare mud flats, and salt-tolerant plants such as *Batis*



maritima and *Borrchia frutescens*. The hurricane of 1935 is believed to have initiated the succession of the plant community on Cape Sable from one dominated by freshwater plants to one dominated by salt tolerant plants. Sea level rise, reduced freshwater flows to the area resulting from upstream water management practices, and another hurricane in 1960 were also likely factors in this habitat change. As a result, the Cape Sable seaside sparrow no longer use this area. The currently preferred nesting habitat of the Cape Sable seaside sparrow appears to be a mixed marl prairie community that often includes muhly grass. These short-hydroperiod, mixed marl prairies contain moderately dense, clumped grasses with open space permitting ground movements by the sparrow. Sparrows tend to avoid tall, dense, sawgrass-dominated communities, spikerush marshes, extensive cattail monocultures, long hydroperiod wetlands with tall, dense vegetative cover, and sites supporting woody vegetation. The birds also avoid sites with permanent water cover. The suitability of short-hydroperiod, mixed marl prairie communities for the sparrow is driven by a combination of hydroperiod and periodic fires. Fires prevent hardwood species from invading these communities and prevent the accretion of dead plant material, both of which decrease the suitability of habitat for Cape Sable seaside sparrows.

The Cape Sable seaside sparrow was first provided protection when it was listed on March 11, 1967, under the Endangered Species Preservation Act of 1967 (32 Federal Register 4001). That protection was continued under the Endangered Species Conservation Act of 1969. The sparrow and all other species listed under the Endangered Species Conservation Act were the first species protected under the Act of 1973, as amended. The Cape Sable seaside sparrow inhabits six distinct subpopulations called A, B, C, D, E, and F. Critical habitat for this species was designated on August 11, 1977 (42 FR 42840). Currently, the critical habitat includes areas of land, water, and airspace in the Taylor Slough vicinity of Collier, Miami-Dade, and Monroe Counties. Much of this area is within the boundaries of ENP. Because this was one of the first critical habitat designations under the Act, there were no primary constituent elements defined. The designated area encompasses about 197,260 acres (79,828 hectares), and includes portions of subpopulations B through F. The Cape Sable seaside sparrow Subpopulation A is the only area occupied by sparrows that does not have associated designated critical habitat. This subpopulation flanks the area west of Shark River Slough and is in the direct path of discharge from WCA-3A through the S-12 discharges. Water levels within the subpopulation are also thought to be affected by discharges from the upstream S-343A and S-343B structures and water concentrations within WCA-3A. This subpopulation, once estimated to be the largest subpopulation besides Subpopulation B, is thought to provide a critical role to the overall survival of the species. The Cape Sable seaside sparrow Subpopulation A drastically declined approximately 84% from an estimated 2,608 birds in 1992 to only 432 birds in 1993 (Pimm et al, 2002). To prevent extirpation of the remaining Cape Sable seaside sparrow Subpopulation A, the USFWS issued a biological opinion (BO) providing recommendations to the USACE on how to control water levels in nesting habitat. The USACE responded by developing changes in water management operations that are still currently in effect. The goals are to keep subpopulations (particularly Subpopulation A) dry during a portion of the breeding season and to keep habitat for the subpopulations B, C, D, E, and F from excessive drying to prevent unnatural fire frequencies. The decline of Subpopulation A has been attributed to upstream water management practices and a recent analysis by ENP scientists indicated that this decline cannot be attributed solely to rainfall increases (Kotun presentation, 2009 Cape Sable seaside sparrow Symposium, 2009), Survey and nesting monitoring within Subpopulation A indicate this is an extant, functional subpopulation but that no significant recovery of the subpopulation has occurred since the massive crash in 1993 (Virzi et al, 2009). In 2009, 19 pairs of breeding pairs were detected in Subpopulation A. The 2009 survey revealed few unmated males in Subpopulation A, and no significant differences in clutch



sizes, adult return rates, or proportion of early to late nesters as compared to the largest and most stable Subpopulation, Subpopulation B (Virzi et al, 2009).

Wood Stork

The wood stork is a large, long-legged wading bird, standing about 50 inches tall, with a wingspan over 60 inches. It has white plumage and a short, black tail. Their bill is black, thick at the base, and curved. Their U.S. range consists of parts of Florida, Georgia, and South Carolina. Wood stork forage mainly in shallow water in freshwater marshes, swamps, lagoons, ponds, tidal creeks, flooded pastures and ditches, where they are attracted to falling water levels that concentrate food sources (mainly fish). Wood storks use thermal drafts for soaring, and may travel 80 miles from nest to feeding areas. These birds eat small fish and probe with their bills for their food in shallow water no more than about 10 inches deep. Highly social, these birds nest in large rookeries and feed in flocks. They are long-lived and first breed at 4 years old. In South Florida, nesting occurs as early as October, with young leaving the nest in February or March. The decline in wood stork populations is attributed mostly to loss of habitat by destruction of wetlands and control of the flows that originally created the Everglades. To minimize adverse effects to the wood stork due to any loss of wetlands, the USFWS recommends that any lost foraging habitat resulting from a project be replaced with construction of new wetlands or enhancement of existing wetlands within the Core Foraging Area (CFA) which is a radius of 18.6 miles from the rookery.

Overall nesting colony trends in ENP have indicated an increasing population size of wood storks since 1985 with peak nesting years occurring in 1994, 2000, 2007, and 2009 (SFWBR 2009) (**Figure 3-32**). 2009 marked a banner year for wood stork production in south Florida, with the largest nesting success since the predrainage period (SFWBR 2009). There were an estimated 6,452 wood stork nests in south Florida in 2009, constituting a 203% increase over the last decade (SFWBR 2009). The lack of dry season rainfall and reversals likely allowed for the optimal foraging conditions during 2009 that lead to such a successful breeding season (SFWBR, 2009).

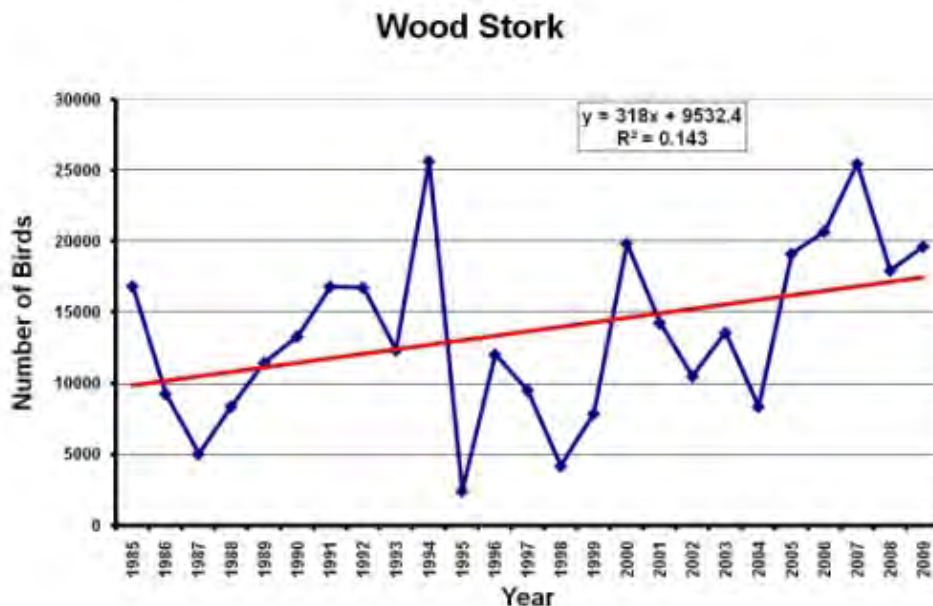


Figure 3-32 – Wood Stork Nesting Colony Trends in ENP



Three wood stork rookeries occur at pond apple stands along the south side of the Tamiami Trail project study area: the Tamiami Trail West Rookery and the Tamiami Trail East 1 and Tamiami Trail East 2 Rookeries (see **Figure 3-33**). The pond apple forest creates a visual barrier between the rookeries and Tamiami Trail and the storks appear to have become somewhat acclimated to highway traffic noise.

The USFWS, using the Habitat Management Guidelines for the Wood Stork in the Southeast Region (Guidelines) (Ogden 1990) and based on recent photography during nesting season, have identified primary and secondary restriction zones for the Tamiami Trail East and West rookeries. These zones are designed to protect stork nesting activities and behaviors and place restrictions on certain human activities during the stork nesting season. The primary zone is the most critical area and must be managed according to the guidelines to insure the colony survives. For the West Colony, a core area that contains nesting habitat has been designated by USFWS to have a radius of 385 feet from the center of the colony. The primary zone for the West Colony extends an additional 1,300 feet in all directions from the core area for a radius of 1,585 feet. The USFWS has designated the primary zone for the East Colony as a 1,300-foot radius from the colony center. The secondary zone may be used by wood storks for collecting nesting material and for roosting, loafing, and feeding (especially important for newly fledged young). The secondary zone of the West Colony extends an additional 1,000 feet beyond the primary zone for a total radius of 2,885 feet from the center of the colony. For the Tamiami East Colony, the secondary zone extends 1,200 feet beyond the primary zone for a total radius of 2,500 feet. Approximately 3,700 linear feet of the Tamiami Trail are located within the primary zone of the Tamiami West Colony; none lies within the primary zone of the East Colony. In addition, approximately 5,000 linear feet of the highway lies within the secondary zones of the colonies. The following guidelines apply to the restriction zones:

- **Primary Zone:** From onset of nesting activity through the onset of the rainy season (or when the young have fledged), highway construction (e.g., heavy human/equipment activity, pile driving, blasting) should not be permitted in the reach of the highway affected by that alternative. Woodstork activity will be monitored by the NPS through Systematic Reconnaissance Flights (SRF).
- **Secondary Zone:** No unauthorized human activity (on foot, airboat, or off-road vehicle) should occur at any time of the year within the reach of highway affected by that alternative on the south side of the highway and particularly during the nesting season.
- **Length of Restrictions:** These restrictions shall remain in effect during the construction phase of the Tamiami Trail project.
- **Qualified Observer:** Subject to the approval of the USFWS, FFWCC, and NPS, a qualified observer(s) shall be stationed onsite during the construction phase of the Tamiami Trail project. The observer shall monitor wood stork activity and shall notify USFWS, FFWCC and the NPS if wood stork behavior is modified such that roosting, nest building, breeding, nesting, and/or fledging of young is disrupted or otherwise interfered with. The NPS will monitor and determine the active status of wood storks through SRF.
- **Modification of Restrictions:** If new information becomes available concerning the wood stork colonies, the NPS, USFWS and FFWCC should immediately contact each other to determine what modifications, if any, are warranted.



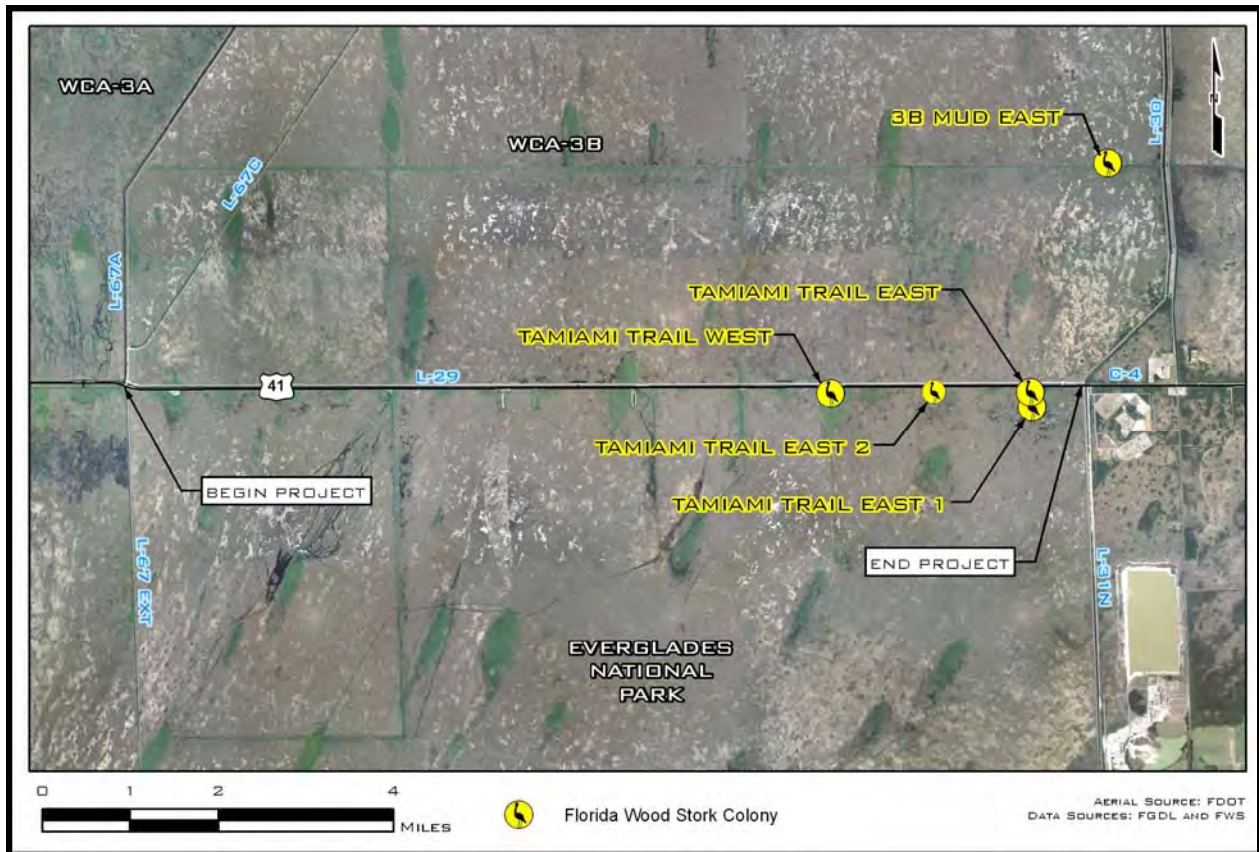


Figure 3-33 – Wood Stork Rookeries along the Project Corridor

State-Listed Species

The state of Florida lists a variety of plant and animal species as endangered, threatened, species of special concern, or commercially exploited. The state defines these species under the Florida Endangered and Threatened Species Act as follows:

Animals

- A threatened species is any species of fish and wildlife naturally occurring in Florida which may not be in immediate danger of extinction, but which exists in such small populations as to become endangered if it is subjected to increased stress as a result of further modification of its environment.
- Endangered species are defined as any species of fish and wildlife naturally occurring in Florida, whose prospects of survival are in jeopardy due to modification or loss of habitat; over utilization for commercial, sporting, scientific, or educational purposes; disease; predation; inadequacy of regulatory mechanisms; or other natural or manmade factors affecting its continued existence.

Plants

- "Threatened plants" means species native to the state that are in rapid decline in the number of plants within the state, but which have not so decreased in such number as to cause them to be endangered.



- "Endangered plants" means species of plants native to the state that are in imminent danger of extinction within the state, the survival of which is unlikely if the causes of a decline in the number of plants continue, and includes all species determined to be endangered or threatened pursuant to the federal Endangered Species Act of 1973, as amended,

The Florida Fish and Wildlife Conservation Commission list includes 118 animal species (FWC 2006); and the Florida Department of Agriculture and Consumer Services (FDACS) identifies 542 plant species (421 endangered species, 113 threatened species, and eight commercially-exploited species (FDACS 2003). FFWCC has identified six birds as species of special concern that may nest or otherwise be found in the vicinity of Tamiami Trail between S-334 and the L-67 Canal: tricolored heron, snowy egret, little blue heron, limpkin, roseate spoonbill, and white ibis (USACE 2005). These migratory birds are protected under the provisions of the Migratory Bird Treaty Act. They are protected species under the jurisdiction of USFWS. Nesting activities in these rookeries usually last until the rains have dispersed prey, leading to the cessation of nesting. USFWS and FFWCC identified the Frog City wading bird colony, which hosts tricolored herons and great egrets, as potentially requiring protective measures during construction. The Frog City rookery is located in WCA-3B close to the L-29 Levee approximately one-quarter mile west of the Tigertail Camp.

The American alligator (*Alligator mississippiensis*), a species of special concern, and the Everglades mink (*Mustela vison evergladensis*), listed as threatened by the State of Florida, are also found along the Tamiami Trail corridor.

Table 3-9 –State-Listed Wildlife Species with Potential to Occur in the Tamiami Trail Project Area

Common Name	Scientific Name	State Status
Little blue heron	<i>Egretta caerulea</i>	Species of Special Concern
The little blue heron is a wading bird found along the Atlantic coast from Massachusetts to Florida, and is most abundant along the Gulf of Mexico. This species ranges up to 30 inches in height and would have a wingspread of 3 feet. Adults have a purple head and neck, with a slate-gray body. The long neck is held in an "S" curve at rest and in flight. Young are all white, with a blue bill and green legs. Little blue herons feed during the day on fish, reptiles, crustaceans, and insects. The long bill is used to jab and eat the prey. Little blue herons are common throughout the project area.		
Snowy egret	<i>Egretta thula</i>	Species of Special Concern
The snowy egret is a small white heron, about 2 feet tall, with a 3 foot wingspan, and weighing just less than 1 pound. This species is distinguished by a black bill and legs, with yellow feet. Both male and female have the same coloring. Snowy egrets breed in shared colonies in salt marshes, ponds and shallow bays. Prey includes aquatic organisms and insects, such as shrimp, fish, frogs, and insects. They forage by walking slowly or standing motionless and striking at the prey. The species was reduced from common to rare by 20th century plume hunting. Snowy egrets are common throughout the project area.		
Tricolored heron	<i>Egretta tricolor</i>	Species of Special Concern
The tricolored heron is a wading bird found from Massachusetts to the Gulf Coast. Reaching 30 inches in height, and weighing up to one pound, its slate-gray plumage is complemented by a white belly and a white chin stripe. During most of the year, the bill is yellow with a black tip and its legs are yellow. During mating season the bill turns bright blue and the legs are bright pink. Its diet consists primarily of fish, but may include small reptiles, amphibians, insects, and crustaceans. This species usually breeds in brackish and saltwater coastal areas, in mixed colonies with other herons. Nests are close to the		



Common Name	Scientific Name	State Status
ground. Tricolored herons are common throughout the project area.		
White ibis	<i>Eudocimus albus</i>	Species of Special Concern
The white ibis is a medium-sized wading bird. Its feathers are entirely white, except for dark wing tips. The face is bare and pink, blending into a long, curved bill. It has long pink legs and webbed toes. Barriers, marshes, coastal islands and inland lakes are the preferred habitat and nesting sites. White ibis probe for aquatic crustaceans and insects using their bill. White ibis are common in the project area.		
Osprey	<i>Pandion haliaetus</i>	Species of Special Concern
Ospreys are large birds with wings bent at the wrist in flight. The back is dark brown, and the undersides are mostly white. These birds are found on or near large lakes, rivers, and coastal areas where suitable nesting sites can be found. Nesting sites are large living or dead trees and man-made structures and often stand above surrounding vegetation or in more open fields with sparsely imbered forests, but low nesting sites are common, especially in mangrove swamps.		
Roseate spoonbill	<i>Ajaia ajaja</i>	Species of Special Concern
Roseate spoonbills are found in the coastal marshes, mudflats, and mangrove keys from Florida to coastal Texas. These large wading birds stand almost 3 feet tall and have a wingspan in excess of 4 feet. The term 'Roseate' refers to the brilliant pink color of the adult bird. This species is often found in small groups with other wading birds. To feed, roseate spoonbills immerse their bill tips in water and swing their heads from side to side. Their diet consists of small fishes, crustaceans, mollusks, slugs and aquatic insects. Roseate spoonbills often nest in rookeries with herons, ibis, and other wading birds. They construct their nests of sticks, in trees or bushes, 5 - 15 feet off the ground.		
Limpkin	<i>Aramus guarauna</i>	Species of Special Concern
The Limpkin is a somewhat large bird, 66 cm (26 in) long, with a wingspan of about 102 cm (40 in) and a weight of about 1.1 kg (2.4 lb). Its plumage is drab—dark brown with an olive luster above. The feathers of the head, neck, wing coverts, and much of the back and underparts (except the rear) are marked with white, making the body look streaked and the head and neck light gray. The Limpkin occurs from peninsular Florida (and formerly the Okefenokee Swamp in southern Georgia) and southern Mexico through the Caribbean and Central America to northern Argentina. In South America it occurs widely east of the Andes; west of them its range extends only to the Equator. It inhabits freshwater marshes and swamps, often with tall reeds, as well as mangroves. In the Caribbean, it also inhabits dry brushland.		
American Alligator	<i>Alligator mississippiensis</i>	Species of Special Concern
The alligator is a large mostly black crocodylian with a broad round snout and no prominently visible tooth in the lower jaw when the mouth is closed. It is distinguished from the American crocodile which has a prominently displayed tooth on the lower jaw when the mouth is closed and is lighter in color with dark crossbands or spots on the back, tail and legs. The alligator is found in most permanent bodies of fresh water including lakes, ponds, canals, marshes, and rivers, and occasionally wanders into brackish water conditions.		
Everglades Mink	<i>Mustela vison</i>	Threatened
The Everglades mink is a medium size member of the weasel family with a long slender body, short legs, and a long tail. It's fur is dark brown over the body and blackish brown at the tip of the tail. Some individuals have a white patch on the chin or chest. The mink utilized a variety of wetland habitats including freshwater marsh, cypress swamp, and forested wetlands. The south Florida distribution is from Southern Collier County, mainland Monroe County, and Miami-Dade County.		

(NPS, 2010 ; FFWCC, 2004 ; Hipes et al., 2001)



Table 3-10 below shows the State-listed plant species with the potential to occur in the project area. According to the FDACS, statutory protection of State-listed plants is not applicable if the clearing of land is performed by a public agency when acting in the performance of its obligation to provide service to the public (Section 581.185(8) Florida Statutes).

Table 3-10 –State-Listed Plant Species with Potential to Occur in the Project Area

Common Name	Scientific Name	State Status	Species Information
Florida Butterfly Orchid	<i>Encyclia tampensis</i>	Commercially Exploited	Rockland hammocks and coastal buttonwood forests
Southern Fogfruit	<i>Phyla stoechadifolia</i>	Endangered	Marshes
Spicewood	<i>Calyptanthus pallens</i>	Threatened	Rockland hammocks, coastal berm
Satinleaf	<i>Chrysophyllum oliviforme</i>	Threatened	Pinelands and hammocks
Sword Fern	<i>Nephrolepis biserrata</i>	Threatened	Moist and shady hammocks
Reflexed wild-pine, northern needleleaf	<i>Tillandsia balbisiana</i>	Threatened	Moist forests, swamps, pinelands, hammocks
Cardinal Airplant; Common Wildpine	<i>Tillandsia fasciculata</i> var. <i>densispica</i>	Endangered	Cypress swamps, sloughs, and hammocks
Golden Leather fern	<i>Acrostichum aureum</i>	Threatened	Coastal hammocks, fresh and saltwater marshes
Royal fern	<i>Osmunda regalis</i>	Commercially Exploited	Hammocks and cypress swamps
Giant wild-pine, giant airplant	<i>Tillandsia utriculata</i>	Endangered	Pinelands, coastal hammocks, cypress swamps, coastal buttonwood forests
Leatherleaf Airplant	<i>Tillandsia variabilis</i>	Threatened	Hammocks and cypress swamps

(NPS, 2010; Coile, 2003)

3.6 Wilderness/Unique Ecosystems

Everglades National Park is one of the most unusual wilderness areas on the continent. It is the largest remaining subtropical wilderness in the United States, and its abundant wildlife includes rare and endangered species, such as Florida panthers, West Indian manatees, eastern indigo snakes, Cape Sable seaside sparrows, snail kites, and wood storks. The Everglades have also been designated as an International Biosphere Reserve, a World Heritage Site, and a Wetland of International Importance, in recognition of its significance to all the peoples of the world (NPS, 2004).

The wilderness of Everglades National Park offers an escape from human-made structures, crowds, artificial light, and noise, and allows visitors to experience solitude, natural quiet, and spectacular scenery. The vast wilderness also allows visitors to explore and discover the incredible natural beauty of the many natural features, and many species of plants and animals. The remote areas of the wilderness provide outstanding opportunities for solitude and a primitive and unconfined type of recreation. This is the basis of a wilderness experience.

Approximately 1,296,500 acres (524,686 hectares) of wilderness was designated at Everglades National Park by Congress on November 10, 1978. The park also contains approximately



81,900 acres (33,144 hectares) of potential wilderness; combined, these areas represent about 86 percent of the total park area (NPS, 2006a). The East Everglades Expansion Area, a 109,600 acre addition to the northeast area of the park in 1989, is currently being evaluated for wilderness characteristics in the park's *Everglades National Park General Management Plan/East Everglades Wilderness Study*. The Draft GMP/EEWS/EIS is expected to be released for public review and comment in January 2011 and would include a Draft NPS Preferred Alternative.

The Park manages its wilderness areas, including potential wilderness, in accordance with the Wilderness Act so that the areas retain their "primeval character and influence, without permanent improvements or human habitation" (16 USC § 1131). Development in the Park is limited to areas of existing services, utilities, and infrastructure. Management activities occurring in wilderness are associated with fire management, exotic plant management, and research and educational activities.

Visitor use and experience of the wilderness area surrounding the area is somewhat limited, due to the difficult access and/or inhospitable nature of the wilderness areas. However, visitors to the park are encouraged to follow "Leave No Trace" principles when recreating in wilderness to ensure its protection and to maximize the visitor's wilderness experience. These principles include traveling and camping on durable surfaces, disposing of waste properly, leaving wilderness resources as they are found, minimizing campfire impacts, respecting wildlife, and being considerate to other visitors (NPS, 2006a).

3.7 Cultural Resources

The cultural environment includes those aspects of the physical environment that relate to human culture and society, along with the institutions that form and maintain communities and link them to their surroundings (King and Rafuse 1994). Section 101(b)(4) of NEPA directs Federal agencies to preserve not only natural resources but also important historical and cultural aspects of our national heritage at Federal undertakings are planned and implemented. In response to that mandate and project scoping, potential impacts on archaeological, historical, and traditional cultural resources were addressed. The analysis also addressed other applicable Federal laws and regulations that protect cultural resources, especially Section 106 of the National Historic Preservation Act. That Act requires Federal agencies to consider the effects of their undertakings on properties that are listed in or eligible for the National Register of Historic Places (NRHP). Section 106 requirements were addressed pursuant to regulations for Protection of Historic Properties (Title 36, Code of Federal Regulations, Part 800) and NPS policy (Director's Order #28: Cultural Resource Management).

To be eligible for the NRHP, properties must be 50 years old (unless they have special significance) and have national, state, or local significance in American history, architecture, archaeology, engineering, or culture. They also must possess integrity of location, design, setting, materials, workmanship, feeling, and association, and meet at least one of four criteria:

- Criterion A: Be associated with significant historical events or trends
- Criterion B: Be associated with historically significant people
- Criterion C: Have distinctive characteristics of a style or type, or have artistic value, or represent a significant entity whose components may lack individual distinction
- Criterion D: Have yielded or have potential to yield important information (Title 36, Code of Federal Regulations, Part 60)



Region of Influence (Area of Potential Effects)

The region of influence is the geographic area within which a Federal action may cause effects on resources. The concept is analogous to the area of potential effects (APE) on NRHP-listed or eligible properties, as defined by regulations implementing Section 106 of the National Historic Preservation Act [Title 36, Code of Federal Regulations, Part 800.16(d)]. Those regulations define the APE as the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties. The scale and nature of the APE can vary for different types of potential impacts on the cultural environment.

The Tamiami Trail Modifications: Next Steps project has potential to affect cultural resources as a result of (1) direct disturbance due to construction activities, and (2) diminishment of historical integrity as a result of indirect effects such as visual changes and limiting access. The APE for direct construction impacts was defined as those areas that could be disturbed by construction of additional bridges and raising the height of the unbridged segments of the Tamiami Trail within the project area. Those areas were estimated on the basis of preliminary engineering data, and include a narrow strip of land along the south side of the Tamiami Trail for widening of the right-of-way or temporary use during construction. Construction staging areas are expected to be located at developed business sites along the corridor. Asphalt removed from sections of the road replaced by bridges might be reused or disposed of in an approved, developed facility. It is expected that other excess material would be deposited in other previously disturbed locations. The APE for visual and access impacts was defined as including the properties along the south side of the Tamiami Trail within the project area.

Cultural History

Archaeological evidence indicates that Florida has been occupied for approximately 12,000 years. Groups called Paleoindians occupied the regions from about 12,000 to 9,500 years ago, when the climate was cool and arid. Paleoindians hunted Pleistocene megafauna (including giant tortoises, giant ground sloths, saber-tooth cats, mammoths, mastodons, camelids, and horses) but probably relied more on smaller game and indigenous plant foods found within a mosaic of wetlands mixed with upland knolls, pine-oak islands, and cabbage palm hammocks. Paleoindian sites are rare and none have been found near the project area.

The subsequent Archaic period represents a continuation of a mobile hunting and gathering way of life that lasted approximately 7,000 years. An oak-savannah environment with a drier climate and rising sea levels characterized the Early Archaic period. During the Middle Archaic period (dated from about 7,000 to 5,000 years ago), the modern climate and Everglades environment developed. Increasing numbers of archaeological sites indicate that populations grew, with coastal groups relying on shellfish and marine resources, but hunting, fishing, and plant collecting also expanded in the Everglades. Pottery was first made during the Late Archaic period.

The population continued to increase during the Glades period, dated from about 2,500 to 500 years ago, and populations became more sedentary, occupying sites for considerable lengths of time. Virtually all tree islands and hardwood tree hammocks in the Everglades have potential for archaeological sites dating to this time period. The period is divided into more than a half dozen phases based primarily on changing types of pottery. Temple mounds and earthworks, particularly in the Okeechobee Basin, suggest that increasingly complex social structures had developed.

When European explorers arrived in 1513, they found people of the Glades culture in Florida (with an estimated population of about 20,000 organized into at least five tribal groups). The Spanish claim of hegemony lasted 250 years until Florida became a British colony for 20 years



between 1763 and 1783. Spain again reclaimed ownership for another 38 years before Florida became part of the United States in 1821. Spanish missionaries and colonists, and the diseases they brought devastated aboriginal groups, which had largely disappeared from south Florida by the mid-1700s. Other aboriginal groups fleeing European settlement in Georgia, Alabama, and north Florida moved into south Florida and the amalgamation of these groups came to be known as the Seminoles. Almost 90 percent of the Seminoles were captured and transported to Indian Territory between 1835 and 1842 during the Second Seminole War. The economy of the European colonists in Florida focused on farming and ranching, and in the last half of the 1800s the Seminoles who remained also followed agricultural pursuits. Florida seceded during the Civil War, and the loss of slave labor curtailed agricultural development after the war, although cattle ranching continued to prosper.

The modern era of south Florida began in the last decade of the nineteenth century, when the population of Dade County grew by five times from fewer than a thousand to almost 5,000. Entrepreneurs made the region a subtropical colony of the North rather than an extension of the south. The arrival of the Florida East Coast Railroad in Miami in 1896 fueled the growth. Development boomed in the 1920s until it was stalled by major hurricanes in 1926 and 1928. During the Great Depression of the 1930s, the region continued to attract tourists and New Deal programs bolstered the economy. The 1940s brought another development boom, and the Cuban exodus of the 1950s and 1960s continued the trend of population growth. Although the region has become a major international commercial and tourist center, much of the Everglades remains an undeveloped wilderness. The Everglades National Park was established in 1947 to preserve part of the ecosystem. The Seminole Tribe and Miccosukee Tribe were officially recognized by the Federal government in 1957 and 1962, respectively. The Miccosukee Reservation is north of the Tamiami Trail at the western end of the project area. The Miccosukee Tigertail Camp is located along the north side of the highway, and the Osceola Camp is on the south side within the Everglades National Park.

Cultural Resources within the Area of Potential Effects

Inventory surveys have identified three properties evaluated as eligible for the NRHP within the APE and a fourth property is considered potentially eligible (**Table 3-11**).

Table 3-11 – Historic Properties within the Area of Potential Effects

	Cultural Resource	Description	National Register of Historic Places Status
1	Tamiami Trail (8DA6510)	Highway constructed between 1915 and 1928	Eligible, Criteria A and C
2	Airboat Association of Florida (8DA6768)	Headquarters of a private organization formed to promote use and conservation of Everglades; clubhouse and kitchen built in 1954 and caretaker residence in 1962	Eligible, Criterion A
3	Coopertown Restaurant and Airboat Rides (8DA6767)	Commercial restaurant and residence built in 1947 as tourist attraction	Eligible, Criterion A
4	Miccosukee Osceola Camp	Tourist attraction and residential location established by William McKinley Osceola in the 1930s	Potentially Eligible, Criterion A and B

(Azzarello et al., 2006; Janus Research, 2001; Perlman et al., 2009; Price et al., 2010)



Construction of the Tamiami Trail highway (State Road 90/U.S. Highway 41) began in 1915 and was completed in 1928 to connect Tampa and Miami. The 245-mile-long highway is considered eligible for the NRHP because construction of the first east-west route across the southern Florida peninsula through the Everglades was a considerable engineering feat that led to substantial development. The highway, however, created a barrier for natural flows into the Everglades and later drainage and flood control projects exacerbated the problem, which the current Next Steps project is now addressing.

The Airboat Association of Florida property is headquarters for a private organization founded in 1951 to promote use and conservation of the Everglades. The property is considered eligible for the NRHP for its association with development and use of airboats for hunting, fishing, and recreational use of the Everglades, which is considered a historically significant tradition. The three historic buildings on the property include a clubhouse and kitchen built in 1954 and a caretaker residence built in 1962. Those buildings are located about 150 to 170 feet south of the highway.

John Cooper, a founding member and first vice president of the Airboat Association of Florida, developed Coopertown Restaurant and Airboat Rides as a commercial tourist attraction when he built a restaurant and a house in 1947. The property is considered eligible for the NRHP for its association with the development of recreational tourism in the Everglades. The two historic buildings on the property are only about 55 to 85 feet south of the highway.

William McKinley Osceola and his wife, Alice, established a camp on Christmas Day, 1935. The camp served as a family residence and gift shop and later as a site for airboat rides. The camp is inside the northern boundary of Everglades National Park. Fill material was recently placed by the present residents, descendants of William McKinley Osceola, to elevate the camp and its buildings so they will not be flooded by rising water levels. There are no intact historic buildings at the camp (Fred Dayhoff, personal communication). Shovel testing has not been conducted to check for buried cultural resources since fill has been placed at the site. Aerial photography indicates there is a tree island on the north side of the highway, to the north of the camp, which is a candidate for having archeological resources. The Osceola Camp is on the south tail of this tree island and appears to have been developed in a low area that was raised with fill material. As such, the potential for buried archeological resources in the fill is low. If archeological deposits are present at the camp, they have been covered by the recently placed fill. The evaluation of the NRHP eligibility of the Osceola Camp remains incomplete, but for purposes of this project, it was considered potentially eligible under Criterion A and Criterion B.

Other cultural resources have been recorded but they were evaluated as having no historic values that warrant preservation and are considered ineligible for the NRHP. Those resources include Gator Park (8DA10088), which was probably built as a gas station, subsequently used as a bar, and then converted to an airboat concession around 1989. The Tamiami Canal or L-29 Canal (8DA6453) is a borrow canal created by excavation of material for elevating the adjacent roadbed of the Tamiami Trail when it was built. The canal was subsequently upgraded to control and transport water released from Water Conservation Area 3 on the north side of the Tamiami Trail. The Tamiami Canal has been evaluated as eligible for the NRHP for its association with the Tamiami Trail, but the segment of the canal in the project area has been modified so much that it has lost its historical integrity and no longer contributes to the historic values of the canal.

3.8 Visitor Use and Experience

The 10.7-mile section of Tamiami Trail that comprises the project area in Miami-Dade County is bordered to the north by Water Conservation Area (WCA)-3B and on the south by the northern edge of Everglades National Park. Tamiami Trail serves as a gateway not only to visitor



recreational opportunities within these adjacent areas but also to the vast recreational opportunities in the South Florida region.

The State Comprehensive Outdoor Recreation Plan (SCORP) is the best source of information on recreation demand and supply at the state and regional level. It disaggregates the state into 11 regions composed of clusters of counties. The South Florida region (Region 11) is composed of Broward, Miami-Dade, and Monroe counties.

The South Florida region includes approximately 7,500 square miles at the southernmost tip of the state. This region includes the Everglades and the Florida Keys, areas with significant natural beauty and recreational value. The region also encompasses Biscayne Bay, and nearly 70 miles of Atlantic Ocean Beach.

Region 11 boasts over 3 million acres of land and water resources for outdoor recreation use. The federal government supplies nearly 70 percent of the available total. A vast portion of this acreage constitutes Everglades National Park. State government agencies supply nearly one million acres of outdoor land and water recreation resources. **Table 3-12** presents descriptive information on the recreation facilities in SCORP Region 11.

Table 3-12 – Regional Outdoor Recreation Facilities (Region 11)

Resource/Facility	Units	Region 11	% of State Total	State Total
Outdoor Recreation Areas	Areas	2,054	16%	13,325
Land	Acres	1,796,151	19%	9,624,923
Water	Acres	1,350,609	37%	3,667,645
Outdoor Recreation Areas	Acres	3,146,974	24%	13,313,762
Cabins	Cabins	382	9%	4,171
Tent Camp Sites	Sites	1,290	6%	20,044
RV Campsites	Sites	12,207	8%	162,041
Historic Sites	Sites	108	8%	1,328
Commemorative Structures	Structures	40	13%	318
Museums	Museums	71	14%	516
Picnic Tables	Tables	14,258	12%	116,086
Hunting Areas	Acres	698,451	13%	5,287,600
Bike Trail (Paved)	Miles	404	28%	1,425
Bike Trail (Unpaved)	Miles	74	3%	2,383
Canoe Trail	Miles	292	13%	2,295
Hiking Trail	Miles	420	8%	5,424
Equestrian Trail	Miles	139	6%	2,361
Jogging Trail	Miles	191	14%	1,326
Ohv Trail	Miles	0	0%	833
Nature Trail	Miles	254	10%	2,475
Freshwater Beach	Miles	3	4%	60



Resource/Facility	Units	Region 11	% of State Total	State Total
Freshwater Boat Ramps	Ramps	110	6%	1,739
Freshwater Boat Ramps	Lanes	144	7%	2,049
Freshwater Catwalks	Catwalks	45	1%	7,947
Freshwater Marinas	Marinas	7	2%	457
Freshwater Marinas	Slips	325	3%	11,762
Freshwater Piers	Piers	39	7%	569
Saltwater Beach	Miles	68	14%	501
Saltwater Boat Ramps	Ramps	202	22%	939
Saltwater Boat Ramps	Lanes	283	22%	1,268
Saltwater Catwalks	Catwalks	65	10%	631
Saltwater Marinas	Marinas	334	36%	937
Saltwater Marina Slips	Slips	13,965	31%	45,716
Saltwater Piers	Piers	72	17%	412

(FDEP, 2007)

Recreational Opportunities

The South Florida region provides substantial opportunities for outdoor resource-based recreation. Among the numerous activities available are diving, snorkeling, camping, hiking, bicycling, boating and hunting. The Atlantic Ocean and numerous bays afford significant opportunities for saltwater beach recreating. Recreational opportunities accessed via Tamiami Trail within the vicinity of project area include biking, boating, fishing, hiking, camping, and wildlife viewing.

Approximately six miles west of the project area, the Shark Valley Information Center offers a 15-mile round-trip tram road (not open to private motorized vehicles) that extends into the marsh, offering one of the best opportunities for viewing wildlife. A two-hour narrated tram ride provides an overview of the freshwater Everglades, and bicycles are available to rent. An observation tower is located at the half-way point.

The Francis S. Taylor Wildlife Management Area, which includes WCA-3B, is managed by FFWCC. This area is managed for both consumptive (hunting, frogging, fishing) and non-consumptive (wildlife viewing, camping, boating, airboating, etc.) recreational use and environmental purposes. WCA-3B is accessed by crossing the L-29 Canal at either the S-333 or S-334 water control structures and launching at the boat and airboat ramps.

Four commercial airboat operators currently operate along the Tamiami Trail and provide guided education eco-tours of the Everglades. Visitors to the concessions range from drive-up visitors to tour groups from major American and European tour operators and cruise lines. The airboat concessions are a significant means by which the public experiences the Everglades. Three operators, Coopertown Airboat Rides and Restaurant, Everglades Safari Park and Gator Park operate from facilities located on the south side of Tamiami Trail and receive as many as 500,000 visitors each year, with a large proportion of the visits coming from international visitors. The other operator, Airboat USA launches from a public airboat ramp immediately east of Coopertown Airboat Rides.



The Airboat Association of Florida is a recreational association with facilities on the south side of the Tamiami Trail about three miles east of the western end of the project area. Facilities include a caretaker's residence, meeting room, workshop arenas for working on airboats, a cookhouse, several mobile RV sites including covered picnic areas, and a pistol shooting range.

The verge between the L-29 Canal and the L-29 Levee is used for passage along the canal, picnicking, or launching boats into the L-29 Canal. A road atop the L-29 Levee allows panoramic views to the north into WCA-3B.

Primary access to boat ramps on the north side of the L-29 Canal is at S-333 and S-334. Roads across these structures lead to several boat ramps and to bank fishing on the north bank of the L-29 Canal. S-334 provides access to a boat ramp (Boat Ramp 153) three miles to the east that allows boat launching into the L-29 Canal. A picnic area is associated with the boat ramp. Control structure S-333 provides access across the L-29 Canal to one airboat ramp and two boat ramps. There is a boat ramp on Canal 67-A and another on Canal 67-C. Both ramps are heavily used by boat fishermen. The airboat ramps provide access for deer and waterfowl hunters, as well as for recreational airboaters. Approximately 10.5 miles of the north bank of the L-29 Canal are available for bank fishing. Noncommercial airboats also launch south of the Tamiami Trail at two locations for sightseeing. The two locations are the ramp immediately east of Coopertown Airboat Rides and an undeveloped area at the L-67 Extension. The "Everglades National Park Protection and Expansion Act" allows those noncommercial airboat operators using the expansion area on January 1, 1989 to continue to operate airboats inside the expansion area.

Bank fishing is also popular from the shoulders of the Tamiami Trail and L-67 Extension Levee. Fishermen frequent the 10.7 miles of the south bank of the L-29 Canal (north shoulder of the highway). The only places for bank fishing on the south side of the highway are where the culvert sets discharge water to the south. FFWCC personnel conducted angler counts along the Tamiami Trail from December 1998 to May 1999. The mean number of anglers per mile for weekdays and weekend days, respectively, was 0.95 and 2.28. Ninety-four percent were bank anglers (personal communication, FFWCC, September 28, 2000).

These numbers translate into an estimated ten fishermen per weekday and 23 per weekend day, totaling approximately 5,000 man-days of fishing per year within the 10.7-mile study area. Personal observation revealed 25 bank fishermen and two boats with two fishermen in the project study segment at approximately 10:00 A.M. on a Saturday in September 2000. Almost all the bank fishermen were fishing on either side of the highway right-of-way, with only a few on the north bank of the L-29 Canal.

It should be noted that at least some of the fishing is subsistence, not recreational. There is reportedly recreational fishing for oscars (*Astronotus ocellatus*), an aquarium fish native to South America that has become established in South Florida. Recreational anglers have also been observed fishing for bass by boat in the canal during the short period of time when dry conditions drive the bass out of the marshes (Dr. Joel Trexler/Florida International University, personal communication).

Everglades National Park Visitation

Everglades National Park receives approximately one million visitors each year. Visitor use patterns at the Everglades are, in part, influenced by the more than 5.7 million people living within 100 miles, and more than 15.2 million people living within 300 miles of the park (ERA, 2007). In addition to visitation from people living in the surrounding area, the Park also receives visitation from vacationers in nearby urbanized areas. For example, more than 8 million people vacation in Miami-Dade County alone (USGS, 2004), many of which could potentially include a



trip to Everglades National Park as part of their vacation plans. Everglades National Park visitation statistics from 1979 to 2008 are shown in **Table 3-13**. Approximately 50 percent of visitation occurs between January and April.

Table 3-13 – Everglades National Park Visitation

Fiscal Year	Recreational	Non-Recreational	Total Visits*	Percentage Change**
2008	822,118	5,521	827,639	-25.77%
2007	1,074,764	40,182	1,114,946	12.17%
2006	954,022	39,927	993,949	-22.42%
2005	1,233,837	47,406	1,281,243	3.38%
2004	1,181,355	57,996	1,239,351	12.61%
2003	1,040,648	59,949	1,100,597	6.04%
2002	968,909	68,973	1,037,882	-6.36%
2001	1,049,851	58,539	1,108,390	4.50%
2000	995,390	65,238	1,060,628	-7.08%
1999	1,073,982	67,461	1,141,443	-3.06%
1998	1,118,215	59,262	1,177,477	11.93%
1997	989,532	62,420	1,051,952	6.82%
1996	890,167	94,658	984,825	8.30%
1995	820,466	88,897	909,363	-7.39%
1994	886,455	95,489	981,944	-7.51%
1993	973,706	87,937	1,061,643	-0.25%
1992	1,025,686	38,671	1,064,357	-21.02%
1991	1,292,014	55,629	1,347,643	34.48%
1990	957,925	44,184	1,002,109	3.54%
1989	913,372	54,520	967,892	-9.66%
1988	1,026,188	45,184	1,071,372	31.34%
1987	787,493	28,261	815,754	7.01%
1986	739,072	23,211	762,283	8.79%
1985	697,646	3,040	700,686	10.89%
1984	628,658	3,233	631,891	8.96%
1983	577,439	2,505	579,944	-6.51%
1982	550,168	70,175	620,343	-0.42%
1981	564,721	58,222	622,943	-22.36%
1980	744,244	58,107	802,351	-4.32%



Fiscal Year	Recreational	Non-Recreational	Total Visits*	Percentage Change**
1979	718,102	120,511	838,613	N/A
* "Total visits" is the total of recreational and non-recreational visits.				
** Percentage change applies to total visits only.				
(http://www.nature.nps.gov/stats/park.cfm?parkid=374)				

In 2008, Papadogiannaki et al. conducted a visitor study at the Park that consisted of a winter survey (February 26 – March 3) that was distributed to 1,094 visitor groups (795 of which responded for a 72.2% response rate) and a spring survey (April 29 – May 5) that was distributed to 647 visitor groups (370 of which responded for a 57.2% response rate). The combined response rate for both surveys was 66.9%.

Based on the survey results, visitors to Everglades National Park ranged in age from 1 to 94 years in the winter survey and 1 to 90 years in the spring survey (**Figure 3-34**) (Papadogiannaki et al., 2008). In the winter survey, 57% of visitors were aged between 51 to 75 years and 7% were 15 years or younger with the remaining respondents falling in between these two age groups (**Figure 3-34**) (Papadogiannaki et al., 2008). In the spring survey, 41% of visitors were aged between 51 to 75 years and 12% were 15 years or younger with the remaining respondents falling in between these two age groups (**Figure 3-34**) (Papadogiannaki et al., 2008).



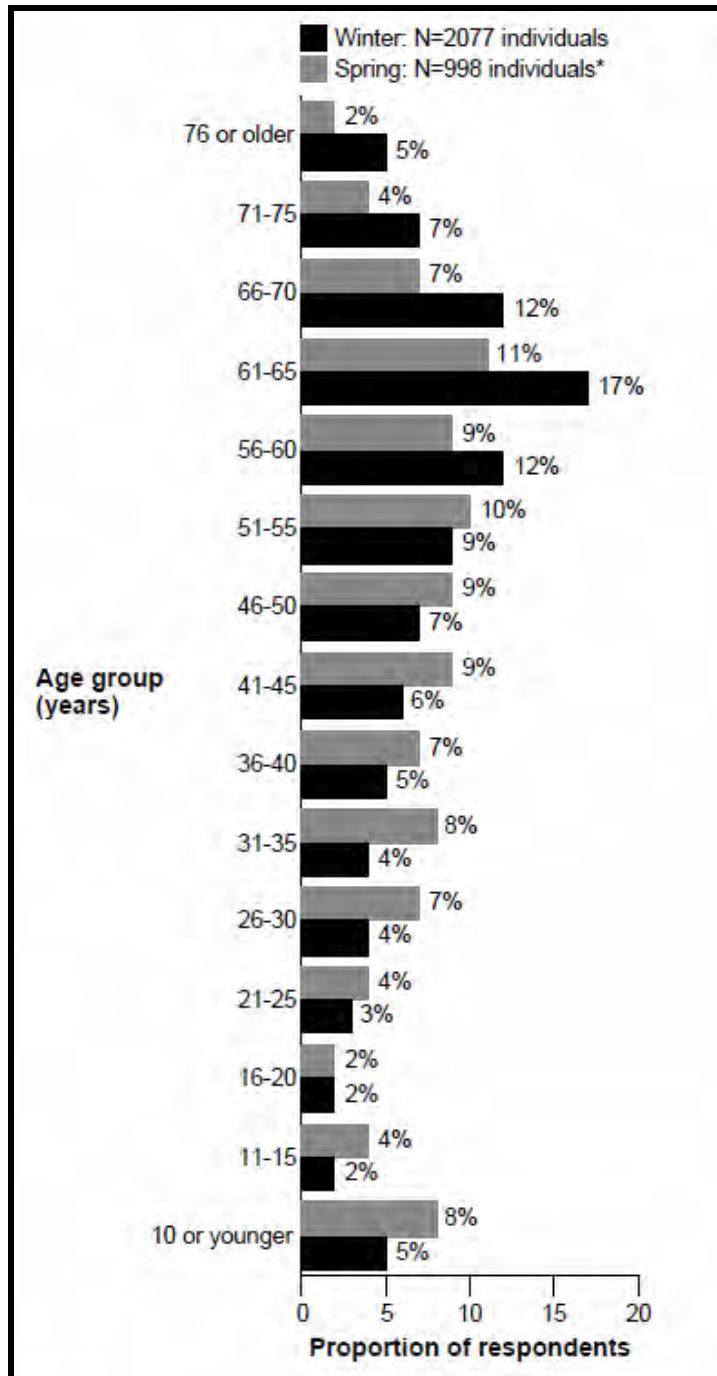


Figure 3-34 – Visitor Age

(Papadogiannaki et al., 2008)

Based on the survey results, patrons visiting Everglades National Park consisted of groups of people of only one person to greater than four people, with the most common visitor group consisting of two people (**Figure 3-35**) (Papadogiannaki et al., 2008).



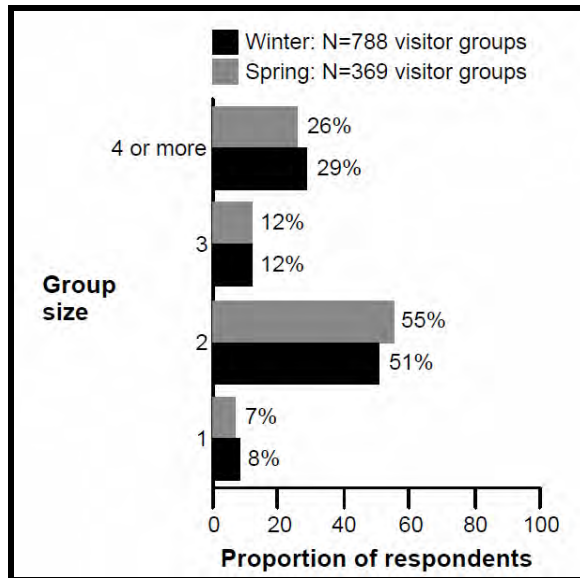


Figure 3-35 – Group Size

(Papadogiannaki et al., 2008)

Based on the survey results, the visitor groups coming to Everglades National Park consisted mainly of friends and family, with a small proportion of visitor groups being categorized as “other” (i.e., church groups, business groups, clubs, etc.) (**Figure 3-36**) (Papadogiannaki et al., 2008). Of the visitors traveling with a group of people, a proportion of the visitors came to Everglades National Park as part of an organized group such as an educational/school group or a commercially guided tour (**Figure 3-37**) (Papadogiannaki et al., 2008).

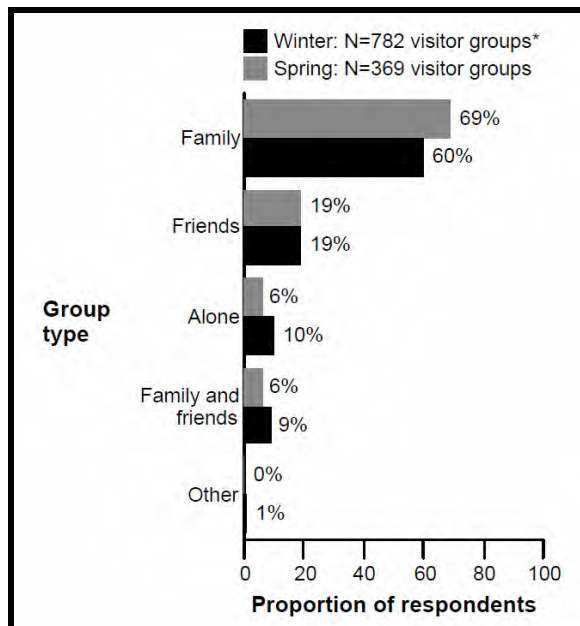


Figure 3-36 – Group Type

(Papadogiannaki et al., 2008)



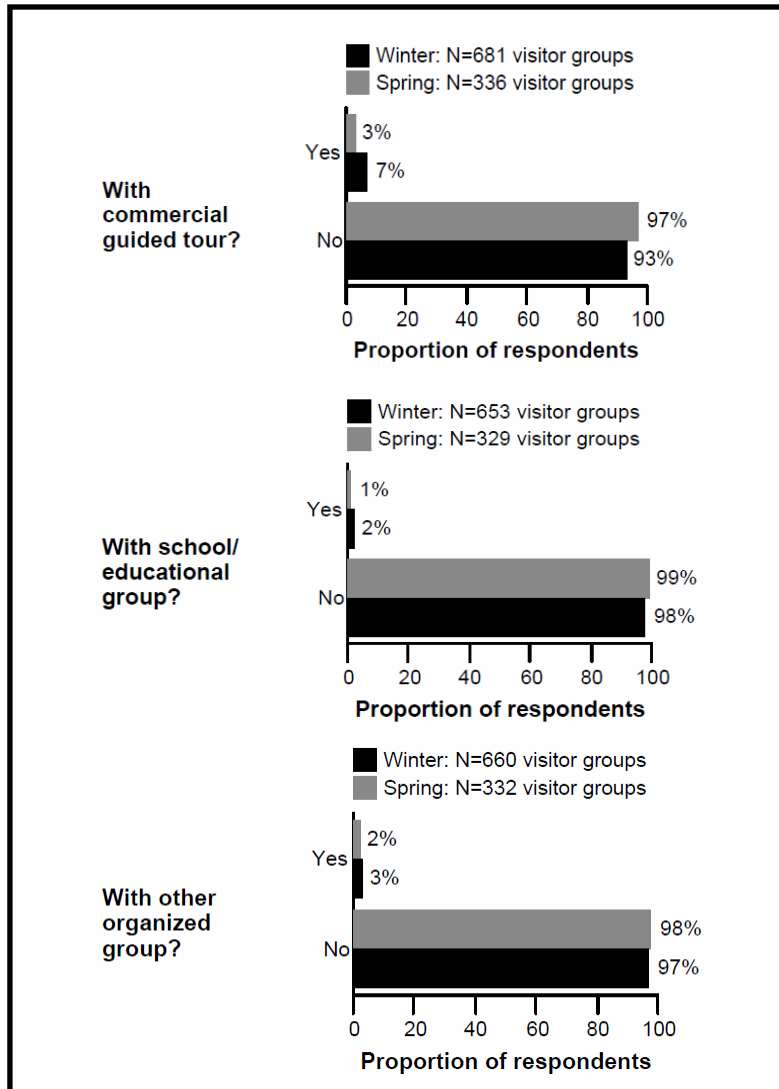


Figure 3-37 – Visitors with Organized Groups
(Papadogiannaki et al., 2008)

U.S. visitors comprised 80% of total visitation to the park in the winter survey (**Table 3-14**). U.S. visitors to Everglades National Park in the winter survey came from 47 states and Washington, D.C., with the largest proportions from: Florida (32%), 7% Pennsylvania (7%), and Michigan (6%) (Papadogiannaki et al., 2008). U.S. visitors comprised 54% of total visitation in the spring survey (**Table 3-14**). U.S. visitors to Everglades National Park in the spring survey came from 34 states and Washington, D.C., with the largest proportions from: Florida (45%), California (8%), and Michigan (4%) (Papadogiannaki et al., 2008).

International visitors came from 19 countries and comprised 20% of total visitation to the Park during the winter survey period (**Table 3-15**). During the winter survey period, 21% of international visitors came from Canada, 20% came from Germany, 16% came from United Kingdom, 16% came from France, and smaller proportions came from 16 other countries (**Table 3-15**). International visitors came to visit Everglades National Park from 21 countries and comprised 46% of total visitation to the Park during the spring survey period (**Table 3-15**). During the spring survey, 36% of international visitors came from Netherlands, 23% came from



Germany, 12% came from the United Kingdom, and smaller proportions came from 15 other countries (**Table 3-15**) (Papadogiannaki et al., 2008).

Table 3-14 – United States Visitors by State of Residence

State	Winter			State	Spring		
	Number of visitors	Percent of U.S. visitors N=1,529 individuals	Percent of total visitors N=1,902 individuals		Number of visitors	Percent of U.S. visitors N=499 individuals	Percent of total visitors N=917 individuals
Florida	483	32	25	Florida	226	45	25
Pennsylvania	100	7	5	California	40	8	4
Michigan	94	6	5	Michigan	18	4	2
New York	72	4	4	New York	17	3	2
Illinois	67	4	4	Texas	15	3	2
Ohio	56	4	3	Virginia	15	3	2
Wisconsin	47	3	2	New Jersey	14	3	2
Massachusetts	44	3	2	Washington	14	3	2
Minnesota	43	3	2	Massachusetts	12	2	1
Virginia	40	3	2	Indiana	10	2	1
New Jersey	39	3	2	New Hampshire	10	2	1
California	34	2	2	North Carolina	10	2	1
Maryland	31	2	2	22 other states and Washington, D.C.	98	20	11
Indiana	29	2	2				
North Carolina	28	2	1				
Vermont	28	2	1				
Kentucky	25	2	1				
Connecticut	23	2	1				
Georgia	19	1	1				
New Hampshire	19	1	1				
27 other states and Washington, D.C.	208	14	11				

(Papadogiannaki et al., 2008)

Table 3-15 – International Visitors by Country of Residence

Country	Winter			Country	Spring		
	Number of visitors	Percent of international visitors N=373 individuals	Percent of total visitors N=1,902 individuals		Number of visitors	Percent of international visitors N=418 individuals	Percent of total visitors N=917 individuals
Canada	80	21	4	Netherlands	149	36	16
Germany	76	20	4	Germany	98	23	11
United Kingdom	61	16	3	United Kingdom	49	12	5
France	58	16	3	Canada	36	9	4
Netherlands	33	9	2	France	31	7	3
Sweden	26	7	1	Denmark	11	3	1
Switzerland	6	2	<1	Switzerland	9	2	1
Italy	5	1	<1	Belgium	6	1	1
Denmark	4	1	<1	Italy	5	1	1
Colombia	3	1	<1	Australia	4	1	<1
Czech Republic	3	1	<1	Czech Republic	4	1	<1
Finland	3	1	<1	Sweden	3	1	<1
Ireland	3	1	<1	Iceland	2	<1	<1
Israel	3	1	<1	Russia	2	<1	<1
Austria	2	1	<1	South Africa	2	<1	<1
Belgium	2	1	<1	Spain	2	<1	<1
Norway	2	1	<1	Austria	1	<1	<1
Slovenia	2	1	<1	Estonia	1	<1	<1
Australia	1	<1	<1	Finland	1	<1	<1
				New Zealand	1	<1	<1
				Norway	1	<1	<1

(Papadogiannaki et al., 2008)



Aesthetics

The views along the project segment of the Tamiami Trail are somewhat limited and constrained. On the north side of the highway are the L-29 Canal and the L-29 Levee, which extend along the entire 10.7 miles of the project segment. The view of the north side of the canal and levee is broken up by several water control structures and the Tigertail Camp. A panoramic view of the sawgrass and occasional hammocks or tree islands is largely blocked by the height of the levee. On the south side, the view is often blocked by tall vegetation growing along the roadside. Occasional breaks allow some distance views.

Flight 592 Memorial

The ValuJet Flight 592 Memorial is located at the western end of the project area on the northern side of the L-29 Levee, about 250 feet from Tamiami Trail and about 11 miles west of Krome Avenue in Miami-Dade County. Access to the memorial is via the S-333 canal crossing. The site consists of a parking area and a sculpture/memorial consisting of 110 concrete pillars that symbolize each of the lives lost in the DC-9 crash on May 11, 1996. The pillars are arranged in a triangular pattern that points to the actual crash site eight miles away in the Everglades.

3.9 Park Management and Operations

Park management and operations at Everglades National Park is overseen by the superintendent, who is responsible for managing the staff, concessionaires and residents, and park programs (NPS 2002). Park staff provides the full scope of functions and activities to accomplish management objectives, performing duties that include enforcement, resource protection and management, and interpretation and education. The discussion of park management and operations is broken down into the following program areas: education, maintenance, and enforcement.

Education and Interpretation

One of the primary functions of Everglades National Park, and all national parks, is to serve educational purposes (NPS, 2006). The NPS is committed to extending its leadership in education, building on what is in place, and pursuing new relationships and opportunities to make national parks even more meaningful in the life of the nation (NPS, 2006). Within the rich learning environments of Everglades National Park and facilitation by NPS interpreters, visitors would be offered authentic experiences and opportunities to enjoy one of the most beautiful and historic places in America (NPS, 2006).

The park's interpretive program is in place to encourage dialogue and accept that visitors have their own individual points of view. Factual information presented is current, accurate, based on current scholarship and science, and delivered to convey park meanings, with the understanding that visitors would draw their own conclusions. The education and interpretive program is also designed to reach out to park neighbors, segments of the population that do not visit the park, and community decision-makers to stimulate discussions about the park and its meanings in local, regional, and national contexts. In addition, interpretive services of the park are designed to help employees better understand the park's history, resources, processes, and visitors.

Maintenance

Everglades National Park currently has staff in the Maintenance Division. However, responsibility for the Park's natural resources and accompanying features also falls on the park's many scientists, planners, and managers.



There is a maintenance responsibility and cost for every asset that is administered by the NPS. The costs and the useful life associated with park features are directly related to the type and level of maintenance provided. Therefore, as outlined in the *NPS Management Policies 2006* for all park facilities, the NPS is committed to conducting a program of preventive and rehabilitative maintenance and preservation, including sustainable design.

Although originally constructed in the 1920s, Tamiami Trail has only had slight modifications to the roadway to impact the maintenance history. In the 1960s parts of the roadway were widened to the east to accommodate larger vehicles; however, Tamiami Trail continued to remain only a one lane east-west roadway. Further modifications, including adding more lanes and significantly widening the road, planned in the 1960s and 1970s were discarded in favor of the construction of Alligator Alley (I-75) to the north.

Enforcement

The law enforcement program is an important tool in carrying out the NPS mission. The objectives of the NPS law enforcement program are (1) the prevention of criminal activities through resource education, public safety efforts, and deterrence; and (2) the detection and investigation of criminal activity and the apprehension and successful prosecution of criminal violators (NPS, 2006). In carrying out the law enforcement program, the Service would make reasonable efforts to protect the natural and cultural resources entrusted to its care and to provide for the protection, safety, and security of park visitors, employees, concessionaires, and public and private property (NPS, 2006).

Illegal activities that have occurred or may occur along the proposed improvements to Tamiami Trail which may require enforcement consist of:

- Littering and improper disposal of waste along the roadway.
- Illegal fishing activities in the surrounding waterways.
- Tampering with or harassing threatened and endangered wildlife.
- Trespassing on private or government property.

3.10 Noise/Soundscapes

All noise levels in this document are reported in decibels (dB) using the “A” weighting scale referred to as “dBA”. This weighting scale correlates well with human response to traffic noise. Also, unless otherwise noted, all noise levels are reported as the one-hour equivalent noise level (LAeq1h). The LAeq1h represents the A-weighted steady-state noise level that contains the same acoustic energy over a one hour period as a fluctuating noise level due to a time varying source(s) over that same period.

Noise sensitive sites along the project corridor are found in three areas: the Flight 592 Memorial, Osceola Camp, and Tigertail Camp. These sites are described in **Table 3-16**.



Table 3-16 –Noise Receiver Locations

Location	Receiver Number	Type	Building Row	Land Use Activity Category	Distance from Roadway Centerline [Existing/Build] (Feet)	Number of Noise Sensitive Sites
Flight 592 Memorial	Flt592	Park	N/A	B	300/312	N/A
Osceola Camp	OC-1	Residential	1 ST	B	90/78	1
	OC-2	Residential	2 ND	B	155/143	3
	OC-3	Residential	3 RD	B	210/197	6
	OC-4	Residential	2 ND	B	165/153	1
	OC-5	Residential	1 ST	B	110/98	3
Tiger Tail Camp	TTC-1	Residential	1 ST	B	195/207	5
	TTC-2	Residential	1 ST	B	195/207	5

Measurements of existing ambient noise levels along the project corridor were performed at two locations using procedures defined in the FHWA report *Measurement of Highway-Related Noise* (FHWA-PD-96-046). The field measurements were conducted over 16.5 hour periods during September and October 2000 at the Osceola Camp and at the Tiger Tail Camp. The average LAeq (1hr) noise levels were 65.8 dBA at the Osceola Camp and 58.4 dBA at the Tiger Tail Camp and the peak hour noise levels were 68.0 dBA and 61.0 dBA, respectively. Noise level, site and traffic data gathered during the field measurements were used to develop inputs to the FHWA’s Traffic Noise Model (TNM) for computer models representative of the existing conditions. These data were used to verify that representative models of the existing conditions could be developed. The average error for all of the field measurement sites fell within the ±3.0 dBA verification limit using TNM in accordance with Chapter 17 of the FDOT Project Development & Environment (PD&E) Manual, and further use of the TNM model on this project was supported.

This study evaluated predicted noise levels for the existing conditions, future without project conditions, and the proposed project alternatives. Existing peak-hour traffic noise levels were predicted for all of the nearby noise sensitive sites using TNM. Locations selected for modeling were based on site characteristics including topography, number of buildings, building arrangement, recreation or other outdoor use areas, building location with respect to the highway, and site features such as fences and walls. **Table 3-17** presents project area traffic data used to evaluate worst-case traffic noise levels for each of these conditions. A peak-season factor of 160 percent was applied to the project design hour volumes to account for heavier tourist-season traffic and for consistency with previous phases of the noise analysis for this project. The purpose of using this factor was to estimate the expected worst-case traffic noise levels at the nearby noise sensitive sites and to provide a conservative estimate of traffic noise impacts along the entire project corridor.



Table 3-17 – Project Area Traffic Data

Year	AADT (vehicles/day)	Peak Hour Factor (K ₃₀)	Design Hour (vehicles/hour)	Peak Season Design Hour (vehicles/hour)	Truck Factor	Average Speed (mph)
2018	5,800	8.07%	468	749	11.5%	55
2038	7,200	8.07%	581	930	11.5%	55

(USACE, 2009)

Table 3-18 presents the peak-hour traffic noise levels for the existing conditions at the Flight 592 Memorial and the two camps. Worst-case existing noise levels at the Flight 592 Memorial are predicted to be 57.3 dBA. At the Osceola Camp, worst-case existing noise levels are predicted to range from 54.8 dBA in the third row of homes to 67.3 dBA at a home directly adjacent to Tamiami Trail. Worst-case existing noise levels at the Tiger-Tail Camp are predicted to range from 57.2 to 58.3 dBA.

Table 3-18 – Existing Peak Hour Noise Levels

Location	Receiver	Predicted Existing (2009) Traffic Noise Levels (dBA)
Flight 592 Memorial	Flt592	57.3
Osceola Camp	OC-1	67.3
	OC-2	58.3
	OC-3	54.8
	OC-4	59.1
	OC-5	60.7
Tiger Tail Camp	TTC-1	57.2
	TTC-2	58.3

3.11 Socioeconomics

This section includes a description of the local economy and demographics of the study area. This descriptive information provides insight into the study area’s socioeconomic characteristics, and provides part of the basis for different facets of the economic impact evaluation work in the remainder of the EIS.

The people who live in the study area, and the economic activity, in which they are engaged, comprise important components of the area’s total environment. In addition to the direct use of this data for the water use projections and other social effects mentioned above, residents of the study area represent the socioeconomic environment for the other impact topics of flooding, water use shortages, fishing, recreation, and navigation.

Adverse changes in the health and condition of the natural system can cause severe negative impacts on the economic system, particularly in the study area for this feasibility study. Conversely, in this study area, beneficial changes to the natural system are expected to have a strong positive effect on the economic system. It is significant, therefore, to describe and



understand the general economic and social environment within which such changes could take place. Although the main focus of economic impact evaluation efforts undertaken for this study has been to describe the economic impacts and benefits of alternatives being considered for implementation, describing the broader context for these evaluation efforts is also necessary and important.

For the purposes of this study the project area is divided into a three proximity zones based on incremental distance relative to the project area. The zones are defined as follows:

- Zone 1: Area within 3 miles of the project area.
- Zone 2: Area within 5 miles of the project area.
- Zone 3: Area within 7 miles of the project area.

These zones are further broken down into census tracts. As of this writing, the 2000 census data is most current available at the census tract level with the exception of 2007 population figures.

Much of the socioeconomic data for the study area is derived from census tract, parcel, and land use GIS data. The proximity zones are a method for aggregating this data based on distance relative to the study area. A zone may incorporate a particular tract and all the data associated with it even though there is area outside the proximity of the zone in question due to overlapping.

Miami-Dade County is located in Southeastern Florida bordered by Broward County to the north, the Atlantic Ocean to the east and south, and Monroe County to the west, and Collier County to the northwest. The county encompasses 1,946 square miles of land, and 485 square miles of water. The county's interior makeup is characterized by: substantial urban development to the east along the coastline; Water Conservation Areas in the northwest corner; agricultural land concentrated in the center of the county; and Everglades National Park comprising vast portions of Miami-Dade, from the center of the county to its western and southern extents.

3.11.1 Demographics

3.11.1.1 *Population*

Miami-Dade County has a population of 2,462,292 persons, and a population density of 1,265 persons per square mile (Florida Statistical Abstract 2008). It is the most populous county in Florida, and the eighth most populous county in United States, comprising half of the total South Florida metropolitan area population (Miami-Dade, Fort Lauderdale, and Palm Beach counties).

All counties within District 11 have slower growth rates than the state as a whole. Current trends indicate Monroe County is expected to lose population between 2007 and 2035, while Broward County is projected to grow faster than Miami-Dade. Though Miami-Dade remains Florida's most populous county, current statistics indicate the percentage of Floridians residing in Miami-Dade have declined 3.5 percent between 1980 and 2000. Furthermore, projections out to 2035 suggest that this trend would continue. See **Table 3-19** for greater detail.



Table 3-19 – Projected Population Totals (2007-2035)

Population Projections 2007-2035 (1,000)								
	Year							% Change (2007-2035)
	2007	2010	2015	2020	2025	2030	2035	
Florida	18,680.4	19,308.1	20,955.9	22,477.9	23,955.1	25,340.7	26,616.6	42%
Broward	1,765.7	1,806.3	1,915.8	2,016.4	2,113.4	2,203.9	2,286.7	30%
Miami-Dade	2,462.3	2,512.3	2,645.5	2,768.3	2,886.8	2,997.2	3,098.3	26%
Monroe	79.0	78.7	77.8	77.0	76.3	75.5	74.9	-5%
% of Floridians Residing in Miami-Dade	13.18%	13.01%	12.62%	12.32%	12.05%	11.83%	11.64%	-1.54%

(BEBR, 2008)

Although Florida’s population growth rates are declining, Miami-Dade’s historic and projected growth rate is significantly lower than that of the state. Population in Florida and Miami-Dade is expected to grow by almost 8 million and 636,000 respectively from 2007 to 2035. Miami-Dade is expected to remain the States most populous county even with declining population growth rates. **Table 3-20** is illustrative of the trend of declining rates of population growth for Miami Dade County.

Table 3-20 – Projected Population Growth Rates (2007-2035)

Average Annual Projected Population Growth Rates 2007-2035							
	Year						Avg. Annual Growth Rate (2007-2035)
	2007-2010	2010-2015	2015-2020	2020-2025	2025-2030	2030-2035	
Florida	1.1%	1.7%	1.5%	1.3%	1.2%	1.0%	1.3%
Broward	0.8%	1.2%	1.1%	1.0%	0.9%	0.8%	0.9%
Miami-Dade	0.7%	1.1%	0.9%	0.9%	0.8%	0.7%	0.8%
Monroe	-0.1%	-0.4%	-0.3%	-0.3%	-0.3%	-0.3%	-0.3%
% of Floridians Residing in Miami-Dade	-0.4%	-0.6%	-0.5%	-0.4%	-0.4%	-0.3%	-0.4%

(BEBR, 2008)

Southeastern Florida’s densely populated urban areas and growing population have fueled the westward development of agricultural and unimproved lands, closer to ENP and Tamiami Trail. According to 2007 Census tract data, there are approximately 179,715 persons within 7 miles of the Tamiami Trail project area, 16 percent more than 2000 Census estimates.

Zone 1 encompasses 94 square miles and incorporates one census tract with an estimated 2007 population of 30,504 persons, up 107 percent from 2000. Tract 101.46, and is located on the eastern tip of the project area.



Zone 2 overlaps three census tracts including 101.46, accounted for in zone 1. It comprises 188 square miles and has a combined 2007 population of 61,049 persons, up 79 percent from 2000. All three tracts are located in the eastern section of the zone.

Zone 3 has an area of 307 square miles and defines the extent of the study area. It groups 22 census tracts including the aforementioned, and has a combined 2007 population of 179,715 persons, up 16 percent from 2000 figures. The combined area of the tracts exceeds the area of the proximity zone in this case, due to the inclusion of tract 115. Census tract 115 is the largest and least populous tract in the study area with a population density of 7 persons per square mile. With an estimated population of 6,446, its numbers have grown by over 24 percent between 2000 and 2007. While this tract overlaps all three proximity zones, its data is only associated with zone 3 due to the location of its geometric centroid. This tract comprises large sections of ENP and the Water Conservation Areas in the northwest section of Miami-Dade County. See **Table 3-21** for a breakdown of proximity zone population data.

Table 3-21 – Population Data for Each Proximity Zone (2007)

	Zone 1	Zone 2	Zone 3
Zone Area (sqmi)	94	188	307
Census Tract Area (sqmi)	11	19	1,056
Population 2000	14,710	34,148	179,715
Population 2007	30,504	61,049	215,214
% Change 2000-2007	107.4%	79%	16%
Population Density 2007 (p/sqmi)	2,733	541	168

(U.S. Census Bureau, 2000)

3.11.1.2 Households

Miami-Dade County's household numbers are the largest in the planning district with the highest rate of growth between 2000 and 2007. However, household growth is less than that of the state as a whole during the same period. See **Table 3-22** for more detail.

Table 3-22 – Households (2007)

	Total	% Change (2000-2007)	Avg. Household Size
Florida	7,443,963	17%	2.45
Broward	702,139	7%	2.48
Miami-Dade	862,750	11%	2.8
Monroe	35,610	2%	2.18

(BEHR, 2008)

Race and Ethnicity

Florida's racial and ethnic make-up is essentially 80 percent white and 17 percent black as of 2007. Individuals of Hispanic origin have seen large numerical increases in recent years, and constitute a majority of the population in Miami-Dade County. See **Table 3-23** for greater detail.



As of 2000, the individuals in this area were overwhelmingly of Hispanic origin. The percentages of blacks in the study area are significantly lower than for Miami-Dade County as a whole.

Table 3-23 – Racial and Ethnic Make-up

Race and Ethnicity				
	Florida	Broward	Miami-Dade	Monroe
Population, 2007	18,680,367	1,765,707	2,462,292	78,987
Population Change (2000-2007)	16.9%	8.8%	9.3%	-0.8%
White, 2007	80.6%	65.8%	71.9%	89.4%
Black, 2007	16.6%	24.2%	19.7%	5.5%
Other, 2007	2.8%	10.0%	8.4%	5.1%
Hispanic Origin	20.8%	22.7%	61.9%	19.3%

(U.S. Census Bureau, 2005-2007; BEBR, 2008)

Age

Current statistics illustrate an aging trend for Miami-Dade County and the state of Florida as a whole. The median age for the state of Florida and Miami-Dade County increased by 2 percent and 7 percent respectively from 2000 to 2007. Miami-Dade's median ages is the lowest in the planning district, and lower than the state as a whole. However the percentage change in its median age from 2000 to 2007 is greater than that of the state. Monroe County has the highest median age and the greatest acceleration in percentage terms during the same time period. See **Table 3-24** for greater detail.

The median age averaged for each proximity zone is between 35 and 36, similar to that of Miami-Dade County. The median age range for the 22 census tracts that constitute zone 3 are between 30 and 40.

Table 3-24 – Median Age

Median Age	2000	2007	% Change
Florida	38.7	39.9	3.10%
Broward	37.8	38.4	1.59%
Miami-Dade	35.6	37	3.93%
Monroe	42.6	45.3	6.34%

(U.S. Census Bureau, 2005-2007)

Table 3-25 compares the aging trend of the three state planning district with that of Florida as a whole. While Miami-Dade shows percentage increases in each category, the two eldest categories are significantly higher than the state as a whole and Broward County. Of individuals 65 years or older, Miami-Dade had the highest percentage increase in the planning district, and greater than the state as a whole. Only Monroe County's surpassed Miami-Dade in percentage increase in individuals of 62 years or older.



Table 3-25 – Aging Trends

	Florida	Broward	Miami-Dade	Monroe
	2000-2007	2000-2007	2000-2007	2000-2007
18 years and over	0.65%	-0.26%	2.13%	0.97%
21 years and over	0.68%	-0.55%	1.97%	1.74%
62 years and over	-1.97%	-7.14%	8.18%	10.67%
65 years and over	-3.98%	-11.80%	8.27%	4.11%

(U.S. Census Bureau, 2005-2007)

Table 3-26 – Proximity Zone Demographics

	Zone 1	Zone 2	Zone 3
Households	3,558	9,115	52,924
White	12,486	29,577	153,660
Black	1,246	1,726	7,463
Hispanic Origin	11,536	27,027	140,965
Median Age	36	35	35

(U.S. Census Bureau, 2000)

3.11.2 Economy

Generally, a strong wholesale and retail trade, government and service sector characterize Florida’s economy. Florida’s warm weather and extensive coastline attract vacationers and other visitors, making the state a significant retirement destination for people all over the country. Agriculture is an important sector of the state’s economy, and is significant to portions of the study area. Manufacturing has played less of a role in Florida in comparison to the national economy, but a high technology manufacturing has begun to emerge as a significant sector in the state over the last 15 years.

Table 3-27 illustrates some basic economic indicators for the state of Florida as a whole, and the counties that make up Planning District 11 based on the 2005 – 2007 American Community Survey. **Table 3-28** illustrates similar data for at the state, county, and study area level based on the 2000 decennial census. While Monroe County has a smaller and older population, it also consistently has the lowest unemployment, and highest personal per capita and median household income of the three counties.

The 2000 decennial census data collected for the study area show significant differentiation from Miami-Dade County as a whole. The area within seven miles of the Tamiami Trail project tended to have lower unemployment, lower percentages of blacks, higher percentages of whites, and higher median household income than Miami-Dade County as a whole. The number of persons of Hispanic origin, tended to be substantially larger than the county average. Individuals living in this area are much less likely to be below the poverty level in comparison to the rest of Miami-Dade. While average median household income for the study area was larger, per capita income for the study area was less than that of than that of the State of Florida and Miami-Dade County. See **Table 3-29** for greater detail.



Table 3-27 – Regional Economic Indicators (2005-2007)

	Florida	Broward	Miami-Dade	Monroe
Population-2007 (1,000)	18,680.4	1,765.7	2,462.3	79.0
Unemployment (ACS 2005-2007)	6.0%	6.0%	6.3%	2.8%
Per Capita Income (ACS 2005-2007)	26,125	27,950	22,479	39,254
Median Household Income (ACS 2005-2007)	46,602	51,221	41,943	55,550
% Below Poverty Level (ACS 2005-2007)	12.6%	11.3%	13.2%	6.1%
White	80.6%	65.8%	71.9%	89.4%
Black	16.6%	24.2%	19.7%	5.5%
Hispanic Origin	20.1%	22.7%	61.9%	18.0%

(U.S. Census Bureau, 2005-2007; BEBR, 2008)

Table 3-28 – Population and Economic Indicators (1999-2000)

	Florida	Broward	Monroe	Miami-Dade	ZONE-1	ZONE-2	ZONE-3
2000 Population	15,982,378	1,623,018	79,589	2,253,362	14,710	34,148	179,715
% Unemployment	3.2%	3.3%	2.0%	5.0%	2.5%	3.3%	4.1%
Per Capita Income	21,557	23,170	26,102	18,497	17,580	18,299	17,025
Median Household Income	38,819	41,691	42,283	35,966	60,679	58,602	48,788
% Below Poverty	12.5%	11.5%	10.2%	18.0%	3.4%	4.8%	8.3%
Total Housing Units	7,302,947	741,043	51,617	852,278	3,665	9,374	54,759
Households	6,337,929	654,445	35,086	776,774	3,558	9,115	52,924
White	78.0%	70.6%	90.7%	69.7%	84.9%	86.6%	85.5%
Black	14.6%	20.5%	4.8%	20.3%	8.5%	5.1%	4.2%
Hispanic Origin	16.8%	16.7%	15.8%	57.3%	78.4%	79.1%	78.4%

Industry Employment

According to the 2005-2007 American Community Survey estimates, the three most significant industrial employment sectors in the Miami-Dade economy are: educational services and health care and social assistance (~19 %); retail trade (~ 12%); and professional, scientific, and management and administrative and waste management services (~12%). In terms of industrial employment percentages, Miami-Dade's economy is quite similar to the state of Florida as a whole. **Table 3-29** illustrates Miami-Dade County's industrial employment numbers in comparison with the state of Florida and the other counties in Planning District 11.



Table 3-29 – Industrial Employment ACS (2005-2007)

	Florida	Broward	Monroe	Miami-Dade
Civilian employed population 16 years and over	8,204,726	863,562	39,318	1,083,842
Educational services, and health care and social assistance	18.5%	17.80%	10.20%	18.90%
Retail trade	12.8%	13.10%	13.30%	11.40%
Professional, scientific, and management, and administrative and waste management services	11.5%	12.50%	10.00%	11.80%
Arts, entertainment, and recreation, and accommodation, and food services	10.4%	9.50%	21.40%	9.10%
Construction	10.3%	8.40%	9.40%	9.20%
Finance and insurance, and real estate and rental and leasing	8.5%	9.40%	8.80%	8.50%
Manufacturing	5.9%	5.50%	2.00%	5.70%
Transportation and warehousing, and utilities	5.1%	5.70%	7.60%	7.60%
Other services, except public administration	5.1%	5.60%	3.70%	6.00%
Public administration	4.8%	4.50%	9.00%	3.80%
Wholesale trade	3.6%	4.80%	2.20%	5.20%
Information	2.4%	3.10%	1.00%	2.30%
Agriculture, forestry, fishing and hunting, and mining	1.0%	0.20%	1.60%	0.50%

(U.S. Census Bureau, 2005-2007)

Statistics on industry employment at the census tract level is available only on a decennial basis. In order to compare the study area industrial employment with state and regional, it was necessary to use the 2000 figures. The study area is fairly representative of Miami-Dade and the state as a whole in terms percentages of industrial employment.

According to 2000 census tract data there is little variation between the industrial employment make-up of the study area and Miami-Dade County. The only relatively significant difference in industrial employment between Miami-Dade and the study area is in the arts, entertainment, recreation and food services sector. Miami-Dade as a whole surpasses the study area by almost 3 percentage points in this area of industrial employment. **Table 3-30** provides greater detail on the comparison between study area, county, and state industrial sector employment.



Table 3-30 – Industrial Sector Employment by State, County, and Study Area

	Florida	Broward	Monroe	Miami-Dade	ZONE-1	ZONE-2	ZONE-3
Employed civilian population 16 years and over; Number	6,995,047	758,939	41,181	921,208	6,005	14,824	78,147
% Educational, health and social services	18.1%	17.8%	11.9%	18.0%	14.9%	17.4%	17.1%
% Retail trade	13.5%	14.1%	12.9%	12.3%	14.5%	12.8%	14.0%
% Professional, scientific, management, administrative, and waste management services	10.6%	11.7%	8.3%	11.6%	10.7%	11.9%	11.3%
% Arts, entertainment, recreation, accommodation and food services	10.5%	9.2%	22.3%	9.1%	4.0%	5.6%	6.7%
% Finance, insurance, real estate, and rental and leasing	8.1%	9.1%	6.8%	8.0%	15.2%	12.8%	9.9%
% Transportation and warehousing, and utilities	5.3%	5.7%	5.9%	7.5%	10.6%	9.5%	8.7%
% Manufacturing	7.3%	6.7%	2.0%	7.1%	5.9%	5.0%	5.9%
% Construction	8.0%	7.4%	9.3%	6.9%	7.3%	5.9%	6.6%
% Wholesale trade	4.0%	4.6%	2.3%	6.0%	6.3%	7.3%	6.7%
% Other services (except public administration)	5.1%	5.4%	5.0%	5.6%	3.0%	4.4%	5.1%
% Public administration	5.2%	4.5%	7.9%	4.1%	4.7%	3.7%	3.9%
% Information	3.1%	3.7%	2.1%	3.1%	2.8%	3.5%	3.4%
% Agriculture, forestry, fishing and hunting, and mining	1.3%	0.3%	3.5%	0.7%	0.1%	0.1%	0.8%

(U.S. Census Bureau, 2005-2007)

Unemployment

The unemployment rate for Florida and Miami-Dade was 6 percent, and 6.3 percent respectively according to American Community Survey 2005 to 2007 three year estimates. Monroe County had the lowest unemployment for Planning District 11 at 2.8 percent. See **Table 3-27** for greater detail.

Unemployment rates for the proximity zones tended to be lower than Miami-Dade County and the State of Florida for 2000 ranging between 2 and 4 percent for the year 2000.

Per Capita Income

Personal per capita income in Florida is \$26,125 but somewhat lower for Miami-Dade County at \$22,479. Monroe and Broward County had higher personal per capita income than the state of



Florida and Miami-Dade at \$39,254, and 27,950 respectively. **Table 3-30** displays some key economic indicators for District 11.

According to 2000 census figures, personal per capita incomes averaged for the census tracts that constitute zones 1, 2, and 3 was 17,580, 18,299, and 17,025 respectively. Per capita income for the study area was less than Miami-Dade, and the state of Florida as a whole.

Median Household Income and Poverty

Of the three counties, Monroe County had the highest median household income at \$55,550 with Broward coming in next at \$51,221. Miami-Dade was alone in having lower median household income than the state average of \$46,602 as a whole, at \$41,943. Monroe's percentage of residents living below the poverty level was 6 percent, the lowest in the region. Miami-Dade had the largest percentage of residents living below the poverty level in the region at 13.2 percent.

The average median household income for the census tracts constituting the study area was larger than that of Miami-Dade County by almost \$13,000 according to 2000 census tract data. While the percentage of people below the poverty level was 18 percent for Miami-Dade, it was 8.3 percent for the census tracts constituting the study area. See **Table 3-28** for greater detail.

3.12 Transportation

The original Tamiami Trail was constructed in the late 1920s and early 1930s primarily by digging the canal by steam shovel and placing the spoil ahead to create the roadbed. In the mid-1940s, about 38 bridges were added at various locations on the Tamiami Trail, 19 of which were within the project area. In the early 1950s, the bridges were removed and replaced with the culvert sets that are currently in place. In 1968, the shoulders were widened and the pavement was overlaid. In 1970, a guardrail was added on the north side. At some time in the 1980s or 1990s, another guardrail was added on the south side of the road. Finally, in 1993, the shoulders were widened, and the mainline pavement was resurfaced. (USACE, 2008)

The Tamiami Trail serves as a major part of South Florida's transportation infrastructure. In addition to providing a major transportation link between South Florida's east and west coast population centers, it serves as a scenic byway providing travelers with 50 miles of picturesque landscape and wildlife viewing opportunities. Using State Road 60 near Tampa as an initial reference point, Tamiami Trail is the final 275 miles of US Highway 41. Starting from Tampa, it passes through Gibsonton, Ruskin, Bradenton, Sarasota, Naples, and terminates in Miami. The highway provides passage through Big Cypress National Preserve, and a Miccosukee Indian Tribe reservation. As the trail bisects Miami-Dade County, it forms the northern boundary of Everglades National Park, and the southern boundary of Water Conservation Area 3.

The segment of highway in Miami-Dade County is located approximately 26 miles south of Interstate-75, another major east-west route across the South Florida. To the south is US Highway-1, which intersects the Tamiami Trail in eastern Miami-Dade County and provides thoroughfare to the Florida Keys.

Traffic volume along Tamiami Trail within the proposed project area was estimated to be 5,375 vehicles per day in 2000 (USACE 2005) with the latest (2008) traffic estimate at 5,200 vehicles per day (USACE 2009), therefore traffic volume has shown no net increase in almost a decade. By 2018 traffic volume is anticipated to increase to 5,800 vehicles or by only 600 vehicles per day (USACE 2009). All projected traffic volume increases are anticipated to be due to increases in south Florida population and not as a result of the construction of the proposed project.



The road is currently in need of maintenance. The asphalt surface of the road has surface environmental stress cracks and subsurface fatigue cracks. Based on FDOT's Flexible Pavement Survey Handbook in 2000 the Pavement Condition Rating, by which road surfaces are rated on a scale of 1 to 10, the Tamiami Trail would receive an FDOT rating of 6. Whenever a road is rated at 6 or below, repair actions are typically required. Because of pavement deterioration in terms of cracking, rutting, and ride, FDOT determined that the portion of the Tamiami Trail within the project area is in need of rehabilitation.

3.13 Hazardous, Toxic, and Radioactive Waste

A Draft Phase 1 Hazardous, Toxic, and Radioactive Waste (HTRW) Assessment for the Tamiami Trail Modifications: Next Steps project in Miami-Dade County, Florida was completed in September 2009.

According to the HTRW Assessment, Four (4) contaminated sites were identified as Recognized Environmental Concerns (RECs) within the project corridor. Two (2) contaminated sites were also identified outside but adjacent to the project corridor. The two sites outside of the project corridor were classified as being cross hydrologic gradient to the project corridor and therefore do not create any concerns for the proposed Tamiami Trail Bridge Project construction activities. The four (4) RECs identified in the Draft Phase I HTRW Assessment report are discussed below.

1. Salem Radio Facility Roadside Ditches (N 25° 45.658', W 80° 32.837'): The HTRW Assessment reported that a previous environmental assessment had discovered concentrations of cis- and trans- 1,2-Dichloroethene, Trichloroethene, 4-Isopropyltoluene, and vinyl chloride in the surface water observed in the ditches along the access roads (dirt roads) leading to the Salem Radio facility. The HTRW Assessment (2009) indicated that solid waste currently fills the ditches and classifies this site as a Low risk REC for the proposed Tamiami Trail Bridge project.

Based on the available information, it is likely that this facility poses a High risk REC to the proposed project corridor as filling the surface water ditches with solid waste could have caused migration (both vertically and horizontally) of the contaminants found in the surface water.

2. Coopertown (N 25° 45.658', W 80° 33.668'): The HTRW Assessment reported that Arsenic was discovered in soil samples collected adjacent to septic tank at the site, and that the Arsenic concentrations exceeded the Florida Department of Environmental Protection Soil Cleanup Target Levels (FDEP SCTLs). The OHC HTRW Assessment Report stated that the land owner had recently contracted a consultant to remediate the site; however no cleanup efforts have been initiated at the site as of the writing of this EIS. The HTRW Assessment Report gave this REC a ranking of "Low".

A review of current regulatory files at Miami Dade Department of Environmental Resources Management (DERM) indicated a correspondence from MACTEC dated October 13, 2009 referred to the completion of the Arsenic source removal project at Coopertown by October 15, 2009. A URS representative contacted the Project Engineer Mr. Jonathan Bulley at MACTEC on November 6, 2009 to confirm the project status. Mr. Bulley indicated that MACTEC completed a small source removal excavation around a monitoring well per DERM's request and a report had just recently been submitted for DERM's review. Mr. Bulley also indicated that it was a small excavation that did not exceed more than one foot below land surface and the arsenic concentrations were only just above background levels and were confined to the soils. Per Mr. Bulley, arsenic did not exist in the groundwater at the site. Based on this information Coopertown does not create a REC for the proposed project



corridor, and that the site be ranked as “Low”, pending DERMs comments on the source removal conducted by MACTEC.

3. Gator Park (N 25° 45.658', W 80° 34.867'): The HTRW Assessment reported that a previous report from Law Engineering from 2001-2002 stated that groundwater quality had been impacted by petroleum discharge(s) at the site from a former Leaking Underground Storage Tank (LUST) that has since been removed from the site. The report preparers were unable to obtain more recent data for the site. The HTRW Assessment Report gave this REC a ranking of “Low”.

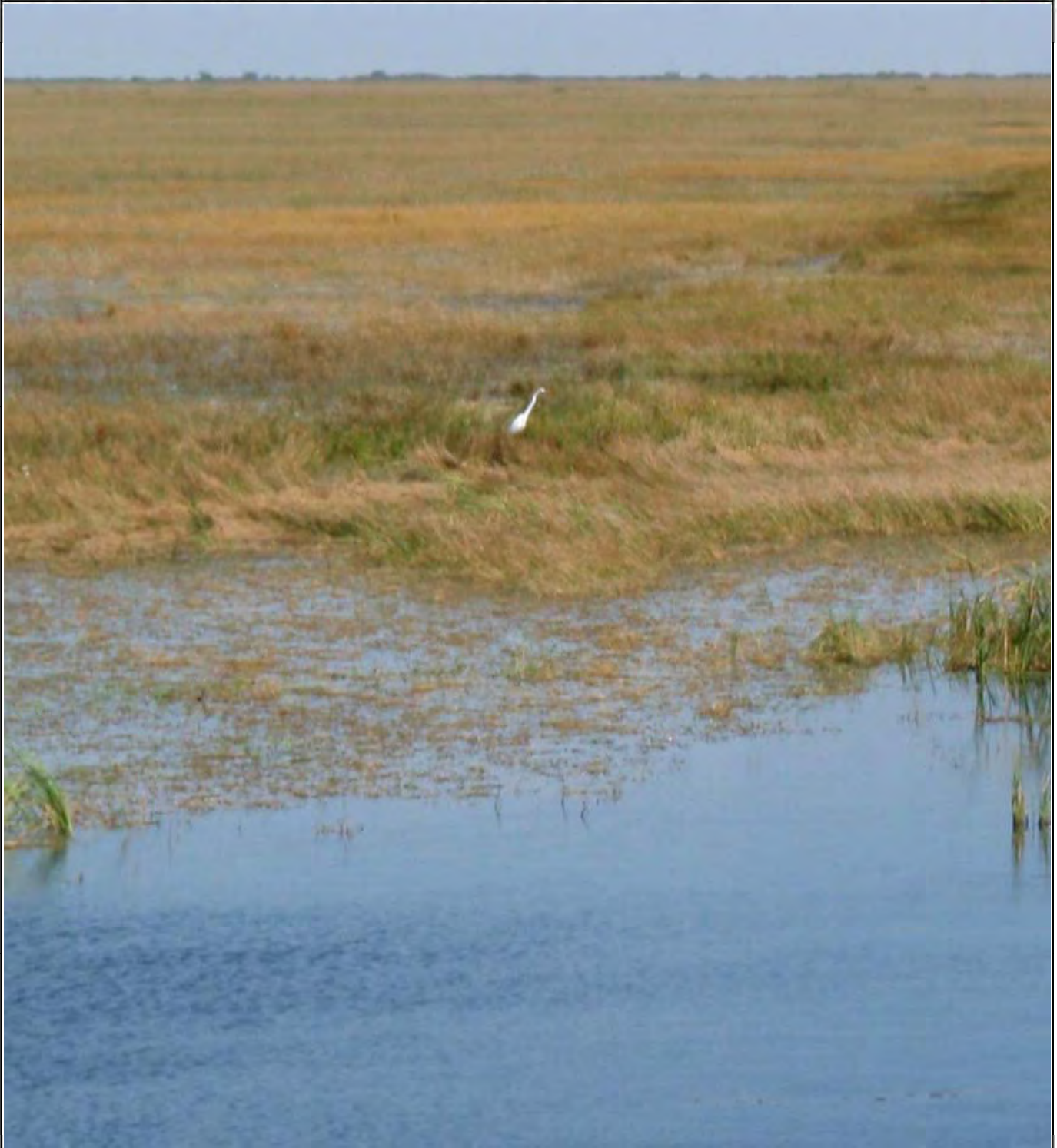
The HTRW indicated that the previous consultant recommended notifying the regulatory agency that the elevated levels of organic compounds were found in the vicinity of the tank form. However, no documentation with regards to either a notification of discharge or any assessment/remedial action was found in the regulatory files. Based on the available information it is likely that this site poses High risk REC to the proposed project corridor.

4. Everglades Safari (N 25° 45.658', W 80° 37.548'): The HTRW Assessment reported that groundwater sampling conducted in 2005 showed that six onsite monitoring wells yielded detectable concentrations of Volatile Organic Aromatics (VOAs) and Polycyclic Aromatic Hydrocarbon (PAHs). Additionally, concentrations in two of the six wells exceeded the FDEP's Groundwater Cleanup Target Levels (GCTLs) for benzene, Methyl Tertiary Butyl Ether (MTBE), naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene. The contamination is attributed to an older LUST that has since been removed, and fluids leaking from tourist busses over the years. Additionally, three (3) three thousand (3,000) gallon ASTs exist at the site on a concrete pad, however no secondary spill containment was visible in the photograph. The HTRW Assessment Report gave this REC a ranking of “High”.

A Site Assessment Report Addendum completed by MACTEC in December 2008 for Everglades Safari revealed that only one well having compounds exceeding the FDEP GCTLs. Well MW-5 had concentrations of Benzene at 67µg/L and 49.3µg/L on 9/16/06 and 5/18/07 respectively. These concentrations exceeded the FDEP GCTLs of 1µg/L, but were below the FDEP Natural Attenuation levels of 100 µg/L. All other compounds were below GCTLs. In the December 2008 SARA, MACTEC proposed a source removal around MW-5 that was estimated to cost \$71,300. No additional information was available for the site. A phone call to Everglades Safari on November 4, 2009 revealed that no remediation has occurred at the site this calendar year. It is likely that Everglades Safari does create a REC for the Tamiami Bridge Project, and that the site be ranked as “High” based on the documented concentrations of Benzene in MW-5 from 2006 and 2007.



**EVERGLADES NATIONAL PARK
TAMIAMI TRAIL MODIFICATIONS: NEXT STEPS
DRAFT ENVIRONMENTAL IMPACT STATEMENT**



**CHAPTER 4
ENVIRONMENTAL CONSEQUENCES**

CHAPTER 4: ENVIRONMENTAL CONSEQUENCES

For each impact topic discussed in Chapter 3, Affected Environment, the “environmental consequences”, or potential impacts, of each of the alternatives (or groupings of alternatives if impacts are similar in nature) to each of the resources or values (i.e., impact topics) is analyzed. This section analyzes both beneficial and adverse impacts that would result from the implementation of any of the alternatives considered. This section also summarizes the laws and policies relevant to each impact topic and explains the general methodology used to analyze impacts, including definitions of impact thresholds for measuring the intensity of impacts. An assessment of whether or not impairment of a resource would occur is also provided for natural and cultural resources.

4.1 Methodology for Establishing Impact Thresholds and Measuring Effects by Resource

The general approach for measuring the effects of the alternatives on each resource category includes general analysis methods as described in guiding regulations, basic assumptions, thresholds used to define the level of impact resulting from each alternative, methods used to evaluate the cumulative effects, and the methods and thresholds used to determine if impairment would occur for those applicable impact topics. The analysis of impacts follows Council on Environmental Quality (CEQ) guidelines and Director’s Order #12 procedures (NPS 2001).

4.1.1 General Analysis Methods

Potential impacts of all alternatives are described in terms of type (Are the effects beneficial or adverse?); context (Are the effects site-specific, local, or regional?); duration (Are the effects short-term or long-term?); and intensity (Are the effects negligible, minor, moderate, or major?). Because definitions of intensity vary by impact topic, intensity definitions are provided separately for each impact topic analyzed in this document. In some cases, alternatives were grouped together in the analysis when impacts were determined to be similar in order to minimize redundancy.

Each alternative is compared to a baseline to determine the context, duration, and intensity of the resource impacts. For purposes of the impact analysis, the baseline is the No-Action Alternative at the Tamiami Trail. In the absence of quantitative data, best professional judgment was used to determine impacts. In general, impacts were determined using existing literature, federal and state standards, and consultation with subject matter experts and park staff and other agencies.

For the purposes of analysis the following assumptions are used for all impact topics:

Beneficial: A positive change in the condition or appearance of the resource or a change that moves the resource toward a desired condition.

Adverse: A change that declines, degrades, and/or moves the resource away from a desired condition or detracts from its appearance or condition.

Context: Context is the affected environment within which an impact would occur, such as local, park-wide, regional, global, affected interests, society as whole, or any combination of these. Context is variable and depends on the circumstances involved with each impact topic.



Duration: The duration of the impact varies according to the impact topic evaluated. However, for the purposes of this analysis, the following assumptions are used for all impact topics except cultural resources:

Short-term impacts: Those impacts occurring in the immediate future or during plan implementation (usually from one to six months, or up to one year). For natural systems (vegetation, wildlife, wetlands), recovery would take less than one year.

Long-term impacts: Those impacts occurring after plan implementation, through the next 10 years; for natural systems (vegetation, wildlife, wetlands), recovery would take more than one year.

Because most cultural resources are non-renewable, impacts to most cultural resources are considered long-term, except those for the natural elements of cultural landscapes that would renew such as vegetation; effects would be short-term (three to five years) until natural components are replaced (e.g., new vegetation grows).

Intensity: Because definitions of impact intensity (negligible, minor, moderate, and major) vary by impact topic, intensity definitions are provided separately for each impact topic analyzed.

A summary table of the environmental consequences for the Tamiami Trail Modifications: Next Steps project have been provided at the end of Chapter 2 of this EIS.

4.1.2 Analysis Area

The area of analysis for all topics is described under each topic and may include either the primary area along the Tamiami Trail roadway corridor (including a 50 foot easement) or the expanded study area, including indirect impacts to Northeast Shark River Slough and the entirety of Everglades National Park.

4.1.3 Cumulative Impacts Analysis

NEPA regulations require an assessment of cumulative impacts in the decision-making process for federal projects. Cumulative impacts are defined as “the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions” (40 CFR 1508.7). As stated in the CEQ Handbook (1997), “Considering Cumulative Effects,” cumulative impacts need to be analyzed in terms of the specific resource, ecosystem, and human community being affected and should focus on effects that are truly meaningful.

Tamiami Trail Modifications: Next Steps Cumulative Impacts Analysis

The Water Resources and Development Act (WRDA) of 2000 approved the Comprehensive Everglades Restoration Plan (CERP) as a framework and guide for modifications to the Central and Southern Florida Project needed to restore the Everglades ecosystem of south Florida and to provide for other water-related needs of the region. Implementation of the Tamiami Trail Modifications: Next Steps project, as a complement to pre-CERP projects and the larger CERP action, would contribute to the restoration of the ecosystem by substantially removing the major barrier (Tamiami Trail) to historical flow patterns in the central and southern Everglades. The removal of this barrier would allow for improved ecological connectivity, more natural flow volumes and velocities, and improved water depths and hydroperiods for over 107,000 acres in Everglades National Park and for large areas of Water Conservation Area 3. Therefore, the Tamiami Trail Modifications: Next Steps project is expected to contribute to a net beneficial cumulative impact on Everglades restoration.



Cumulative impacts are defined in 40 CFR 1508.7 as those impacts that result from:

...the incremental impacts of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or nonfederal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

Collectively, all the projects listed below are needed to achieve the greatest possible hydrologic restoration of the southern Everglades and many of the projects have been incorporated into the CERP modeling and planning process. The hydrologic conditions of the area have been modeled on a regional scale, covering the entire south Florida ecosystem. As part of the modeling analysis, a set of performance measures was applied to ecological targets to predict the restoration benefits of the hydrologic improvements. The CERP models include fundamental assumptions about the future status of CERP and pre-CERP projects. CERP assumes that the Modified Water Deliveries to Everglades National Park (MWD) project would include modifications to the Tamiami Trail to allow essentially unconstrained flows to Northeast Shark River Slough, substantially improving the distribution, timing and volumes of flows to Everglades National Park. Due to cost constraints, the MWD project was unable to meet the MWD and CERP flow targets. The purpose of the Tamiami Trail Modifications: Next Steps project is to provide the additional modifications to the trail needed to meet the restoration objectives of the MWD and CERP projects. No adverse environmental impacts are identified.

The Tamiami Trail Modifications: Next Steps project is, therefore, one of the critical projects within a synergistic framework of interrelated projects that when implemented would result in improved hydrologic conditions that, in turn, are expected to produce the ecological responses required for restoration of the Everglades. This set of projects would be implemented over a period of years, each project contributing to the cumulative benefits that ultimately would constitute ecosystem restoration. Due to its location, modifications to Tamiami Trail would need to be made prior to the implementation of the other restoration projects in order to allow their incremental benefits to be attained. Further, due to the cost of the roadway modifications, economics dictate that the remaining modifications to the Tamiami Trail be done in a manner compatible with all future projects.

Past Actions

- Modified Water Deliveries to Everglades National Park – Raising Tigertail Camp (USACE/ENP)
- Experimental Program of Water Deliveries to Everglades National Park (USACE)
- Interim Structural and Operational Plan (ISOP) for the Hydrologic Compliance with the Cape Sable Seaside Sparrow Biological Opinion (USACE)
- Interim Operational Plan (IOP) for Protection of the Cape Sable Seaside Sparrow (USACE)

Present Actions

- Tamiami Trail Limited Reevaluation Report—1-mile bridge/elevated highway (I-29 Canal stage to 8.5') (NPS)
- Modified Water Deliveries to Everglades National Park (MWD) – Spreader Swale Pilot Project (NPS/USACE)



- Modified Water Deliveries to Everglades National Park (MWD) – Conveyance between WCA-3A and WCA-3B (Conveyance and Seepage Control Project) and Combined Operational Plan (COP) as part of MWD (USACE/ENP)
- Modified Water Deliveries to Everglades National Park – 8.5 Square Mile Area (USACE/ENP)
- Modified Water Deliveries to Everglades National Park (MWD) – Exotic Vegetation Removal Project (ENP/USACE)
- C-111 South Dade Project (detention areas and seepage management along the southeastern boundary of ENP) (USACE)
- East Coast Buffer/Water Preserve Areas Project (SFWMD)
- Lower East Coast Regional Water Supply Interim Plan (SFWMD)

Reasonably Foreseeable Future Actions

- Comprehensive Everglades Restoration Plan: WCA-3 Decomp, ENP Seepage Management, C-111 Spreader Canal, River of Grass Initiative (USACE/SFWMD)
- Everglades Restoration Transition Plan – Supercedes the Interim Operational Plan to Protect the Cape Sable Seaside Sparrow and implements operational flexibilities based on multi-species management (USACE/SFWMD)
- Everglades National Park *Everglades National Park General Management Plan/East Everglades Wilderness Study/Environmental Impact Statement*
- Lower East Coast Regional Water Supply Plan – South Florida Ecosystem Restoration Plan (SFWMD)
- Everglades Construction Project - 12 inter-related construction projects located between Lake Okeechobee and the Everglades (SFWMD)

Of these, the following were particularly relevant and formed the basis of the cumulative impact analysis:

Current Projects

The MWD project began the process to raise the Tamiami Trail to accommodate higher water levels. The primary purpose of the project is to provide improved water flows to ENP at the northern park boundary (**Figure 4-1**). However, because the degree of road-raising in the original MWD project is minimal, flows to ENP would be constrained to prevent degradation of the roadbed (2008 limited Reevaluation Report). According to the Florida Department of Transportation, road-raising must be substantial enough to prevent forced cut-off of flows to ENP during normal high rainfall events. The MWD project would improve flows to Northeast Shark River Slough; however, maximum flows would only approach 1400 cubic feet per second (cfs), far below the MWD target flows of 4000 cfs, identified as needed to restore ecological conditions in Northeast Shark River Slough. The 2009 Omnibus Appropriations Act recognized this limitation of the MWD project and directed the Department of Interior to immediately evaluate additional bridging and road-raising to provide much greater flow capacity to Northeast Shark River Slough in ENP. The resulting Tamiami Trail Modifications: Next Steps project would provide the conveyance capacity and infrastructure needed to meet the flow volume and spatial distribution objectives of the original MWD project, and of future projects, including the CERP and the more recently proposed River of Grass (ROG) initiative.



The MWD project was authorized in 1989; however, legal, political, and fiscal constraints have plagued this project from its inception. Two technical documents/products associated with the MWD Project were developed between 2002 and 2006 and are instrumental in recognizing the need for the Tamiami Trail Modifications: Next Steps project. One was the 2005 Revised General Reevaluation Report/Supplemental Environmental Impact Statement (RGRR/SEIS) for Tamiami Trail and the other was the Combined Structural and Operational Plan (CSOP). Both plans recognized that raising and bridging the Tamiami Trail to allow for unconstrained flows to ENP are critical to future CERP projects and to reestablishing the physical processes and ecological conditions that once sustained the ridge and slough habitat in Northeast Shark River Slough. While the recommended plan of the 2005 RGRR/SEIS was abandoned due to escalating costs, and the CSOP was not finalized after selecting a preferred plan in 2006, the modeling evaluations of both plans show the potential regional benefits that can be achieved by providing increased flow capacity into Northeast Shark River Slough.

The purpose of CSOP was to develop an operational plan that would integrate MWD and C-111 components, including conveyance and seepage control through L-67A and I-67C, Tamiami Trail modifications, 8.5 square mile area flood mitigation, and the L-31N/C-111 seepage management components. The goal was to create a single regional water management plan to maximize ecological benefits to WCA-3 and ENP, while maintaining existing levels of flood control and water supply to the built environment. In 2006, the CSOP inter-agency team identified a preferred plan, Alternative 5r, based on the 2005 RGRR Record of Decision (November 2005) that authorized modifications to Tamiami Trail to allow water levels in the L-29 canal to increase to 9.7 feet, supplying essentially unconstrained flows to Northeast Shark River Slough.

The bridge alternatives and roadway improvements in the Tamiami Trail Modifications: Next Steps project provide structural capacities at Tamiami Trail similar to the CSOP alternatives exhibiting better performance. It is therefore reasonable to assume that these bridge alternatives provide the increased capacity needed to achieve the more natural flow distribution and other regional benefits demonstrated in the CSOP study. Potential benefits include the ability to reduce the duration of excessively deep water from ponding in Southern WCA-3A, to increase water depths in Northeast Shark River Slough, and to improved the volume, timing and spatial distribution of flows into Everglades National Park.

Most of the CSOP alternatives increased the Tamiami Trail roadway Design High Water (DHW) stage in the L-29 Canal to 9.7 feet—the same DHW as for the Tamiami Trail Modifications: Next Steps project. The DHW for the project roadway was developed by the COE for the 2005 Tamiami Trail Revised General Reevaluation Report (RGRR) project, using stage-frequency curves from the Natural Systems Model (NSM). The DHW for the project roadway is the 20-year, 24-hour stage (9.7 feet, NGVD 1929). The DHW for the overtopping criteria is based on the 100-year stage (10.1 feet, NGVD 1929). The Florida Department of Transportation concurred with this COE determination.

Future Projects

The common thread connecting the past (MWD and foundation projects) and future (Tamiami Trail Modifications: Next Steps, CERP, and ROG) projects is the removal of barriers to sheet flow that have been constructed over the last hundred years in the central and southern Everglades (**Figure 4-1**). The removal of these barriers (levees, roads, and canals) would have to be accompanied by adequate seepage management to protect adjacent areas from flooding and to keep water inside the natural areas. The most significant barrier, and arguably the most debilitating to the natural environment, has been Tamiami Trail. Past actions attempted to move water from the water conservation areas to ENP without major modifications to Tamiami Trail,



with few benefits to ENP resulting. These actions were primarily directed at providing the needed mitigation for the future restoration project features or relatively minor modifications to the operating plans for delivery of water to the park.

In 2009, the State of Florida agreed to purchase 187,000 acres of land in the EAA, called the River of Grass (ROG) purchase, to reestablish historical flows from Lake Okeechobee to the water conservation areas and Everglades National Park. Recent modeling for the ROG indicates that flows closer to 6,000 cfs may be needed across the Tamiami Trail to restore the volumes of flows to southern Florida needed both to restore ecological conditions in Northeast Shark River Slough and Florida Bay. The recognition of the importance of removing obstacles to flow at Tamiami Trail has become the critical component in all Everglades restoration planning for the future. Successful ecological restoration of the Everglades system hinges on substantial modifications to Tamiami Trail, as proposed in the Tamiami Trail Modifications: Next Steps Project. Only then can a significant increase in flows from both CERP projects and the ROG initiative be delivered to Everglades National Park.

Cumulative impacts for each impact topic for this project have been incorporated into this chapter of the EIS.



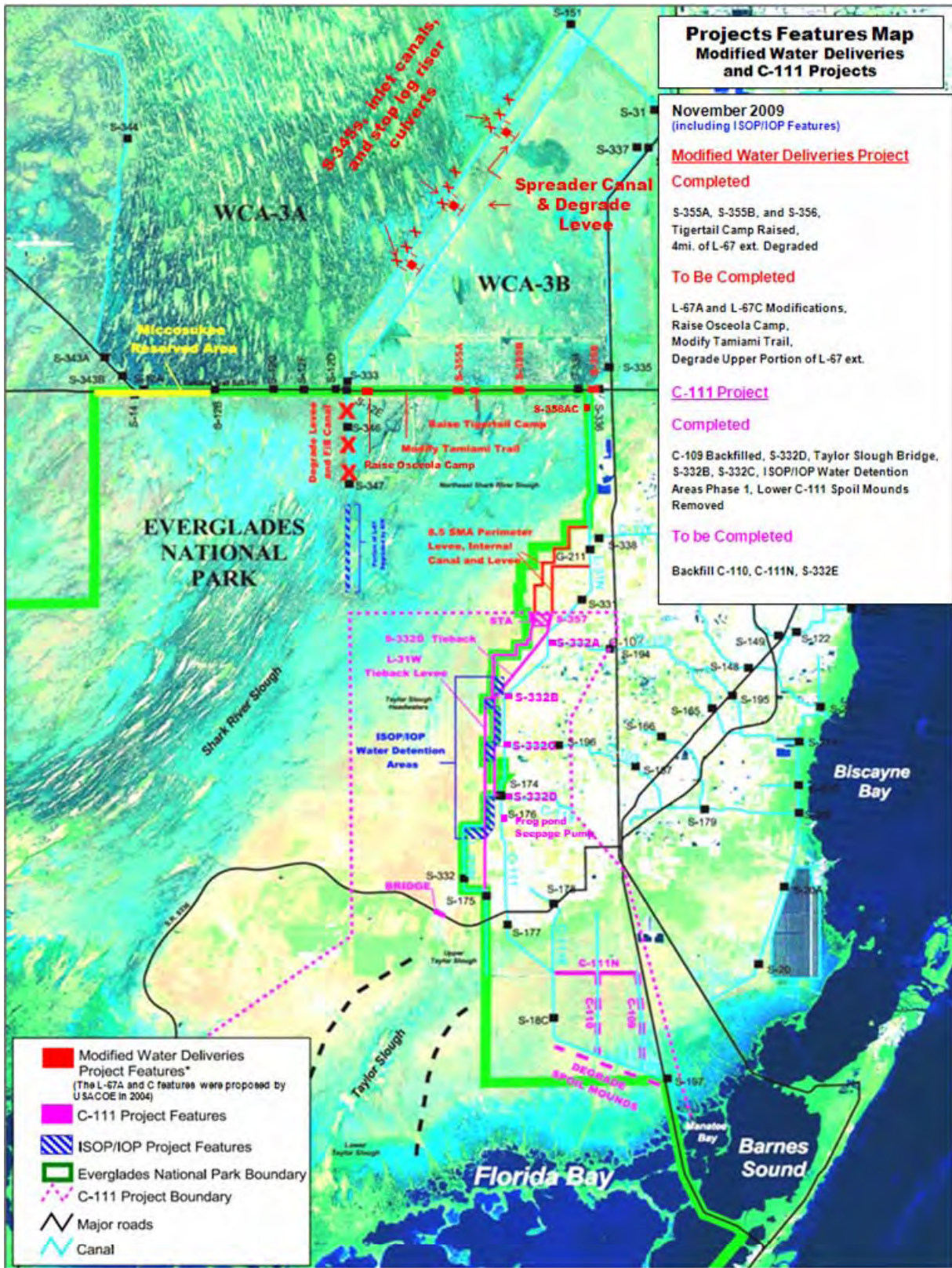


Figure 4-1 – Modified Water Deliveries and C-111 Projects Map



4.1.4 Impairment Analysis

The NPS *Management Policies 2006* requires an analysis of potential effects to determine whether or not actions would impact park resources, but it also must determine whether those actions would impair park resources. The fundamental purpose of the national park system, as established by the Organic Act and reaffirmed by the General Authorities Act, as amended, begins with a mandate to conserve park resources and values. These laws give the NPS the managerial discretion to allow park resources and values to be impacted when necessary and appropriate to fulfill the purposes of a park, as long as the impact does not constitute impairment of the affected resources and values. NPS managers must always seek ways to avoid, or to minimize to the greatest degree practicable, adversely impacting park resources and values.

The impairment that is prohibited by the Organic Act and the General Authorities Act is an impact that, in the professional judgment of the responsible NPS manager, would harm the integrity of park resources or values, including the opportunities that otherwise would be present for the enjoyment of those resources or values. Whether an impact meets this definition depends on the particular resources and values that would be affected; the severity, duration, and timing of the impact; the direct and indirect effects of the impact; and the cumulative effects of the impact in question, and other impacts. An impact to any park resource or value may constitute impairment, but an impact would be more likely to constitute impairment to the extent that it has a major or severe adverse effect upon a resource or value whose conservation is:

- Necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park;
- Key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park; or
- Identified as a goal in the park's general management plan or other relevant NPS planning documents as being of significance.

Impairment may result from NPS activities in managing the park, visitor activities, or activities undertaken by concessioners, contractors, and others operating in the park.

An impairment determination is included in the conclusion statement for all impact topics related to Everglades National Park natural and cultural resources. Impairment determinations are not made for visitor use, park operations and management, socioeconomics, transportation, or hazardous, toxic, and radioactive waste because impairment findings relate back to park resources and values, and these impact areas are not generally considered to be park resources or values. Impairment determinations are not made for visitor use and experience because, according to the Organic Act, enjoyment cannot be impaired in the same way an action would impair park resources and values.

4.1.5 Climate Change and Sea Level Rise

Guiding Regulations and Policies

Executive Order 13514, "*Federal Leadership in Environmental, Energy, and Economic Performance*" and DOI Secretarial Order 3285 both provide guidance on how federal agencies should address greenhouse gas emissions and climate change.

NPS *Management Policies 2006* (Section 4.7.2) states that "Parks containing significant natural resources will gather and maintain baseline climatological data for reference." Management Policies also state that "The Service will use all available authorities to protect park resources



and values from potentially harmful activities...NPS managers must always seek ways to avoid, or minimize to the greatest degree possible, adverse impacts on park resources and values” (NPS, 2006). Section 9.1.1.6 discusses sustainable energy design, requiring any facility development to include improvements in energy efficiency and reduction in greenhouse gas emissions for both the building envelope and the mechanical systems that support the facility. Additionally, projects that include visitor centers or major visitor services facilities must incorporate LEED (Leadership in Energy and Environmental Design) standards to achieve a silver rating (NPS, 2006). Finally, Section 9.1.7 requires the NPS to interpret for the public the overall resource protection benefits from the efficient use of energy, and to actively educate and motivate park personnel and visitors to use sustainable practices in conserving energy (NPS, 2006). The NPS has also prepared draft interim guidance for considering climate change in NPS NEPA analyses.

Climate Change/Sea Level Rise

Climate change and the resulting sea level rise are affecting all of South Florida, especially low-lying areas such as Everglades National Park, and therefore will be addressed as part of this EIS. The Miami-Dade County Climate Change Advisory Task Force (CCATF) was established in 2006 with the charge of identifying potential future climate change impacts to Miami-Dade County and providing ongoing recommendations regarding mitigation and adaptation measures to respond to climate change (Miami-Dade 2009). The CCATF's 25 appointed members represent a diverse, multidisciplinary and highly knowledgeable group of individuals, including the Superintendent of Everglades National Park (Miami-Dade 2009). Since Everglades National Park is located largely within Miami-Dade County, the advice of the CCATF applies to the park's resources.

The 2001 report of the United Nations sponsored Intergovernmental Panel on Climate Change (IPCC) projected a sea level rise over the coming century of one to three feet (median sea level rise of two feet) (CCATF, 2008). The *Second Report and Initial Recommendations* published by the Miami-Dade CCATF states that global warming would result in many changes to the natural environment, “including changing atmospheric circulation and temperature patterns, changes in rainfall and severe weather, changes in biologic community distribution, increased extinction rates, changes in disease and pest distribution, and changes in sea level” (CCATF, 2008). While all these environmental impacts would affect South Florida and Everglades National Park within the next century, the key concern for the lowlying areas of Everglades National Park would be rising sea level, “with a very high likelihood” that the sea level would rise an additional 1.5 feet in the next 50 years and a cumulative total of three to five feet within a century (CCATF, 2008).

The 2007 IPCC report projected a somewhat lower sea level rise than the 2001 IPCC report, but it did not incorporate the substantially accelerated melting being observed in the Greenland Ice Sheet (CCATF, 2008). The recent changes occurring in the Arctic and Greenland mean that global warming and sea level rise would happen much more rapidly than had been only recently projected (CCATF, 2008). Even recent model projections of future ice melt for Greenland by 2040 have already occurred (CCATF, 2008). In the Antarctic, there is no inherent reason why the impacts of global warming should follow the pattern of the Arctic Ocean (CCATF, 2008). Nevertheless, there has been a gradual loss of pack ice through the last half of the twentieth century, but a slight expansion in the past decade (as anticipated by climate models); about a 12% increase in the flow rate of 300 glaciers around the margin of Antarctica between 1993 and 2003; and a substantial increase in summer snow melt in both marginal and interior areas of the ice sheet since 2005 (CCATF, 2008). Antarctica is a critical unknown to future projections; however, it is showing distinctive early signatures of accelerated ice release (CCATF, 2008). As



a result of these uncertainties, the IPCC reports underestimate the amount of sea level rise that is likely to occur in this century (CCATF 2008); therefore, the Miami-Dade County CCATF findings are used as the basis for impact analysis for this project.

Only a two-foot sea level rise by the end of the century, as projected in the 2001 IPCC report, would drastically change the landscape of South Florida and Everglades National Park (CCATF, 2008). Spring high tides would be +4.5 to 5 feet above present mean sea level; storm surges would be higher; barrier islands, fill islands, and low-lying mainland areas would be frequently flooded; salt water intrusion would restrict available freshwater resources; and drainage would be more sluggish (CCATF 2008). Based on the Miami-Dade County CCATF 2008 report, it is anticipated that sea level within the next century would rise substantially more than the IPCC's projected two feet. Many respected scientists, as documented in the CCATF's 2008 report, now see a likely sea level rise of at least 1.5 feet in the next 50 years and a total of at least three to five feet by the end of the century, with the potential for a larger rise. With this scenario, spring high tides would be at +6 to +8 feet (CCATF 2008). This estimate also does not take into account the possibility of a catastrophically rapid melt of land-bound ice from Greenland, and it makes no assumptions about Antarctica (CCATF 2008). The IPCC is not expected to revisit these estimates until 2012; therefore, the current estimates must be taken into account in the analysis of project alternatives.

NPS *Management Policies 2006* (Sect. 4.7.2) regarding weather and climate states that the NPS would "gather and maintain baseline climatological data for reference" for parks containing "significant natural resources." The NPS further states that "the Service would not conduct weather-modification activities" in an attempt to alter naturally occurring conditions in the park (NPS 2006). While slowing the rate of sea level rise is beyond the resources of the park, monitoring sea level change and evaluating and predicting impacts on the park's landscape is a valid management issue.

4.2 Geology, Topography, and Soils

4.2.1 Guiding Regulations and Policies

NPS *Management Policies 2006* (Section 4.8) states that the NPS would protect geologic features from the unacceptable impacts of human activity, while allowing natural processes to continue. The term "geologic features" describes the products and physical components of geologic processes. Examples of geologic features include rocks, soils, and minerals; geysers and hot springs in geothermal systems; cave and karst systems; canyons and arches in erosional landscapes; sand dunes, moraines, and terraces in depositional landscapes; dramatic or unusual rock outcrops and formations; and paleontological and paleoecological resources such as fossilized plants or animals, or their traces.

4.2.2 Assumptions, Methodology and Impact Thresholds

Potential impacts to soils are assessed based on the extent of disturbance to natural undisturbed soils, the potential for soil erosion resulting from disturbance, and limitations associated with the soils. Analysis of possible impacts to soil resources was based on on-site inspection of the resource within the project area, review of existing literature and maps, and information provided by the NPS and other agencies.

The following thresholds were used to determine the magnitude of impacts on soils and geologic features:



Negligible: Soils and geologic features would not be affected, or effects would not be measurable. Any soil erosion, effects on soil productivity, or the ability of the soil to support native vegetation would be slight, and would occur in a relatively small area.

Minor: Effects on soils or geologic features (soil erosion, effects on soil productivity or the ability of the soil to support native vegetation) would be detectable, but only a small area would be affected. If mitigation was needed to compensate for adverse effects, it would be relatively simple to implement and would likely be successful.

Moderate: Effects on soils or geologic features (soil erosion, effects on soil productivity or the ability of the soil to support native vegetation) would be readily apparent, and would occur over a relatively large area. Mitigation would probably be necessary to compensate for adverse effects and would likely be successful.

Major: Effects on soils or geologic features (soil erosion, effects on soil productivity or the ability of the soil to support native vegetation) would be readily apparent, and would substantially change the soil or geologic characteristics over a large area. Extensive mitigation would be needed to compensate for adverse effects, and its success would not be assured.

Duration: Short-term impacts occur during all or part of alternative implementation; long-term impacts extend beyond implementation of the alternative.

Analysis area: The focus of this analysis is the area that would be directly affected by the proposed actions, primarily the project footprint plus 50 foot easements; however, impacts to geology, topography and soils in the greater project area (Everglades) are also discussed.

4.2.3 Impacts of the Alternatives

No-Action Alternative

Analysis. If the No-Action Alternative is selected as the preferred alternative, there would be no additional direct or indirect short- or long-term impacts on geology, topography, or soils other than those already realized from construction of the 2008 LRR/EA preferred alternative (1-mile eastern bridge). The geology, topography, and soils within the vicinity of the project area would continue to be adversely impacted in the short- and long-term due to peat loss.

Cumulative Impacts. Cumulative effects to geology, soils and topography are based on the analysis of past, present and reasonably foreseeable future actions in the Everglades region in combination with the No-Action Alternative. Implementation of current projects such as the MWD and the CERP and reasonably foreseeable projects such as WCA-3A Decompartmentalization and the River of Grass initiative are anticipated to provide longer hydroperiods and increased water depths that will provide more favorable conditions for peat accretion. The implementation of MWD and CERP projects planned for the Everglades area is anticipated to result overall in a cumulative long-term beneficial effect on soils.

Conclusion. No short- or long-term adverse or beneficial effects to geology, topography, and soils would result from the selection of the No-Action Alternative. Consequently, there would be no impairment to geology, topography, or soils as a result of the No-Action Alternative.

Action Alternatives

Analysis. Short-term effects to soils in Northeast Shark River Slough would occur during project implementation. Access routes for removal of excavated material may need to be created and disturbance and compaction of soils is anticipated from temporary construction-related activities. Soil impacts resulting from temporary construction-related activities for any of the bridging alternatives are expected to be adverse, local, minor, and short-term. The estimated temporary



acreage of soil impacts associated with each of the bridging alternatives is provided in **Table 4-1**.

Table 4-1 – Estimated temporary soil impacts resulting from construction-related activities of bridging project alternatives

Bridging Project Alternative	Estimated Permanent Soil Impacts (acres)	Estimated Temporary Soil Impacts (acres)
Alternative 1	49.6	22.0
Alternative 2a	55.4	28.3
Alternative 4	39.7	16.2
Alternative 5	43.3	18.7
Alternative 6e	53.7	37.9

Note: This acreage does not include the soil acreage impacts of the No-Action 1-mile eastern bridge.

Best management practices would be implemented to minimize impacts to soils resulting from construction and maintenance-related activities. Long-term effects to soils would result from construction and maintenance-related activities and implementation of an operational plan in association with the project alternative. For all bridging alternatives (Alternatives 1-6e), soils would be excavated in the bridging footprint during construction and long-term maintenance procedures would be implemented to permanently maintain the bridging footprint devoid of soils and vegetation. It is anticipated that excavation of the soils and the vegetation layer within the bridge footprint may cause phosphorus assimilation processes to occur further downstream into ENP. The estimated permanent acreage of soil removal associated with each of the bridging alternatives is provided in **Table 4-1**. Best management practices would be implemented to minimize impacts to soils resulting from long-term maintenance-related activities. It is expected the impacts resulting from this soil excavation and disturbance would be adverse, local, minor and long-term because soils would be permanently removed from the project area. Other long-term effects on soils would result from implementation of an operational plan in association with the bridging project alternatives.

The *Second Report and Initial Recommendations* published by the Miami-Dade CCATF states that global warming would result in many changes to the natural environment, “including changing atmospheric circulation and temperature patterns, changes in rainfall and severe weather, changes in biologic community distribution, increased extinction rates, changes in disease and pest distribution, and changes in sea level” (CCATF, 2008). All these environmental impacts would affect South Florida, Everglades National Park, and the project area within the next century, with the key concern for the low topography project area being rising sea level, “with a very high likelihood” that the sea level would rise an additional 1.5 feet in the next 50 years and a cumulative total of three to five feet within a century (CCATF, 2008). Geology, topography and soils would be impacted by saltwater infiltration of surficial aquifers and saltwater intrusion into freshwater marshes of the Northeast Shark River Slough and southern ENP.

Cumulative Impacts. Implementation of current projects such as the MWD and the CERP and reasonably foreseeable projects such as WCA-3A Decompartmentalization and the River of Grass initiative are anticipated to provide longer hydroperiods and increased water depths that will provide more favorable conditions for peat accretion. The occurrence of unnatural peat fires is also expected to decline. While construction activities and bridge maintenance activities



associated with the all the action alternatives (1-6e) would create short- and long-term adverse impacts by disturbance and removal of peat and muck. The expected benefits to soils from other projects and plans are expected to outweigh the minor adverse effects to soils of the any of the action alternatives of the proposed project. The current project in combination with related actions in other locations such as MWD and CERP projects planned for Everglades area is anticipated to result overall in a cumulative long-term beneficial effect on soils.

Conclusion. Effects to soils would be directly related to the short-term and long-term effects caused by construction, operations, and maintenance associated with any of the bridging alternatives. It is anticipated that the soil impacts resulting from temporary construction-related activities would be adverse, local, minor, and short-term. Long-term impacts resulting from implementing any of the project alternatives are anticipated to be adverse, local, and minor. No impairment of or unacceptable impacts to soils are anticipated from construction and maintenance-related activities associated with the bridging project.

4.3 Water Resources

4.3.1 Hydrology

4.3.1.1 Guiding Regulations and Policies

The 1989 Everglades National Park (ENP) Protection and Expansion Act authorized improvements in the delivery of water from Water Conservation Area 3B (WCA 3B) to the ENP expansion area in Northeast Shark River Slough (Northeast Shark River Slough immediately south of Tamiami Trail (U.S. Highway 41).

NPS *Management Policies 2006* specifically addresses the management of Wetlands in Section 4.6.5. The policy states:

The Service will manage wetlands in compliance with NPS mandates and the requirements of Executive Order 11990 (Protection of Wetlands), the Clean Water Act, the Rivers and Harbors Appropriation Act of 1899, and the procedures described in Director's Order 77-1 (Wetland Protection). The Service will (1) provide leadership and take action to prevent the destruction, loss, or degradation of wetlands; (2) preserve and enhance the natural and beneficial values of wetlands; and (3) avoid direct and indirect support of new construction in wetlands unless there are no practicable alternatives and the proposed action includes all practicable measures to minimize harm to wetlands.

The Service will implement a "no net loss of wetlands" policy. In addition, the Service will strive to achieve a longer-term goal of net gain of wetlands across the national park system through restoration of previously degraded or destroyed wetlands...

NPS *Management Policies 2006* specifically addresses the management of Watershed and Stream Processes in Section 4.6.6. The policy states:

The Service will manage watersheds as complete hydrologic systems and minimize human- caused disturbance to the natural upland processes that deliver water, sediment, and woody debris to streams.

The Service will manage streams to protect stream processes that create habitat features such as floodplains, riparian systems, woody debris accumulations, terraces, gravel bars, riffles, and pools. Stream processes include flooding, stream migration, and associated erosion and deposition.



The Service will protect watershed and stream features primarily by avoiding impacts on watershed and riparian vegetation and by allowing natural fluvial processes to proceed unimpeded...

4.3.1.2 Assumptions, Methodology and Impact Thresholds

Potential impact to hydrology is based on impacts to potential flows into Northeast Shark River Slough and water velocity in the vicinity of the bridges into the Northeast Shark River Slough in the ENP. The level of benefit for each alternative is ranked according to comparison of the expected system response to either target values or to the best response. The level of impact for velocity is scored and ranked relative to the target velocity of the natural flow condition. The level of impact for the potential flows into Northeast Shark River Slough is related to bridge length and location, and is expressed as a percentage of total available marsh capacity. The rankings for the impact evaluation topics are grouped into three categories based on the evaluations. The categories are:

Negligible: Hydrology would not be affected, or changes would be at low levels any detected effects to hydrology would be slight and localized.

Minor: Changes in hydrology would be measurable, although the changes would be small and localized.

Moderate: Changes in hydrology would be measurable and regional.

Major: Changes in hydrology would be readily measurable, and would have observable consequences on a regional scale.

Duration: Short-term – Recovers in less than 1 year following completion of construction. Long-term - Takes more than 1 year to recover following completion of construction.

Analysis Area: The area of analysis for this project includes the Tamiami Trail project area and areas immediately upstream and downstream of the project area.

4.3.1.3 Impacts of the Alternatives

No-Action Alternative

Analysis. If the No-Action Alternative is selected as the preferred alternative, there would be no additional direct or indirect short- or long-term impacts on hydrology other than those already realized from construction of the 2008 LRR/SEIS preferred alternative (1-mile eastern bridge). The project area would continue to experience the unnatural altered hydrologic conditions that currently exist in Everglades National Park and Northeast Shark River Slough, and the hydrologic flows would be forced through the existing culvert sets, causing continued adverse wetland impacts.

Cumulative Impacts. The intent of past, on-going and foreseeable future projects are to restore the natural hydrology of the Everglades ecosystem and increase surface water deliveries to Northeast Shark River Slough and ENP. Implementation of past, and present projects is leading to incrementally better hydrologic conditions within the Everglades ecosystem and future projects will further enhance hydrologic flows. Therefore, an analysis of future projects in conjunction with the No-Action Alternative concludes that related actions in other areas are expected to have a long-term beneficial cumulative effect on hydrology.

Conclusion. No short- or long-term adverse or beneficial effects to hydrology would result from the selection of the No-Action Alternative. Consequently, there would be no impairment to hydrology as a result of the No-Action Alternative.

Action Alternatives



Analysis. Activities associated with the construction of all action alternatives (1-6e) have the potential to negatively affect hydrology. Dewatering and the temporary diversion of water flow during construction would cause adverse, short-term, localized impacts to hydrology.

The ability of the action alternatives to convey potential flows is an important factor in determining a benefit to hydrology. The wider (longer) the bridge opening provided by an alternative the more potential there is to pass expected flows. Alternatives 6e and 2a provide the best potential to pass surface water flows as a percentage of available capacity with Alternative 6e able to pass 64% of available capacity and 2e able to pass 50% of available capacity along the 10.7 mile project corridor (See **Table 4-2**). The shortest bridge length, Alternative 4, can only pass 24% of the available capacity. Given these values the long term benefits to hydrology based on flow capacity is minor and localized for Alternatives 2a and 6e and negligible for Alternatives 1, 4 and 5.

Velocity of flows below the newly constructed bridges is also an important factor. The goal is to closely match natural flows which are approximately 0.5 ft/sec. Velocities over 1.0 ft/sec can cause scour and other damage to the downstream ridge and slough ecosystem. All action alternatives meet the velocity parameter at 200 feet below the bridges thus provide a beneficial level of flow (See **Table 4-2**). Therefore, all action alternatives provide a long-term beneficial affect to hydrology in terms of water velocities.

Table 4-2 – Water Deliveries to Everglades National Park

Alternative	Potential Flows as Percentage of Available Capacity	Average Velocity 200 feet Below Bridge (ft/sec)
1	35	0.14
2a	50	0.10
4	26	0.20
5	29	0.16
6e	64	0.08

Cumulative Impacts. The intent of past, on-going and foreseeable future projects is to restore the natural hydrology of the Everglades ecosystem and increase surface water deliveries to Northeast Shark River Slough and ENP. Implementation of past, and present projects is leading to incrementally better hydrologic conditions within the Everglades ecosystem and future projects will further enhance hydrologic flows. While all action alternatives (1-6e) of the proposed project are associated with a short-term, localized, adverse impact to hydrology related to construction activities, the action alternatives have incremental long-term, beneficial effects on hydrology based on bridge opening length. Therefore, the action alternatives of the proposed project in combination with related actions in other areas are expected to have long-term beneficial cumulative effects on hydrology.

Conclusion. All action alternatives (Alternative 1 - 6e) will have a short-term, adverse, minor localized affect on hydrology associated with project construction. Additionally, all action alternatives will have a long-term beneficial effect on hydrology based on their capacity to convey flows and relative low velocities. Consequently, there would be no impairment to hydrology as a result of any of the action alternatives, relative to existing conditions.



4.3.2 Water Quality

4.3.2.1 Guiding Regulations and Policies

NPS *Management Policies 2006* specifically addresses water quality in Section 4.6.3. The policy states:

The pollution of surface waters and groundwater by both point and nonpoint sources can impair the natural functioning of aquatic and terrestrial ecosystems and diminish the utility of park waters for visitor use and enjoyment. The Service will determine the quality of park surface and groundwater resources and avoid, whenever possible, the pollution of park waters by human activities occurring within and outside the parks. The Service will

- *Work with appropriate governmental bodies to obtain the highest possible standards available under the Clean Water Act for the protection for park waters;*
- *Take all necessary actions to maintain or restore the quality of surface waters and groundwater within the parks consistent with the Clean Water Act and all other applicable federal, state, and local laws and regulations; and*
- *Enter into agreements with other agencies and governing bodies, as appropriate, to secure their cooperation in maintaining or restoring the quality of park water resources.*

4.3.2.2 Assumptions, Methodology and Impact Thresholds

Potential impacts to water quality are based on impacts to the chemical, physical, or biological constituents of the water column. The following thresholds were used to determine potential impacts to water quality:

Negligible: Water quality would not be affected, or changes would be at low levels of detection. Any detected effects to water quality would be slight and localized.

Minor: Changes in water quality would be measurable, although the changes would be small and localized.

Moderate: Changes in water quality would be measurable and regional.

Major: Changes in water quality would be readily measurable, and would have observable consequences on a regional scale.

Analysis area: The area of analysis for water quality is the Tamiami Trail project area and areas immediately downstream of the project area.

4.3.2.3 Impacts of the Alternatives

No-Action Alternative

Analysis. If the No-Action Alternative is selected as the preferred alternative, there would be no additional direct or indirect short- or long-term impacts on water quality other than those already realized from construction of the 2008 LRR/EA preferred alternative (1-mile eastern bridge). The water quality within the vicinity of the project area would remain unchanged.

Cumulative Impacts. Current and future projects associated with MWD and CERP such as the WCA-3 Decompartmentalization and Sheetflow Enhancement Project (DECOMP) is anticipated to improve flow patterns within the area necessary for the recovery of the native flora and fauna.



The MWD projects like the DECOMP project will improve sheetflow from WCA-3B to ENP. These improvements are meant to enable the reestablishment of the historic Shark River Slough flow-way from WCA-3A through WCA-3B to ENP. Under these improvements source waters will have greater residence time moving slowly as sheetflow to undergo biological, physical and chemical reactions that will improve water filtration and reduce pollutant loadings to ENP.

Even if the No-Action Alternative is implemented, It is expected that the total cumulative impacts to water quality given related projects would be beneficial and long-term.

Conclusion. No short- or long-term adverse or beneficial effects to water quality would result from the selection of the No-Action Alternative. Consequently, there would be no impairment of water quality as a result of the No-Action Alternative.

Action Alternatives

Analysis. Short-term effects on water quality in Northeast Shark River Slough would occur during project implementation. Excavation of the project area and other construction-related disturbance activities would cause temporary impacts to water quality in Northeast Shark River Slough such as increased TP, TSS and turbidity in the surface water in all of the bridging alternatives (Alternatives 1-6e). For all bridging alternatives (Alternatives 1-6e), soils and vegetation would be excavated in the bridging footprint during construction and long-term maintenance procedures would be implemented to permanently maintain the bridging footprint devoid of soils and vegetation. Best management practices would be implemented to minimize impacts to water quality resulting from construction and maintenance-related activities. Based on the results of the S-12D Flow-way Maintenance Plan water quality monitoring and the scope of the bridging projects, it is anticipated that the water quality impacts resulting from construction-related activities for all bridging alternatives would be adverse, local, minor, and short-term.

Long-term effects on water quality would result from implementation of an operational plan in association with this project alternative. Long-term effects to water quality resulting from operations remain unknown since an operational plan has not yet been developed for this project alternative. Since a water operations plan has not yet been developed and is not being analyzed as part of this EIS, long-term effects to water quality would need to be assessed as part of any future project that implements an operational plan.

The *Second Report and Initial Recommendations* published by the Miami-Dade CCATF states that global warming would result in many changes to the natural environment, “including changing atmospheric circulation and temperature patterns, changes in rainfall and severe weather, changes in biologic community distribution, increased extinction rates, changes in disease and pest distribution, and changes in sea level” (CCATF, 2008). All these environmental impacts would affect South Florida, Everglades National Park, and the project area within the next century, with the key concern for the low topography project area being rising sea level, “with a very high likelihood” that the sea level would rise an additional 1.5 feet in the next 50 years and a cumulative total of three to five feet within a century (CCATF, 2008). Water quality would be impacted by increasing amount and duration of saltwater in interior marshes of the southern ENP.

Cumulative Impacts. The localized, minor adverse impacts for all project action alternatives (1-6e) would not detract measurably from the water quality benefits anticipated from current and future projects associated with MWD and CERP. The WCA-3 Decompartmentalization and Sheetflow Enhancement Project (DECOMP) is anticipated to improve flow patterns within the area necessary for the recovery of the native flora and fauna. The MWD projects like the



DECOMP project will improve sheetflow from WCA-3B to ENP. These improvements are meant to enable the reestablishment of the historic Shark River Slough flow-way from WCA-3A through WCA-3B to ENP. Under these improvements source waters will have greater residence time moving slowly as sheetflow to undergo biological, physical and chemical reactions that will improve water filtration and reduce pollutant loadings to ENP.

It is expected that the total cumulative impacts to water quality given the action alternatives of the proposed project combined with related projects would be beneficial and long-term.

Conclusion. Water quality effects would be directly related to the short-term and long-term effects caused by construction, operations, and maintenance associated with the of the Tamiami Trail bridging project alternatives. It is anticipated that the water quality impacts resulting from construction-related activities would be adverse, local, minor, and short-term. No long-term effects to water quality associated with the construction of the project alternatives are anticipated. No impairment of or unacceptable impacts to water quality resources or values is anticipated from construction and maintenance-related activities associated with the bridging project. Since a water operations plan has not yet been developed and is not being analyzed as part of this EIS, long-term effects to water quality would need to be assessed as part of any future project that implements an operational plan.

4.3.3 Wetlands

4.3.3.1 Guiding Regulations and Policies

As described in the Purpose and Need chapter a federal executive orders, EO 11990 (Protection of Wetlands) direct federal agencies to avoid adverse impacts to wetlands. Director's Order #77-1 establishes policies, requirements, and standards for implementing Executive Order 11990.

Director's Order #77-1 states the NPS would employ a sequence of avoiding adverse wetland impacts to the extent practicable, minimizing impacts that would not be avoided, and compensating for remaining unavoidable adverse wetland impacts by restoring degraded wetlands. If the preferred alternative would result in adverse impacts to wetlands, the NPS would prepare and approve a Statement of Findings (SOF) in accordance with procedures described in Procedural Manual 77-1: Wetland Protection. Since wetland resources are located within the study area and would be adversely affected by the construction of the proposed project, a SOF has been prepared in accordance with procedures described in *Procedural Manual #77-1* (see **Appendix C**).

NPS *Management Policies 2006* specifically address water quality, wetlands, and floodplains in Sections 4.6.3, 4.6.4, and 4.6.5, respectively. The policies state that NPS would "take all necessary actions to maintain or restore the quality of surface waters and ground waters within parks consistent with the Clean Water Act and all other applicable and federal, state, and local laws and regulations" and provide similar protective provisions for wetlands and floodplains that reiterate the language in the Director's Orders discussed above (NPS 2006b).

4.3.3.2 Assumptions, Methodology and Impact Thresholds

The impact thresholds for wetlands are based on the wetlands acreage permanently filled or restored, and the size, integrity, and connectivity of the wetlands affected. These indicators are defined as follows:

- Size – The severity of impacts to wetlands depends on the size of the wetland impacted. A small area of impact in a large wetland would be likely to have less of an effect than a



large area of impact in a small wetland. The change in size of a wetland, as a result of an impact, would also influence the integrity and connectivity of the wetland and vice versa.

- Integrity – Highly intact wetland areas with little prior disturbance would be more susceptible to impacts from direct development than a wetland previously degraded by development or other activities. The loss of function and productivity of the higher quality wetland would be a greater loss than that of a lower quality wetland. Additionally, indirect impacts due to human trampling or a change in vegetation or hydrology would also impact the integrity of the wetland.
- Connectivity – The relationship of wetlands to other wetlands or other valuable natural resources is also important in determining the degree of impact or project benefits. Narrow, previous trail corridors that are infrequently or seasonally used would have less fragmenting effect than would a wide hard-surface roadway with high volumes of vehicular or pedestrian traffic. Establishment of buildings or other structures in wetlands areas would also create barriers to the natural dispersal of plants and animals and impact the connectivity of wetlands.

Negligible: No measurable or perceptible effects on size, integrity or connectivity of wetlands would occur. No U.S. Army Corps of Engineers 404 permit would be necessary.

Minor: The effect on wetlands would be measurable or perceptible, but small in terms of area and the nature of the impact. A small effect on size, integrity, or connectivity would occur; however, the overall viability would not be affected. If left alone, an adversely affected wetland would recover, and the impact would be reversed. A U.S. Army Corps of Engineers 404 permit would not be required.

Moderate: The impact would be sufficient to cause a measurable effect on one of the three parameters (size, integrity, connectivity) or would result in a permanent loss or gain in wetland acreage, but not to large areas. Wetland functions would not be affected in the long-term. A U.S. Army Corps of Engineers 404 permit would be required.

Major: The impact would result in a measurable effect on all three parameters (size, integrity, connectivity) or a permanent loss or gain of large wetland areas. The impact would be substantial and highly noticeable. The character of the wetland would be changed so that the functions typically provided by the wetland would be substantially altered. A U.S. Army Corps of Engineers 404 permit would be required.

Analysis area: The area of analysis for wetlands is the Tamiami Trail project area and wetland directly adjacent to the project area.

4.3.3.3 Impacts of the Alternatives

No-Action Alternative

Analysis. If the No-Action Alternative is selected as the preferred alternative, there would be no additional direct or indirect short- or long-term impacts on wetlands other than those already realized from construction of the 2008 LRR/EA preferred alternative (1-mile eastern bridge). The current unnatural altered hydrologic conditions within the vicinity of the project area would continue to have a negative impact on wetland values and functions within the WCAs, Everglades National Park, and Northeast Shark River Slough.



Cumulative Impacts. The intent of past, present, and future actions has been to restore the hydrology of the Everglades ecosystem so that degraded wetlands could recover. MWD and CERP projects are being implemented as an incremental part of total Everglades restoration plan that has wetland restoration as a main goal. The implementation of the No-Action Alternative in conjunction with other related actions in other areas is expected to have overall long-term beneficial cumulative effects on wetlands.

Conclusion. No short- or long-term adverse or beneficial effects to wetlands would result from the selection of the No-Action Alternative. Consequently, there would be no impairment of wetlands as a result of the No-Action Alternative.

Action Alternatives

Analysis. Specific construction methodologies and details for the action alternatives are not available at present, however all action alternatives involve a combination of different length of bridging and lengths of road reconstruction that involve varying levels of wetland impacts. Under the action alternatives the bridges and ConSpan (where required) would create a conveyance opening through Tamiami Trail by removing the sections of the existing highway. The bridges would be constructed approximately 50 south of the roadway areas to be removed maintain motor vehicle traffic during bridge construction. The remaining highway embankment would be reconstructed to raise the crown elevation to 12.3 feet, the minimum required based on the design high water of 9.7 feet and the roadway cross section geometry. Wetland and surface water impacts will be associated with the removal of portions existing roadway, construction of the bridges, the widening of the existing roadway to accommodate the new higher crown elevation, and construction of temporary work spaces that allow for access of construction equipment to the project site. Avoidance and minimization of wetland impacts is an important NPS consideration thus, impact minimization efforts will be considered during project design and permitting to reduce impact to adjacent wetlands and surface waters to the maximum extent possible while maintaining safe and sound engineering and construction practices. Unavoidable direct impacts (permanent and temporary) were quantified for based on the aerial extent of wetlands/surface waters within the proposed construction limits. The resulting quantities are depicted in **Table 4-3**.

Unavoidable direct wetland impacts resulting from the proposed action alternatives range from an estimated low of 68.20 (46.04 acres permanent, 22.16 acres temporary) with Alternative 4 to an estimated high of 102.07 (59.22 acres permanent, 42.85 acres temporary) with Alternative 6e, the preferred alternative. While the alternatives with the most bridging are associated with the largest wetland impacts they also allow the most on-site wetland restoration, as the bridges are off-set from the existing roadway to the south, areas of pavement removed to allow flow under the bridges would be restored to wetland grade and planted with native wetland vegetation. Alternative 6e allows 50.46 acres of road removal/wetland restoration while road removal/wetland restoration associated with implementation of Alternative 4 is only 15.48 acres.



Table 4-3 – Estimated Permanent and Temporary Wetland Impacts

Wetland Type		Permanent Impact – Square Feet	Permanent Impact - Acres	Temporary Impact – Square Feet	Temporary Impact - Acres
Alternative 1	Freshwater Marsh	846,806	19.44	460,864	10.58
	Mixed Wetland Hardwood/Shrub	1,051,974	24.15	576,299	13.23
	Sawgrass Marsh	482,209	11.07	182,081	4.18
	Water/Canal/Pond	32,670	0.75	9583	0.22
	Totals	2,413,659	55.41	1,228,827	28.21
Alternative 2a	Freshwater Marsh	865,537	19.87	482,644	11.08
	Mixed Wetland Hardwood/Shrub	1,125,590	25.84	670,824	15.40
	Sawgrass Marsh	482,209	11.07	182,081	4.18
	Water/Canal/Pond	33,977	0.78	9,148	0.21
	Totals	2,507,313	57.56	1,344,697	30.87
Alternative 4	Freshwater Marsh	724,402	16.63	416,433	9.56
	Mixed Wetland Hardwood/Shrub	898,207	20.62	426,017	9.78
	Sawgrass Marsh	354,142	8.13	112,385	2.58
	Water/Canal/Pond	28,749	0.66	10,454	0.24
	Totals	2,005,500	46.04	965,289	22.16
Alternative 5	Freshwater Marsh	757,508	17.39	421,661	9.68
	Mixed Wetland Hardwood/Shrub	957,884	21.99	470,012	10.79
	Sawgrass Marsh	396,396	9.10	185,130	4.25
	Water/Canal/Pond	30,492	0.70	9,147	0.21
	Totals	2,142,280	49.18	1,085,950	24.93
Alternative 6e	Freshwater Marsh	747,054	17.15	731,372	16.79
	Mixed Wetland Hardwood/Shrub	1,276,743	29.31	846,806	19.44
	Sawgrass Marsh	512,701	11.77	263,538	6.05
	Water/Canal/Pond	43,124	0.99	24,829	0.57
	Totals	2,579,623	59.22	1,866,546	42.85

Permanent impacts would result from dredging and filling of wetlands associated with widening of Tamiami Trail to support the new crown elevation, dredging and filling for bridge supports and pilings, and from shading of wetlands associated with the construction of the new bridges. Temporary wetland/surface water impacts are associated with the construction of temporary work spaces so that construction equipment can access all areas within the construction zone.

To minimize wetland resource impacts, BMP's would be implemented during construction. These practices would include employment of staked silt fence and turbidity barriers. Silt fence would be employed prior to commencement of construction around the outer perimeter of each



work zone to minimize the potential for impacts to adjacent undisturbed wetlands. Turbidity barriers would be employed in canals and deep water sites prior to commencement of construction at a sufficient distance (approximately 500 feet if conditions allow) from the work zone to create a temporary mixing zone upstream and downstream of the project area to allow for settling of any turbidity generated during construction. Because the project is located in a Outstanding Florida Water (OFW) which has restrictive water quality requirements including no degradation of water quality including turbidity above ambient levels, all turbidity barriers would remain in place and be inspected daily throughout the construction phase of the project. Additionally, a turbidity monitoring plan would be employed during construction. If monitoring reveals that turbidity levels exceed the standards, construction activities would be immediately halted and shall not resume until corrective actions are employed (e.g. the use of additional turbidity barriers, waiting for rain events to pass, modifications of equipment, etc.). After construction, temporarily disturbed areas would be restored to pre-existing conditions (e.g. regraded, soil uncompacted, etc) with upland areas stabilized per DOT specifications and wetlands allowed to reestablish naturally. The turbidity barriers and silt fence would be removed at the work areas once turbidity has subsided and all exposed soils are stabilized upon completion of construction.

At present an operational plan for manipulation of water levels in the L-29 Canal is being developed, however is not reviewed under this EIS. Full realization of project benefits is dependent upon an operational plan that utilizes the structural capacity of the alternatives. Potential benefits that would occur once an operational plan is defined and executed include enhancement of degraded wetland habitats within the Northeast Shark River Slough system. It is highly likely that implementation of the bridging alternatives in conjunction with the operational plan is self-mitigating, and that permanent and temporary wetland impacts associated with the construction of the proposed project would be offset by the enhancement to wetlands attributed to operation of the completed Tamiami Trail Modification: Next Steps project. However, long-term effects to wetlands resulting from operations remain unknown since an operational plan has not yet been developed for this project alternative. Since there is uncertainty as to the degree future benefits associated with the operation of the project, a back-up off-site mitigation plan would be implemented should anticipated project benefits not offset the project's impacts to wetland value and functions. Potential off-site mitigation scenarios may include purchase of mitigation bank credits or performing mitigation elsewhere on park property.

The *Second Report and Initial Recommendations* published by the Miami-Dade CCATF states that global warming would result in many changes to the natural environment, "including changing atmospheric circulation and temperature patterns, changes in rainfall and severe weather, changes in biologic community distribution, increased extinction rates, changes in disease and pest distribution, and changes in sea level" (CCATF, 2008). All these environmental impacts would affect South Florida, Everglades National Park, and the project area within the next century, with the key concern for the low topography project area being rising sea level, "with a very high likelihood" that the sea level would rise an additional 1.5 feet in the next 50 years and a cumulative total of three to five feet within a century (CCATF, 2008). Wetlands would be impacted by saltwater intrusion into freshwater marsh areas which would lead to conversion of the areas to brackish water systems. Additionally, freshwater wetlands would be impacted by increasing water levels and longer duration hydroperiods as freshwater flows to Florida Bay are obstructed by increased tidal gradients in southern portions of ENP.

Since the preferred alternative would result in adverse impacts to existing wetlands, a Statement of Findings (SOF) in accordance with procedures described in *Procedural Manual 77-1: Wetland Protection*, has been prepared (see **Appendix C**).



Cumulative Impacts. Direct effects of the project alternatives (1-6e) on wetlands consist of dredging and filling of wetlands and their conversion to transportation corridor. These impacts result in moderate, adverse, long and short-term effects on wetlands. However construction of any of the action alternatives and implementation of an operation plan for water flows creates the potential for increased flows to the ENP, and provides an opportunity for the improvement of the wetland communities located to the south of Tamiami Trail. The intent of past, present, and future actions has been to restore the hydrology of the Everglades ecosystem so that degraded wetlands could recover. MWD and CERP projects are being implemented as an incremental part of total Everglades restoration plan that has wetland restoration as a main goal. Though the action alternatives of the proposed project has localized adverse effects on wetlands, the proposed project in conjunction with other related actions in other areas is expected to have overall long-term beneficial cumulative effects on wetlands.

Conclusion. The implementation of the action alternatives (1-6e) would result in moderate, adverse, short-term, localized effects to wetlands associated with construction of temporary work areas. Additionally, implementation of the action alternatives would result in moderate, adverse, long-term, localized effects to wetlands associated with permanent filling of wetlands in conjunction with raising the crown of Tamiami Trail and construction of bridges. At present an operational plan for manipulation of water levels in the L-29 Canal is being developed; however, since it has not been completed, it is not reviewed under this EIS. Full realization of project benefits is dependent upon an operational plan that utilizes the structural capacity of the preferred alternative. Potential benefits that would occur once an operational plan is defined and executed include enhancement of degraded wetland habitats within the Northeast Shark River Slough system. It is highly likely that implementation of the preferred bridging alternative in conjunction with the operational plan is self-mitigating, and that permanent and temporary wetland impacts associated with the construction of the proposed project would be offset by the enhancement to wetlands attributed to operation of the completed Tamiami Trail Modification: Next Steps project. However, long-term effects to wetlands resulting from operations remain unknown, since an operational plan has not yet been developed for the project alternatives. Since there is uncertainty as to the level of wetland improvements that would be achieved with the operation of the project, an off-site mitigation plan would be implemented should anticipated project benefits not adequately offset the project's impacts to wetland value and functions. Potential off-site mitigation scenarios may include purchase of mitigation bank credits at Hole-in-the-Donut Mitigation Bank (ENP) or performing mitigation elsewhere on Park property. Wetland impacts would be mitigated, thus, there would be no impairment of wetland values and functions as a result of implementation of any of the action alternatives.

4.3.4 Floodplains

4.3.4.1 Guiding Regulations and Policies

Procedural Manual #77-2: Floodplain Management establishes the NPS procedures for implementing floodplain protection and management actions in units of the National Park System as required by Executive Order 11988, "Floodplain Management," and Director's Order #77-2, "Floodplain Management." It is NPS policy to preserve floodplain values and minimize potentially hazardous conditions associated with flooding. To implement NPS floodplain policy, proposed actions are classified into one of three action classes. Depending upon the action class, one of three "regulatory floodplains" applies (100-year, 500-year, or Extreme). If a proposed action is found to be in an applicable regulatory floodplain and relocating the action to a non-floodplain site is considered not to be a viable alternative, then flood conditions and associated hazards must be quantified as a basis for management decision making and a



formal Statement of Findings (SOF) must be prepared, which describes the rationale for selection of a floodplain site, discloses the amount of risk associated with the chosen site, and explains flood mitigation plans. Since the project is located within a mapped floodplain, a Statement of Findings (SOF) in accordance with procedures described in *Procedural Manual 77-2: Floodplain Management*, has been prepared (see **Appendix D**).

NPS *Management Policies 2006* specifically addresses floodplains in Section 4.6.4. The policy states:

In managing floodplains on park lands, the National Park Service will (1) manage for the preservation of floodplain values; (2) minimize potentially hazardous conditions associated with flooding; and (3) comply with the NPS Organic Act and all other federal laws and executive orders related to the management of activities in flood-prone areas, including Executive Order 11988 (Floodplain Management), the National Environmental Policy Act, applicable provisions of the Clean Water Act, and the Rivers and Harbors Appropriation Act of 1899. Specifically, the Service will

- *Protect, preserve, and restore the natural resources and functions of floodplains;*
- *Avoid the long- and short-term environmental effects associated with the occupancy and modification of floodplains; and*
- *Avoid direct and indirect support of floodplain development and actions that could adversely affect the natural resources and functions of floodplains or increase flood risks.*

When it is not practicable to locate or relocate development or inappropriate human activities to a site outside and not affecting the floodplain, the Service will

- *Prepare and approve a Statement of Findings, in accordance with procedures described in Director's Order 77-2 (Floodplain Management);*
- *Use nonstructural measures as much as practicable to reduce hazards to human life and property while minimizing the impact to the natural resources of floodplains;*
- *Ensure that structures and facilities are designed to be consistent with the intent of the standards and criteria of the National Flood Insurance Program (44 CFR Part 60).*

4.3.4.2 Assumptions, Methodology and Impact Thresholds

Impact thresholds for floodplain impacts are based on size of impact, length of effect, and area effected.

Negligible: Floodplains would not be affected; effects would either be non-detectable, or, if detected, would be considered slight, local, and would likely be short-term. A U.S. Army Corps of Engineers 404 permit would not be necessary.

Minor: Effects on floodplains would be measurable, although the effects would likely be small, short-term, and localized. No mitigation measures associated with water quality or hydrology would be necessary. A U.S. Army Corps of Engineers 404 permit would not be necessary.



Moderate: Effects on floodplains would be measurable and long-term but would be relatively localized. Mitigation could be required and if implemented, would likely be successful. A U.S. Army Corps of Engineers 404 permit could be required.

Major: Effects on floodplains would be readily measurable, would have substantial consequences, and would be observable over a relatively large area and likely long-term. The character of the floodplain would be changed so that the functions typically provided by the floodplain would be substantially changed. Mitigation would be required and its success could not be assured. A U.S. Army Corps of Engineers 404 permit would be required.

Analysis area: The area of analysis for floodplains is the 10.7-mile project corridor including the 50-foot right of way.

4.3.4.3 Impacts of the Alternatives

No-Action Alternative

Analysis. If the No-Action Alternative is selected as the preferred alternative, there would be no additional direct or indirect short- or long-term impacts on floodplains other than those already realized from construction of the 2008 LRR/EA preferred alternative (1-mile eastern bridge). The current unnatural altered hydrologic conditions within the vicinity of the project area would continue to have a negative impact on floodplain functions and values within the WCAs, Everglades National Park, and Northeast Shark River Slough.

Cumulative Impacts. Related actions such as the decompartmentalization of WCA-3 will lead to removal of impediments to flow which will benefit floodplain value and functions. The No-Action Alternative will have no effect on floodplains, however other past, present, and foreseeable future actions in the Everglades region will have a long-term beneficial cumulative effect on floodplains.

Conclusion. No short- or long-term adverse or beneficial effects to floodplains would result from the selection of the No-Action Alternative. Consequently, there would be no impairment to floodplain functions and values as a result of the No-Action Alternative.

Action Alternatives

Analysis. Action Alternatives 1, 4, and 5 provide for additional restoration of floodplain values and functions by bridging an additional 1 to 2.2 miles of floodplain when compared to the No-Action Alternative. The additional capacity to convey storm and flood events allowed by these bridging options would allow for enhanced hydrology and improved function of floodplain values and functions. Implementation of these alternatives is expected to have long-term beneficial effects to the values and functions of the floodplain.

Action Alternatives 2a and 6e provide for the highest restoration of floodplain values and functions compared to the other alternatives based on the amount of bridging associated with these two alternatives. The preferred alternative, 6e, provides for most bridging of all alternatives, 5.5 miles of additional bridging compared to the No-Action Alternative. Implementation of alternatives 2a and 6e can be expected to provide long-term beneficial effects to the values and functions of floodplains. Under current conditions water flows from large storm events are prevented from quickly flowing to tide by the damming effect of Tamiami Trail. This situation causes regional high water conditions in the upstream Water Conservation Areas until flows can bleed down through the Tamiami Trail culvert sets. Openings created by bridge crossings will allow flows to be released immediately thus allowing regional water levels to recover quickly after storm events.



It is anticipated that construction of all alternatives will have short-term negative impacts associated with project construction, due to placement of temporary fill, and changes in the existing duration, timing, and delivery of storm and flood events because of temporary rerouting of water flows. However, bridging of floodplain/wetlands will have a beneficial effect on floodplain values and functions in the long term.

The *Second Report and Initial Recommendations* published by the Miami-Dade CCATF states that global warming would result in many changes to the natural environment, “including changing atmospheric circulation and temperature patterns, changes in rainfall and severe weather, changes in biologic community distribution, increased extinction rates, changes in disease and pest distribution, and changes in sea level” (CCATF, 2008). All these environmental impacts would affect South Florida, Everglades National Park, and the project area within the next century, with the key concern for the low topography project area being rising sea level, “with a very high likelihood” that the sea level would rise an additional 1.5 feet in the next 50 years and a cumulative total of three to five feet within a century (CCATF, 2008). Floodplains would be impacted by the intrusion of saltwater into interior freshwater marshes as conveyance of storm and flood events to tide would be reduced as freshwater flow is impeded by increasing tidal gradients in southern portions of ENP.

Finally, since the project is located within a mapped floodplain, a Statement of Findings (SOF) in accordance with procedures described in *Procedural Manual 77-2: Floodplain Management*, has been prepared (see **Appendix D**).

Cumulative Impacts. The intent of future projects such as the Decentralization of WCA-3 will be to remove impediments to flow which will benefit floodplain values and functions. While the implementation of the action alternatives (1-6e) will have short-term adverse impacts associated with project construction, it is offset by the long term benefit realized by the removal of portions of the roadway which were major restrictions to floodplain function. The action alternatives in combination with present and foreseeable future actions will have long-term beneficial cumulative effects on floodplains.

Conclusion. All action alternatives (1-6e) would have a short-term, adverse, minor, localized effect on floodplain values and functions associated with project construction including diminished ability of the floodplain to convey storm and flood events due to temporary fill and rerouting of water flow. However, action alternatives 2a and 6e would have a long-term beneficial effects associated with restoration of water flow while action alternatives 1, 4, and 5 would have a long-term beneficial effect based on the additional capacity the floodplain would have to convey storm and flood events, therefore no impairment of floodplain functions is anticipated by implementation of any of the action alternatives.

4.4 Wildlife and Vegetation / Habitat

4.4.1 Guiding Regulations and Policies

The NPS Organic Act of 1916 and the NPS *Management Policies 2006* (NPS 2006b) direct parks to provide for the protection of park resources. The NPS *Management Policies 2006* state that “the Service would not attempt to solely preserve individual species (except threatened or endangered species) or individual natural processes; rather, it would try to maintain all the components and processes of naturally evolving park ecosystems, including the natural abundance, diversity, and genetic and ecological integrity of the plant and animal species native to those ecosystems. Just as all components of a natural system would be recognized as important, natural change would also be recognized as an integral part of the functioning of natural systems.”



4.4.2 Assumptions, Methodology and Impact Thresholds

Maps showing vegetation cover in the Tamiami Trail project area and communications with NPS staff were used to identify baseline conditions for wildlife, wildlife habitat, and vegetation. Available information was also taken from other NPS and non-NPS resources to describe these resources in more detail.

In general, it was assumed that there would be impacts to wildlife and wildlife habitat that occur from the construction phase of the action alternatives, as well as post-construction effects. The primary steps taken in assessing impacts on wildlife and wildlife habitat (including vegetation) included determining:

1. Which species are found in areas likely to be affected by management actions described in the alternatives;
2. Habitat/vegetation loss or alteration caused by the alternatives; and
3. Displacement and disturbance potential of the actions and the species' potential to be affected by construction or future use and management activities.

The thresholds for the intensity of an impact are defined as follows:

Negligible: There would be no observable or measurable impacts to native species, their habitats, or the natural processes sustaining them. Impacts would be well within natural fluctuations.

Minor: A change in effects on wildlife and habitats would be localized within a small area. The change would be measurable or perceptible in terms of abundance, distribution, quantity, or quality of populations. While the mortality of individual animals might occur, the viability of wildlife populations would not be affected and the community, if left alone, would recover. Impacts would be detectable and are expected to be outside the natural range of variability.

Moderate: A change in effects on wildlife and habitats would occur over a relatively large area. The change would be readily measurable in terms of abundance, distribution, quantity, or quality of populations. Impacts on native species, their habitats, or the natural processes sustaining them would be detectable, and would be outside the natural range of variability. Disruptions to key ecosystem processes that would be outside natural variation might occur, but the ecosystem would soon return to natural conditions. Mitigation measures would probably be necessary to compensate for adverse effects and would likely be successful.

Major: A change in effects on wildlife and habitats would be readily apparent, and would substantially change wildlife populations over a large area in and out of the park. Impacts on native species, their habitats, or the natural processes sustaining them would be detectable, and would be expected to be outside the natural range of variability or be permanent. Key ecosystem processes might be disrupted. Loss of habitat might affect the viability of at least some native species. Extensive mitigation would be needed to compensate for adverse effects, and its success would not be assured.

Analysis area: The focus of this analysis is the area that would be directly affected by the proposed actions, primarily the project footprint plus 50 foot easements; however, impacts to wildlife in the greater project area (Everglades) are also discussed.



4.4.3 Impacts of the Alternatives

No-Action Alternative

Analysis. If the No-Action Alternative is selected as the preferred alternative, there would be no additional direct or indirect short- or long-term impacts on wildlife or vegetation/habitats other than those already realized from construction of the 2008 LRR/EA preferred alternative (1-mile eastern bridge). The current unnatural altered hydrologic conditions within the vicinity of the project area would continue to have a negative impact on wildlife habitat and vegetation in Everglades National Park, and Northeast Shark River Slough and movement of wildlife between Northeast Shark River Slough and the WCAs would continue to be hindered by the presence of Tamiami Trail.

Cumulative Impacts. Related actions in the vicinity of the proposed project would lead to improved wildlife habitat and increased ecological connectivity. The Decompartmentalization of WCA-3 will remove the L-29 levee and allow the return of the ridge and slough ecosystem to areas north of Tamiami Trail while increasing connectivity to areas to the south. While the No-Action Alternative offers no significant improvement to wildlife habitat the cumulative effects to wildlife associated with the related projects in region is long-term and beneficial.

Conclusion. No short- or long-term adverse or beneficial effects to wildlife and vegetation/habitats would result from the selection of the No-Action Alternative. Consequently, there would be no impairment to wildlife and vegetation/habitats as a result of the No-Action Alternative.

Action Alternatives

Analysis. In the areas directly adjacent to the proposed project area, the noise associated with construction, and the presence of construction personnel would temporarily disperse wildlife to adjacent habitats although it is unlikely that changes to community or population dynamics would occur.

Erosion, sedimentation, and petroleum spills from equipment have the potential to lead turbidity, decreasing dissolved oxygen levels, and pollution in surface waters that could adversely affect fish and amphibians that utilize surface waters in the project area. However, pre and post construction erosion control BMPs would minimize impacts, including the installation and inspection of silt fences, hay bale barriers, sediment traps, or other equivalent measures; and the revegetation of disturbed measures

The implementation of the action alternatives would also result in a negligible adverse effect due to loss of useable habitat by wildlife. It is anticipated that the project would result in the loss of resting, shelter, and foraging habitat for mammals. Amphibians and reptiles would incur habitat loss as culvert sets and the associated deep water holes are replaced by bridges. Additionally wading bird nesting, loafing, roosting, and foraging habitat would be lost as a result of project implementation. At present, wading birds including great blue herons, snowy egrets, tricolored herons, and white ibis nest within the existing wood stork rookeries. Impact of the action alternatives would have minor affect on wading birds because of impacts to nesting areas. Based on the small scale of the project impacts compared to the overall available habitat in the project area it is estimated that habitat losses resulting from implementation of any action alternative (1-6e) is negligible for mammals and amphibians.

All action alternatives would result in an increase in ecological connectivity. The ability for wildlife to move between habitat components is crucial for maintaining wildlife population health and diversity. Tamiami Trail has long represented a barrier to wildlife movement to the north and south and the construction of bridges would provide much improved access for species to move



between habitats in the WCAs and Northeast Shark River Slough. The deaths of small animals from collision with vehicles would continue to occur in the sections of Tamiami Trail that would be connected to the adjacent marsh and canal. The mortality would not occur in the bridged sections because there would be no connection between the road surface and the marsh and canal habitat of the animals. The animals would not easily reach the road surface in these sections and be at risk of being hit. However, because the L-29 canal and levee are not eliminated and because conditions may be artificially deep under the bridge, limited bridging (as in Alternatives 4 and 5) may simply redirect animals to cross at other sections of the unbridged Tamiami Trail. A short bridge would only result in a small reduction in mortality while a bridge that spans a long stretch of the project area would produce the maximum value of deaths per year avoided. Section 1.2.4.5 of this EIS provides greater detail on the development of performance measures and the procedures for calculating reduction in wildlife mortality. Alternative 6e would provide the most benefit for wildlife moving north or south in the Tamiami Trail area. Alternatives 1 and 2a provide a moderate improvement over the No-Action alternative, while Alternatives 4 and 5 provide only a minimal improvement.

Steps would be taken to minimize the introduction of non-native plant species, which would affect the makeup of wildlife habitat, during and after construction. This would include initiating revegetation of disturbed areas immediately after construction, salvaging native vegetation from the project area, limiting the amount of topsoil imported for revegetation, using seeds from native species revegetation, and implementing exotic species control as necessary.

Full realization of project benefits is dependent upon an operational plan for water levels in the L-29 Canal that utilizes the structural capacity of the alternatives. Potential benefits that would occur once an operational plan is defined and executed include enhancement of degraded wetland habitats within the Northeast Shark River Slough system which in turn would lead to overall improvements in the quality of wildlife habitats in the vicinity of the project area. However, since an operational plan has not been developed for the project alternatives, anticipated benefits to wildlife habitats as a result of full implementation of an operational plan and structural improvements (the action alternatives) can not be analyzed at this time.

The *Second Report and Initial Recommendations* published by the Miami-Dade CCATF states that global warming would result in many changes to the natural environment, “including changing atmospheric circulation and temperature patterns, changes in rainfall and severe weather, changes in biologic community distribution, increased extinction rates, changes in disease and pest distribution, and changes in sea level” (CCATF, 2008). All these environmental impacts would affect South Florida, Everglades National Park, and the project area within the next century, with the key concern for the low topography project area being rising sea level, “with a very high likelihood” that the sea level would rise an additional 1.5 feet in the next 50 years and a cumulative total of three to five feet within a century (CCATF, 2008). Wildlife and vegetation would be impacted by increasing saltwater intrusion into interior freshwater wetlands. This impact would cause dramatic changes in vegetation type and would lead to shifts in wildlife habitat forcing wildlife to seek areas where appropriate habitat was still available.

Cumulative Impacts. Related actions in the vicinity of the proposed project would lead to improved wildlife habitat and increased ecological connectivity. The Decompartmentalization of WCA-3 will remove the L-29 levee and allow the return of the ridge and slough ecosystem to areas north of Tamiami Trail while increasing connectivity to areas to the south. While all action alternatives (1-6e) result in short-term adverse effects to wildlife as a result of construction activities and loss of habitat, the increased connectivity provided by the project compensates for these negligible to minor adverse effects. Cumulative effects to wildlife associated with the



action alternatives of the proposed project in conjunction with related projects in other areas are long-term and beneficial.

Conclusion. Short-term negligible to minor, adverse, localized effects to wildlife and vegetation/habitats would result from the construction of the action alternatives (Alternatives 1-6e). Long-term beneficial effects to wildlife and habitat would result from the increased ecological connectivity provided through the implementation of all action alternatives. Consequently, there would be no impairment of wildlife and habitat as a result of the action alternatives.

4.5 Land Use

4.5.1 Guiding Regulations and Policies

NPS *Management Policies 2006* (Section 3, Land Protection) states that “the National Park Service would use all available authorities to protect lands and resources within units of the national park system, and the Park Service would seek to acquire nonfederal lands and interests in land that have been identified for acquisition as promptly as possible. For lands not in federal ownership, both those that have been identified for acquisition and other non federally owned lands within a park unit’s authorized boundaries, the Service would cooperate with federal agencies; tribal, state, and local governments; nonprofit organizations; and property owners to provide appropriate protection measures. Cooperation with these entities would also be pursued, and other available land protection tools would be employed when threats to resources originate outside boundaries”.

4.5.2 Assumptions, Methodology and Impact Thresholds

Maps showing land use in the Tamiami Trail project area and communications with NPS staff were used to identify land use in the project area. Available information was also taken from other NPS and non-NPS resources to describe these resources in more detail.

The thresholds for the intensity of an impact are defined as follows:

Negligible: Land use in the form of construction of facilities and/or location or introduction of recreational or other activities in all cases conforms to the existing area land uses, any existing city or county zoning, and existing easements, licenses, rights-of-way, and leases.

Minor: Land use in the form of construction of facilities and/or location or introduction of recreational or other activities generally conforms to the existing area land uses, any existing city or county zoning, and generally honors existing easements, licenses, rights-of-way, and leases. Nonconforming uses or activities can be easily mitigated to bring them into conformance.

Moderate: Land use in the form of construction of facilities and/or location or introduction of recreational or other activities generally conforms to the existing area land uses, any existing city or county zoning, and generally honors existing easements, licenses, rights-of-way, and leases. Nonconforming uses or activities can be mitigated to bring them into conformance; however, such mitigation is difficult and expensive and may result in substantial changes to the proposal.

Major: Land use in the form of construction of facilities and/or location or introduction of recreational or other activities does not conform to the existing area land uses, any existing city or county zoning, and/or honors all existing easements, licenses, rights-of-way, and leases, and constitutes a conflicting use. Mitigation measures cannot be implemented to change the level of conformance.



Analysis area: The focus of this analysis is the area that would be directly affected by the proposed actions, primarily the project footprint plus 50 foot easements.

4.5.3 Impacts of the Alternatives

No-Action Alternative

Analysis. If the No-Action Alternative is selected as the preferred alternative, there would be no additional direct or indirect short- or long-term impacts on land use other than those already realized from construction of the 2008 LRR/EA preferred alternative (1-mile eastern bridge). The current land uses along the project corridor consisting of a mix of commercial, communication, development, and wetland uses would remain unchanged.

Cumulative Impacts. The consequence of certain CERP and ROG related actions is to change land use from agricultural related activities to surface waters for water treatment or wetland habitats. While this change of land use has negative connotation in terms of lost jobs and tax base, the change of use is consistent with general land use of the area, which is former wetlands, and consistent with local policies and plans. The No-Action Alternative maintains a status quo in the project area and in combination with other related actions in the vicinity of the project area will have a negligible long-term cumulative effect on land use.

Conclusion. No short- or long-term adverse or beneficial effects to land use would result from the selection of the No-Action Alternative. Consequently, there would be no impairment of land use as a result of the No-Action Alternative.

Action Alternatives

Analysis. Existing land use along the project area includes transportation corridor, commercial, communication, general development, and wetlands. **Table 4-4** shows the acres of each land use that would be converted to Tamiami Trail transportation corridor associated with the implementation of each action alternative.

Table 4-4 – Acres of Land Use Converted to Transportation Corridor

Land Use	Alternative 1	Alternative 2a	Alternative 4	Alternative 5	Alternative 6e
Commercial	0.21	0.21	0.21	0.21	0.23
Communications	0.76	0.76	0.30	0.76	0.52
Development	0.33	0.33	0.33	0.33	0.54
Freshwater Marsh	19.44	21.56	16.63	17.39	17.15
Grass/Bare Ground	2.89	2.92	2.86	2.88	3.07
Mixed Wetland Hardwood/Shrub	24.15	27.70	20.62	21.99	29.31
Sawgrass Marsh	11.07	11.07	8.13	9.10	11.77
Road	0.75	0.76	0.70	0.71	0.82
Pond	0.75	0.80	0.66	0.70	0.99
Totals	60.35	66.11	50.44	54.07	64.4



Approximately 91% of all land use conversion resulting from implementation of the project action alternatives (1-6e) is conversion of wetlands to transportation corridor. Impacts resulting from this conversion are discussed in detail in Section 4.3.3 (Wetlands). Conversion of commercial and developed land uses combined represents approximately 1% of all converted land uses across all action alternatives. Additionally, conversion of the communications land use for Alternatives 1, 2a, and 5 represents approximately 1% of all converted land uses while Alternatives 4 and 6e represent conversion of less than 1% of all converted land uses across all action alternatives.

Commercial and developed land use categories can experience short-term adverse impacts due to conversion activities. These include entrances that can be blocked by construction activities, and noise and fugitive dust generated by the construction activities. Construction activities may dissuade customers from visiting a commercial business operation or reduce the enjoyment of customers utilizing the business site. Long-term adverse impacts are associated with the loss of commercial or developed land uses to transportation corridor, however these impacts are minor given the small acreages that are involved.

Cumulative Impacts. The consequence of certain CERP and ROG related actions is to change land use from agricultural related activities to surface waters for water treatment or wetland habitats. While this change of land use has negative connotation in terms of lost jobs and tax base, the change of use is consistent with general land use of the area, which is former wetlands, and consistent with local policies and plans. The action alternatives (1-6e) of the proposed project would result in the change of wetland and commercial business land uses to transportation corridor. This change of land use will have a minor, adverse, short and long-term adverse effect on land use within the project area. The action alternatives in combination with other related actions in the vicinity of the project area will have a negligible long-term cumulative effects on land use.

Conclusion. Implementation of all action alternatives would have a minor, short-term, localized, adverse, effect associated with project construction and a long-term, localized, adverse, minor effect on land use in association with the conversion of existing land uses to transportation corridor.

4.6 Special Status Species

4.6.1 Guiding Regulations and Policies

The primary regulation governing this topic is the Endangered Species Act (ESA), 16 USC § 1531-1543.

The purpose of the ESA is to conserve “the ecosystem upon which endangered and threatened species depend” and to conserve and recover listed species. The ESA is a comprehensive wildlife conservation law administered by the Department of Interior’s U.S. Fish and Wildlife Service and the National Oceanic and Atmospheric Administration-Fisheries. This act mandates that all federal agencies protect listed species and preserve their habitats.

The state of Florida also has regulations for the protection of threatened and endangered species. The Florida Endangered and Threatened Species Act (Title 28, Florida Statutes, Natural Resources Conservation, Reclamation, and Use, Chapter 372, Wildlife, Section 372.072) is the primary regulation in the state, and sets the policy to conserve and wisely manage these resources, as well as provide for research and management to conserve and protect these species as a natural resource. This act also emphasizes coordination with other



state agencies, and outlines annual reporting requirements as well the development of specific biological goals for manatees.

The Endangered Species Protection Act (Florida Statutes Section 372.0725) prohibits the intentional wounding or killing of any fish or wildlife species designated by the Florida Game and Freshwater Fish Commission as “endangered”, “threatened” or of “special concern”. This prohibition also extends to the intentional destruction of the nests or eggs of any such species.

The protection of endangered, threatened, or “commercially exploited” plants is addressed in the Preservation of Native Flora of Florida Act (Florida Statutes Section 581.185). Commercially exploited plants are defined as species native to the state which are subject to being removed in substantial numbers from native habitats in the state and sold or transported for sale. This act sets the policy for the state of Florida relating to these species, and includes several prohibitions covering the “willful destroying or harvesting” of such plants. It also contains an exemption for agricultural and silviculture uses.

Section 4.4.2.3 of the NPS *Management Policies 2006* provides specific guidance for management of threatened or endangered plants and animals. These policies dictate that the NPS would survey for, protect, and strive to recover all species native to national park system units that are listed under the Endangered Species Act. The NPS would fully meet its obligations under the NPS Organic Act and the Endangered Species Act to both proactively conserve listed species and prevent detrimental effects on these species. This section also states that the National Park Service would inventory, monitor, and manage state and locally listed species in a manner similar to its treatment of federally listed species to the greatest extent possible. In addition, the Service would inventory other native species that are of special management concern to parks (such as rare, declining, sensitive, or unique species and their habitats) and would manage them to maintain their natural distribution and abundance.

4.6.2 Assumptions, Methodology and Impact Thresholds

The USFWS and NOAA-NMFS guidance for implementing Section 7 consultation under the Endangered Species Act uses the following terminology to assess impacts to listed species¹⁴ :

“No Effect” – This conclusion is reached if the proposed action and its interrelated and interdependent actions will not directly or indirectly affect listed species or destroy/adversely modify designated critical habitat. Formal section 7 consultation is not required when the no effect conclusion is reached. However, a request for the optional written concurrence is encouraged to facilitate a complete administrative record.

“May Affect, but is not likely to adversely affect” – This conclusion is appropriate when effects to the species or critical habitat are expected to be beneficial, discountable, or insignificant. Beneficial effects are contemporaneous positive effects without any adverse effects to the species or habitat. Insignificant effects relate to the size of the impact (and should never reach the scale where take occurs), while discountable effects are those that are extremely unlikely to occur. Based on best judgment, a person would not: (1) be able to meaningfully measure, detect, or evaluate insignificant effects; or (2) expect discountable effects to occur. If the project scientist making the determination and the project manager agree that the project “is not likely to adversely affect” listed species or critical habitat, the intra-Service section 7 consultation process is completed. If formal section 7 consultation is required

¹⁴ U.S. Fish and Wildlife Service and National Marine Fisheries Service. 1998. Endangered Species Consultation Handbook, Procedures for Conducting Consultation and Conference Activities Under Section 7 of the Endangered Species Act.



for other species affected by this proposed action, then it may be easier and less confusing to fold the "is not likely to adversely effect" concurrence into the formal section 7 consultation rather than doing a separate concurrence.

“May affect, and is likely to adversely affect” – This conclusion is reached if any adverse effect to listed species or critical habitat may occur as a direct or indirect result of the proposed Service action or its interrelated or interdependent actions, and the effect is not discountable or insignificant (see definition of "is not likely to adversely affect". In the event the overall effect of the proposed action is beneficial to the listed species or critical habitat, but may also cause some adverse effect on individuals of the listed species or segments of the critical habitat, then the determination should be "is likely to adversely affect." Such a determination requires formal section 7 consultation.

Based on these impact levels, the thresholds for threatened and endangered species are as follows:

Negligible: There would be no observable or measurable impacts to federally-listed species, their habitats, or the natural processes sustaining them in the proposed project area. This impact intensity would equate to a determination of “no effect” under Section 7 of the Endangered Species Act.

Minor: Individuals may temporarily avoid areas. Impacts would not affect critical periods (e.g., breeding, nesting, denning, feeding, resting) or habitat. This impact intensity would equate to a determination of “not likely to adversely affect” under Section 7 of the Endangered Species Act.

Moderate: Individuals may be impacted by disturbances that interfere with critical periods (e.g., breeding, nesting, denning, feeding, resting) or habitat; however, the level of impact would not result in a physical injury, mortality, or extirpation from the park. This impact intensity would equate to a determination of “likely to adversely affect” under Section 7 of the Endangered Species Act.

Major: Individuals may suffer physical injury or mortality or populations may be extirpated from the park. This impact intensity would equate to a determination of “likely to adversely affect” under Section 7 of the Endangered Species Act.

4.6.3 Impacts of the Alternatives

All species of special concern would benefit from improved hydrologic conditions and ecological connectivity. Species populations would require a few seasons to respond to the changed hydrology and vegetation. In the long-term, implementation of any alternative would result in beneficial effects to species of special concern.

No-Action Alternative

Analysis. If the No-Action Alternative is selected as the preferred alternative, there would be no additional direct or indirect short- or long-term impacts to special status species other than those already realized from construction of the 2008 LRR/EA preferred alternative (1-mile eastern bridge). The current unnatural altered hydrologic conditions within the vicinity of the project area would continue to have a negative impact on special status species within Everglades National Park and Northeast Shark River Slough.

Cumulative Impacts. On-going and future projects are expected to provide some degree of restoration of habitat benefits including, restoration of more natural sheet flows to the Northeast Shark River Slough and improved hydrology in other portions of the Everglades which would improve special status species habitats. While the No-Action Alternative offers no improvement



to habitat of special status species other related projects in the area will improve special species habitats would have beneficial long-term cumulative effects on special status species.

Conclusion. No short- or long-term adverse or beneficial effects to special status species would result from the selection of the No-Action Alternative. Consequently, there would be no impairment to special status species as a result of the No-Action Alternative.

Action Alternatives

Analysis.

Florida Panther

According to radio collar telemetry data, no Florida panther activity has been recorded in the project area in the past six years. The status and activities of uncollared panthers is unknown (USFWS 2008). Under the recent USFWS panther consultation protocols, any loss of habitat greater than five acres in the primary habitat zone must undergo formal consultation. The primary habitat zone for the panther extends north through Northeast Shark River Slough to the southern edge of Tamiami Trail. A linear strip of native and exotic woody vegetation would be removed along the highway for construction of the transition roadways and the bridges. Therefore, because of the impacts to this strip of vegetation formal USFWS consultation under Section 7 of the ESA would be necessary to assess the effects of habitat loss associated with implementation of any of the action alternatives (Alternatives 1 through 6e). However, the USFWS considers this to be low quality potential panther habitat and habitat for panther prey species due to proximity of the highway and the fact that preferred panther habitat is pine and saw palmetto dominated uplands.

Beneficial effects to the Florida panther would be realized with the implementation of any of the action alternatives through increased habitat connectivity and reduced habitat fragmentation. Implementation of any of the action alternatives would link primary panther habitat in Northeast Shark River Slough to secondary habitat in WCA-3B via passage underneath bridges. Panther-vehicle collisions on busy roadway such as Tamiami Trail are a significant source of mortality and pose an on-going threat (USFWS, 2008). Since all of the action alternatives include some type and length of bridging which would allow panthers to traverse under Tamiami Trail, this threat of panther-vehicle collisions would be greatly reduced with the implementation of any of the action alternatives.

Due to the lack of recent panther activity within the project area, the small size and poor quality of panther habitat proposed to be impacted, and the increased habitat connectivity provided by the bridging proposed under any of the action alternatives, additional mitigation for loss of panther habitat is not expected to be required for this project. Project mitigation for loss of wetland habitat in general is addressed in the discussion of wetland impacts and mitigation in Section 4.3.3.3. Additionally, in conjunction with the implementation of any of the action alternatives, all project construction personnel would be provided with environmental training with the intent of reducing impacts on special status species such as the Florida panther.

Therefore, because of the lack of recent panther activity, the small size and poor quality of panther habitat proposed to be impacted, and the increased habitat connectivity provided by the bridging proposed under any of the action alternatives, the implementation of any of the proposed action alternatives may affect, but are not likely to adversely affect the Florida panther.



West Indian Manatee

For the period of record of over 20 years, there has been only one record of a manatee utilizing the L-29 Canal adjacent to Tamiami Trail. Therefore, it is highly unlikely that a manatee would be encountered in the project area. However, manatee protection procedures will be followed during construction. There would be no activities that would occur in the canal during construction. Therefore, the implementation of any of the action alternatives may affect, but are not likely to adversely affect the West Indian manatee.

Snail Kite

Based on snail kite nesting data, the proposed project would impact currently designated USFWS snail kite Priority Management Zone habitat, however there will be no impacts to designated snail kite Critical Habitat.

Two nests previously used by snail kites have Priority Management Zones that fall within the project boundary. (refer to **Figure 3-31** in Chapter 3 for location of the nests). One nest, located in the western portion of the project area is in close enough proximity to the existing road to have both the Limited Activity Buffer Zone (1,640 feet) and the No-Entry Buffer Zone (500 feet) fall within the project boundary. The second nest, located in the eastern portion of the project area only has the Limited Activity Buffer Zone fall within the project boundary. Snail kites do not utilize these nests every year and these Priority Management Zones would only be in effect should snail kites utilize the nests. There have been no snail kite nests found within the construction footprint. It should be noted that the NPS will actively monitor snail kite nesting during the construction of the project and should the two existing nests be utilized or a new nesting site be found the USFWS snail kite management guidelines will be implemented. **Table 4-5** lists estimated impacts to snail kite Priority Management Zones for each action alternative should both existing nest sites be utilized at the same time.

Table 4-5 – Estimated Impacts to Snail Kite Priority Management Zones

Alternative	Temporary Priority Management Zone Impacts (acres)	Permanent Priority Management Zone Impacts (acres)
1	0.35	1.07
2a	0.35	1.07
4	0.35	1.07
5	0.35	1.07
6e	1.05	2.95

Due to the temporary impacts to snail kite priority management zone habitat short-term, minor, adverse, localized impacts to the snail kite would be expected with implementation of any of the proposed action alternatives should snail kites nest within 1,640 feet of the project area. However, short-term adverse impacts are expected to be limited to the timeframe of construction and snail kites would be expected to fully return to the areas of temporary impact following completion of construction activities.

Due to the permanent impacts to snail kite habitat, long-term, minor, adverse, localized impacts to the snail kite would be expected with implementation of any of the proposed action alternatives. However, during a February 2010 site visit by NPS personnel, no snail kites or apple snails were observed in the proposed project area. Additionally, per surveys conducted by NPS, it is rare to find native apple snail eggs in the location of the Old Tamiami Trail Canal adjacent to the proposed project area (personal communication, Jeffrey Kline, NPS, February



2010). Snail kite activity (nest construction and usage) will be monitored during all stages of construction and the USFWS *Draft Snail Kite Management Guidelines* (2006) will be followed during all phases of project construction. Therefore, the implementation of any of the proposed action alternatives may affect but are not likely to adversely affect the snail kite.

Eastern indigo snake

This species may be in the project area, although there are no known sightings. Because the indigo snake could potentially be found the area affected by construction activities, *Standard Protection Measures for the Eastern Indigo Snake* would be implemented during construction. The “Standard Construction Precautions for the Eastern Indigo Snake” would be adopted in the project design. It is concluded that any of the action alternatives may affect, but are not likely to adversely affect, the Eastern indigo snake.

Cape Sable Seaside Sparrow

A Federally endangered species, the Cape Sable seaside sparrow, occupies habitat that is susceptible to alterations in hydroperiods. Excessive discharges from the WCA's can flood sparrow nesting habitat, while lack of freshwater flows can lead to devastating fires that render marsh habitat unusable to the sparrow. As part of the USFWS 1999 BO regarding USACE water management practices, Reasonable and Prudent Alternatives (RPAs) were developed to “preclude jeopardy” to the Cape Sable seaside sparrow. A USFWS BO of November 17, 2006, evaluated additional RPAs and action alternatives for water management actions to avoid jeopardy to the Cape Sable seaside sparrow. All alternatives considered in this EIS would be capable of passing sufficient flow through their respective hydraulic openings to satisfy the RPAs of the 1999 and 2006 BOs for the Cape Sable seaside sparrow. The closest occupied Cape Sable seaside sparrow nest lies ten miles south of the project area. Construction activities would have no effect on this species. There is no designated critical habitat located within the project area, so none would be affected. Because construction and operation of the proposed project would have no direct affect on the Cape Sable seaside sparrow It is concluded that the action alternatives may affect, but are not likely to adversely affect, the Cape Sable seaside sparrow.

Wood Stork

There are three nesting wood stork colonies located in the vicinity of Tamiami Trail: the Tamiami West Colony and the Tamiami East Colony 1 and Tamiami East Colony 2. The USFWS has applied the *Habitat Management Guidelines for the Wood Stork in the Southeast Region* (Ogden, 1990) to designate primary and secondary management zones for the colonies. The primary zone is the most critical area and must be managed according to recommended guidelines to insure the colony's survival. Restrictions in the secondary zone are needed to minimize disturbances that might impact the primary zone, and to protect essential areas outside of the primary zone. The USFWS has designated the primary zone for the Tamiami West Colony as the distance of 1,300 feet extended in all directions from the core area of the colony; the secondary zone includes the area between the 1,300 and 2,500 foot radii. The primary zone of the Tamiami East Colony extends 1,000 feet from the center of the colony; the secondary zone is the area between 1,000 feet and 2,000 feet from the colony center. The existing Tamiami Trail runs through about 3,700 feet of the primary zone and 2,050 feet of the secondary zone of the Tamiami West Colony. Approximately 3,000 feet of the highway lies in the secondary zone of the East Colony. Highway construction would occur within these respective zones. All action alternatives (1-6e) would involve construction activities within the secondary management zone of the Tamiami East Colony. Impacts to the Tamiami West Colony include direct temporary impacts to the core area of the colony itself associated with



Alternatives 2a and 6e (see **Table 4-6**). Temporary and permanent impacts to the primary and secondary zones of the Tamiami West Colony resulting from project construction are also greatest with implementation of Alternatives 2a and 6e.

Direct impacts within the secondary zones could impact wood stork foraging and loafing habitat, while impacts within the primary zone could impact wood stork nesting and fledging behaviors. Impacts to the core rookery area could reduce the amount of available nesting habitat and disturb nesting activity. Filling of wetlands within the project area also reduces foraging habitat within the 18.6-mile core foraging area (CFA) for the two rookeries.

Table 4-6 –Estimated Impacts to Tamiami Trail Wood Stork Colonies

Tamiami East Colony						
Alternative	Temporary Nesting Colony Impacts (Acres)	Permanent Nesting Colony Impacts (Acres)	Temporary Primary Management Zone Impacts (Acres)	Permanent Primary Management Zone Impacts (Acres)	Temporary Secondary Management Zone Impacts (Acres)	Permanent Secondary Management Zone Impacts (Acres)
1	0.00	0.00	0.00	0.00	0.73	2.16
2a	0.00	0.00	0.00	0.00	0.73	2.16
4	0.00	0.00	0.00	0.00	0.73	2.16
5	0.00	0.00	0.00	0.00	0.73	2.16
6e	0.00	0.00	0.00	0.00	3.03	4.16
Tamiami West Colony						
Alternative	Temporary Nesting Colony Impacts (Acres)	Permanent Nesting Colony Impacts (Acres)	Temporary Primary Management Zone Impacts (Acres)	Permanent Primary Management Zone Impacts (Acres)	Temporary Secondary Management Zone Impacts (Acres)	Permanent Secondary Management Zone Impacts (Acres)
1	0.00	0.00	0.84	3.43	1.06	1.44
2a	0.14	0.00	2.69	5.20	1.89	2.33
4	0.00	0.00	0.84	2.53	0.24	0.70
5	0.00	0.00	0.84	2.53	0.24	0.70
6e	0.06	0.00	4.24	4.27	1.99	2.05

In order to minimize impact to wood storks the following guidelines would be implemented during project construction:

- **Primary Zone:** From onset of nesting activity through the onset of the rainy season (or when the young have fledged), highway construction (e.g., heavy human/equipment activity, pile driving, blasting) should not be permitted in the reach of the highway affected by that alternative. Woodstork activity will be monitored by the NPS through Systematic Reconnaissance Flights (SRF).
- **Secondary Zone:** No unauthorized human activity (on foot, airboat, or off-road vehicle) should occur at any time of the year within the reach of highway affected by that alternative on the south side of the highway and particularly during the nesting season.



- **Length of Restrictions:** These restrictions shall remain in effect during the construction phase of the Tamiami Trail project.
- **Qualified Observer:** Subject to the approval of the USFWS, FFWCC, and NPS, a qualified observer(s) shall be stationed onsite during the construction phase of the Tamiami Trail project. The observer shall monitor wood stork activity and shall notify USFWS, FFWCC and the NPS if wood stork behavior is modified such that roosting, nest building, breeding, nesting, and/or fledging of young is disrupted or otherwise interfered with. The NPS will monitor and determine the active status of wood storks through SRF.
- **Modification of Restrictions:** If new information becomes available concerning the wood stork colonies, the NPS, USFWS and FFWCC should immediately contact each other to determine what modifications, if any, are warranted.

All of the Guidelines, restrictions, and recommendations identified in the original Final FWCA Report (USFWS 2003) for the Tamiami East and West wood stork colonies are valid and still apply. The NPS would manage construction activities within the protection zones according to the USFWS “Draft Supplemental Habitat Management Guidelines for the Wood Stork in the South Florida Ecological Services Consultation Area.” Because activities of all action alternatives would take place within the primary zone of the Tamiami West Colony and the secondary zone of the Tamiami East Colony it is concluded that the proposed project may affect, and is likely to adversely affect the wood stork.

Other Protected Species. The Frog City rookery, which supports nesting by tricolor herons and great egrets, is located in WCA-3B close to the L-29 Levee approximately one-quarter mile west of the Tigertail Camp. Because all alternatives would be located south of the L-29 Levee/Canal, USFWS and FFWCC did not recommend that any buffer zone restrictions be applied to the Frog City colony. The colony is protected from construction noise by the approximately 20- foot-high L-29 Levee; the wading birds nesting at this colony have acclimated to continuous highway traffic and noise. Therefore, no adverse impacts to the rookery are anticipated.

Alligators are a keystone species in the South Florida wetlands in that they play a major role in influencing the overall health and ecological patterns of the region. In ENP, overall numbers of alligators have substantially declined, and distribution patterns have been greatly altered, as a result of water management practices. Hydrological conditions are known to have direct and indirect effects on alligator population numbers and nesting success. Direct effects include nest flooding caused by high variability in daily discharges from flood control structures. Indirect effects on alligators result from changes in the amount and distribution of the prey base (marsh fishes). Lower water levels in Northeast Shark River Slough, due to lack of overland flow from the north, have been shown to reduce the number of alligators nesting in ENP. Water management practices, including drainage of peripheral wetlands and increasing salinity in mangrove habitats, have also likely been the cause of a shift in distribution of alligators from these areas to canals and the central slough habitats of the Everglades. Construction related activities associated with all action alternatives would likely cause alligators to abandon man altered waterways in the project area for more natural habitats within the Northeast Shark River Slough. However, because construction activities would be restricted to the immediate vicinity of the highway, it is concluded that the proposed project may affect, but is not likely to affect the American alligator, the Everglades mink, or any wading birds.

The *Second Report and Initial Recommendations* published by the Miami-Dade CCATF states that global warming would result in many changes to the natural environment, “including changing atmospheric circulation and temperature patterns, changes in rainfall and severe



weather, changes in biologic community distribution, increased extinction rates, changes in disease and pest distribution, and changes in sea level” (CCATF, 2008). All these environmental impacts would affect South Florida, Everglades National Park, and the project area within the next century, with the key concern for the low topography project area being rising sea level, “with a very high likelihood” that the sea level would rise an additional 1.5 feet in the next 50 years and a cumulative total of three to five feet within a century (CCATF, 2008). Special status species would be impacted by habitat changes caused by intrusion of saltwater into interior freshwater marshes of the Northeast Shark River Slough and southern ENP. Changing conditions could lead to decrease in populations of special status species, or shifts in habitat ranges.

Cumulative Impacts. On-going and future projects are expected to provide some degree of restoration of habitat benefits including, restoration of more natural sheet flows to the Northeast Shark River Slough and improved hydrology in other portions of the Everglades which would improve special status species habitats. Implementation of all action alternatives (1-6e) would result in enhanced ecological connectivity, however would also in loss of special species habitat especially to wood storks. Alternatives 2a and 6e would also result in direct impacts to a wood stork rookery. Overall impacts of the action alternatives to special status species are negligible to major and adverse. The action alternatives of the proposed project in conjunction with other related projects would have beneficial, long-term cumulative effects on special status species.

Conclusion. Under any of the action alternatives short-term disturbances to special status species and their habitat would occur. Impacts would occur from construction-related noise and vibration impacts that cause special status species to flee from construction areas and the close proximity. However, these adverse effects are expected to be limited to the timeframe of construction and wildlife is expected to fully return to the project area following completion of construction activities. Therefore, these adverse impacts to special status species are expected to be moderate, localized, and short-term in nature. Long-term impacts to special status species would be adverse, localized, and range in intensity from negligible to major, dependent upon the species. See **Table 4-7** below for a summary of the effect determination (per USFWS guidelines) and associated reasoning for each Federally-listed species with the potential to occur in the project area.

Table 4-7 – Effect Determinations for Federally-Listed Species

Species	Effect Determination	Reason
Florida panther	May affect, but is not likely to adversely affect	Lack of recent usage of project area, poor quality habitat, linkage of Northeast Shark River Slough to WCA-3B via passage underneath bridges.
West Indian manatee	May affect, but is not likely to adversely affect	No manatees observed in the project area for 20 years. No work in the L-29 Canal.
Snail Kite	May affect, but is not likely to adversely affect	No snail kites or apple snails observed within the project area. No known nesting in project construction footprint. Implementation of USFWS draft snail kite management plan.
Eastern Indigo snake	May affect, but is not likely to adversely affect	No sightings within project area. Implement standard construction precautions.
Cape Sable Seaside Sparrow	May affect, but is not likely to adversely affect	No Critical Habitat within project area. Nearest nesting site 10 miles south of project area.
Wood stork	May affect, and is likely to adversely affect	Temporary nesting colony impacts; temporary and permanent management zone impacts. Implementation of USFWS approved construction guidelines.



Since Federally-listed threatened and endangered species are located within the study area and would be affected by the proposed project, a Biological Assessment would be required by the USFWS for this project. Through ongoing coordination efforts with the USFWS (see Section 6.2.2), it has been agreed that the requirements for the Biological Assessment can be met through this EIS document.

Additionally, at present an operational plan for manipulation of water levels in the L-29 Canal is being developed; however, since it has not been completed, it is not reviewed under this EIS. Full realization of project benefits is dependent upon an operational plan that utilizes the structural capacity of the preferred alternative. Potential benefits that would occur once an operational plan is defined and executed include enhancement of degraded habitats within the Northeast Shark River Slough system, benefiting special status species. It is highly likely that implementation of the preferred bridging alternative in conjunction with the operational plan is self-mitigating, and that permanent and temporary impacts to special status species and their habitats associated with the construction of the proposed project would be offset by the enhancement to special status species' habitats attributed to operation of the completed Tamiami Trail Modification: Next Steps project. However, long-term effects to habitats resulting from operations remain unknown since an operational plan has not yet been developed for the project alternatives. Since there is uncertainty as to the level of habitat improvements that would be achieved with the operation of the project, an off-site mitigation plan would be implemented should anticipated project benefits not adequately offset the project's impacts to special status species' habitats. Potential off-site mitigation is discussed further in the wetland impacts analysis in Section 4.3.3.3. Therefore, there would be no impairment to special status species as a result of implementation of any of the action alternatives.

4.7 Wilderness/Unique Ecosystems

4.7.1 Guiding Regulations and Policies

The Wilderness Act, passed on September 3, 1964, established a National Wilderness Preservation System, "administered for the use and enjoyment of the American people in such manner as would leave them unimpaired for future use and enjoyment as wilderness, and so as to provide for the protection of these areas, the preservation of their wilderness character, and for the gathering and dissemination of information regarding their use and enjoyment as wilderness" (16 USC § 1131). Lands identified as being suitable for wilderness designation, wilderness study areas, proposed wilderness, and recommended wilderness (including potential wilderness) must also be managed to preserve their wilderness character and values in the same manner as "designated wilderness" until Congress has acted on the recommendations (NPS 1999).

Wilderness regulations at the park include:

- It is illegal to feed wildlife. Backcountry sites are shared with alligators, sea turtles, nesting birds and other wildlife that would be observed but not disturbed;
- All plants, animals, and artifacts are protected and should not be collected or disturbed. Cutting mangroves or other vegetation in any manner is prohibited. Unoccupied shells may be gathered, up to one quart per person;
- Pets are not permitted at backcountry campsites, beaches, or ashore anywhere in the backcountry. Pets would disrupt feeding, nesting, and mating activities of wildlife;



- All vessels must conform to Coast Guard regulations. Boaters are required to obey all posted signs regarding closures, no wake zones, etc. Caution should be used in posted manatee areas, and all travel in these areas should be at idle speed;
- Operation of generators, chain saws, and other portable motors is prohibited at wilderness sites;
- Ground fires are not permitted at ground sites and chickees. Ground fires are only allowed at beach sites (except islands in Florida Bay), where they must be below the average high tide line. Only dead *and* down wood is allowed for fires, which should be cleaned up after use. Backpacking stoves are recommended, as wood is often wet;
- All sleep-aboard vessels in the wilderness must be anchored out of sight of chickees and 1/4 mile from other occupied sites;
- State fishing licenses in fresh and salt water are required, and species and size requirements are enforced;
- Food should not be left unattended, and should be stored in a secure compartment aboard a vessel or in a hard-sided cooler (not foam); and
- All trash must be removed from the backcountry. Burying it or disposing of it in toilets is prohibited. Toilets should be used for human waste only where provided. International laws prohibit dumping trash at sea.

Within the NPS, Director's Order #41 addresses wilderness issues. The purpose of Director's Order #41 is to provide accountability, consistency, and continuity within the NPS' wilderness management program, and to otherwise guide Service-wide efforts in meeting the letter and spirit of the 1964 Wilderness Act. In addition, NPS *Management Policies 2006* are based on provisions of the 1916 NPS Organic Act, the 1964 Wilderness Act, and legislation establishing individual units of the national park system.

Chapter 6 of the NPS *Management Policies 2006* addresses all aspects of wilderness management and preservation of designated wilderness in units of the NPS. This chapter requires that wilderness considerations be integrated into all planning documents to guide the preservation, management, and use of the park's wilderness area and ensure that wilderness is unimpaired for future use and enjoyment as such. According to section 6.1, the purpose of wilderness in the national parks includes the preservation of wilderness character and wilderness resources in an unimpaired condition and, in accordance with the Wilderness Act, wilderness areas shall be devoted to the public purposes of recreational, scenic, scientific, educational, conservation, and historical use.

4.7.2 Assumptions, Methodology and Impact Thresholds

Section 6.2.1 of the NPS *Management Policies 2006*, dictates that NPS lands would be considered eligible for wilderness if they are at least 5,000 acres or of sufficient size to make practicable their preservation and use in an unimpaired condition, and if they possess the following characteristics (as identified in the Wilderness Act):

- The earth and its community of life are untrammelled by humans, where humans are visitors and do not remain;
- The area is undeveloped and retains its primeval character and influence without permanent improvements or human habitation;



- The area generally appears to have been affected primarily by the forces of nature, with the imprint of humans' work substantially unnoticeable;
- The area is protected and managed so as to preserve its natural conditions; and
- The area offers outstanding opportunities for solitude or a primitive and unconfined type of recreation.

Per section 6.3.4.3, in evaluating environmental impacts, this EIS considers (1) wilderness characteristics and values, including the primeval character and influence of the wilderness; (2) the preservation of natural conditions (including the lack of man-made noise); and (3) assurances there would be outstanding opportunities for solitude, that the public would be provided with a primitive and unconfined type of recreational experience, and wilderness would be preserved and used in an unimpaired condition. Mitigation measures considered in this analysis are listed in Chapter 2 and are mentioned in the analysis where appropriate.

The thresholds for the intensity of an impact are defined for wilderness as follows:

Negligible: There would be little or no effect on wilderness character or wilderness experience. The effect on wilderness character would be so small that it would not be of any measurable or perceptible consequence.

Minor: An effect on one or more attributes of wilderness character and wilderness experience and associated values would occur; it would be slightly detectable and highly localized.

Moderate: Attributes of wilderness character and wilderness experience would be affected in a substantial way in a single distinct area, or the impact would affect multiple areas but would not be permanent and would not affect an entire visitor season.

Major: One or more attributes of wilderness character and wilderness experience would be affected substantially across more than one distinct area of the park on either a permanent or frequent but temporary basis during the course of an entire visitor season.

Analysis area: The focus of this analysis is the area adjacent to the 10.7-mile project corridor along Tamiami Trail that would be directly affected by the proposed action; however, impacts to wilderness extending beyond the vicinity of the project corridor occurring as a result of project impacts are also discussed.

4.7.3 Impacts of the Alternatives

No-Action Alternative

Analysis. If the No-Action Alternative is selected as the preferred alternative, there would be no additional direct or indirect short- or long-term impacts to wilderness other than those already realized from construction of the 2008 LRR/EA preferred alternative (1-mile eastern bridge). The current unnatural altered hydrologic conditions within the vicinity of the project area would continue to have a negative impact on the wilderness character and experience within the WCAs, Everglades National Park, and Northeast Shark River Slough.

Cumulative Impacts. The goal of past, on-going and future related projects is to restore hydrology to the Everglades ecosystem and to provide enhanced waterflows to areas south of Tamiami Trail. The result of these activities will be to enhance the ecosystem which occurs within the wilderness areas of ENP. The No-Action Alternative would lead to no improvement within the ENP wilderness, however related actions in other areas are expected to have a beneficial long-term cumulative effect on wilderness within ENP.



Conclusion. No short- or long-term adverse or beneficial effects to wilderness would result from the selection of the No-Action Alternative. Consequently, there would be no impairment of wilderness as a result of the No-Action Alternative.

Action Alternatives

Analysis. Minor, short-term, localized, adverse impacts and long-term beneficial effects to wilderness would occur from the implementation of any of the action alternatives (Alternatives 1 through 6e). The only difference in impacts to wilderness between the various action alternatives would be related to the length of bridging of each of the alternatives. The action alternative with the shortest length of proposed bridging (Alternative 4) would experience of least amount and shortest duration of construction-related adverse impacts as well as the least amount of both adverse and beneficial long-term effects and vice versa for the alternative with the longest length of proposed bridging (Alternative 6e). However, since bridge length is the only variable factor between the action alternatives, the thresholds for both short- and long-term impacts would be the same for all of the action alternatives.

In regards to short-term impacts caused by construction of any of the bridging alternatives (Alternatives 1 through 6e), designated wilderness within ENP would be impacted by construction-related noise and vibration; reduced quantity/diversity of wildlife caused by construction-related noise and vibration impacts that cause wildlife to flee from construction areas; construction-related dust and fumes; and the visual presence of construction vehicles and heavy equipment in construction zones.

Minor short-term impacts from construction-related noise and vibration would be experienced in wilderness areas adjacent to the Tamiami Trail project area. Construction-related noise impacts and abatement/mitigation measures have been thoroughly evaluated for this project and can be found in Sections 2.3.11 and 4.11.3 of this document. Generally, construction-related noise and vibration would comply with all noise regulations and would be limited to the project area and close proximity only during periods of active construction. Therefore, the impact to wilderness and the wilderness experience of visitors should be minor and short-term in duration.

Wilderness areas would also temporarily experience indirect effects from construction-related noise and vibration impacts in the form of reduced quantity and diversity quality of wildlife caused by construction-related noise and vibration impacts that cause wildlife to flee from construction areas and the close proximity. However, these adverse effects are expected to be limited to the timeframe of construction and wildlife is expected to fully return to the project area following completion of construction activities. Therefore, these adverse impacts to wilderness and the wilderness visitor experience are expected to be minor and short-term in nature.

The air quality of the area within the project corridor is a valuable park resource, enhancing visitation quality by providing clean air and high visibility to match the unique ecosystem experience. Everglades National Park is a designated Class I air quality area under the Clean Air Act, which dictates the most stringent air quality regulations for the park that only permit very limited increases in pollution in the vicinity. If any of the action alternatives are implemented, short-term emissions generated from transport and construction equipment would be mitigated and would not measurably contribute adversely to air quality conditions or adversely affect visitor use and experience conditions. Because of the high water table, it is unlikely that large quantities of dust would be generated, and any occurrence of fugitive dust would be localized and very transient. If dust were generated during construction, best management practices for dust suppression would be initiated. Emissions from construction equipment would be kept to a minimum by restricting idling time. Therefore, adverse impacts to wilderness and the wilderness visitor experience as a result of construction-related dust would be negligible.



Finally, minor short-term adverse effects to the aesthetics of wilderness would be experienced by visitors along the project corridor. While many visitors patron Everglades National Park in order to experience the unique aesthetics of the wilderness area, the views on both sides of the project segment along Tamiami Trail are somewhat limited and constrained by the L-29 Canal, the L-29 Levee, several water control structures, Tigertail Camp, and tall invasive exotic vegetation. Therefore, the short-term impacts of the visual presence of construction vehicles and heavy equipment in construction zones along the project corridor should only cause minor disturbances to wilderness and the wilderness visitor experience.

While all of the construction-related impacts to wilderness would be short-term in nature, the wilderness areas would also be impacted by some long-term adverse and beneficial effects from the implementation of any of the action alternatives. Because the project is located within a wilderness area, long-term, minor, adverse, localized impacts would occur from construction of the bridges associated with any of the action alternatives. However, long-term beneficial effects would occur as a result of project implementation of any of the action alternatives. Negligible to minor improvements in ground-dwelling wildlife quantity may be observed in the area following project implementation of any of the action alternatives due to the increased connectivity between Everglades National Park and the Water Management Areas north of Tamiami Trail. Additionally, the potential for a future increase in number and diversity of wildlife species in proximity to the project area is possible if a water operations plan is implemented in the area of the project, which would improve the quality of designated wilderness areas within the Park. However, this benefit cannot be realized as a part of this project until a water operations plan is developed.

The *Second Report and Initial Recommendations* published by the Miami-Dade CCATF states that global warming would result in many changes to the natural environment, “including changing atmospheric circulation and temperature patterns, changes in rainfall and severe weather, changes in biologic community distribution, increased extinction rates, changes in disease and pest distribution, and changes in sea level” (CCATF, 2008). All these environmental impacts would affect South Florida, Everglades National Park, and the project area within the next century, with the key concern for the low topography project area being rising sea level, “with a very high likelihood” that the sea level would rise an additional 1.5 feet in the next 50 years and a cumulative total of three to five feet within a century (CCATF, 2008). Wilderness areas would be impacted as saltwater intrusion into freshwater marshes would lead to ecosystem shifts that would alter the wilderness character and experience.

Cumulative Impacts. The goal of past, on-going and future related projects is to restore hydrology to the Everglades ecosystem and to provide enhanced waterflows to areas south of Tamiami Trail. The result of these activities will be to enhance the ecosystem which occurs within the wilderness areas of ENP. The action alternatives (1-6e) of the proposed project will provide for conditions (bridges) that will allow for enhanced flows to be delivered to the park, thus wilderness areas will benefit once an operational plan for water deliveries is in place. Therefore, the action alternatives of the proposed project in combination with related actions in other areas are expected to have a beneficial long-term cumulative effect on wilderness within ENP.

Conclusion. Minor, short-term, localized, adverse impacts would occur from the implementation of any of the action alternatives (Alternatives 1 through 6e) as a result of noise, vibrations, and dust generated during construction activities. Minor, long-term, localized, adverse effects to wilderness would also occur from the implementation of any of the action alternatives (Alternatives 1 through 6e) as a result of direct footprint impacts to wilderness. Beneficial effects would occur as a result of improved connectivity and potential for improved hydrologic flow in



the project area and Everglades National Park. Consequently, there would be no impairment of wilderness with the implementation of any of the action alternatives.

4.8 Cultural Resources

4.8.1 Guiding Regulations and Policies

The primary law related to cultural resources is the National Historic Preservation Act of 1966, as amended. Section 106 of this act requires federal agencies to consider the effects of their undertakings on properties listed or potentially eligible for listing in the National Register of Historic Places (NRHP). Other regulatory guidance includes:

Title 36, Code of Federal Regulations, Part 800 – Protection of Historic Properties.

These regulations of the Advisory Council on Historic Preservation define procedures for implementing Section 106 of the National Historic Preservation Act.

Native American Graves Protection and Repatriation Act – This law assigns ownership or control of Native American human remains, funerary objects, sacred objects, and objects of cultural patrimony that are excavated or discovered on federal lands or tribal lands to lineal descendants or affiliated Indian tribes. If discoveries of human remains are made within the Everglades National Park, the protocols outlined in the May 2008 *Native American Graves Protection and Repatriation Act Plan of Action for Inadvertent Discoveries, Everglades National Park and Associated Tribes* would be followed.

Executive Order 13007 – Indian Sacred Sites

This Executive Order directs Federal agencies, to (1) accommodate access to and ceremonial use of Indian sacred sites by Indian religious practitioners, and (2) avoid adversely affecting the physical integrity of such sacred sites on federal lands, to the extent practicable, permitted by law, and not clearly inconsistent with essential agency functions.

NPS Director's Order 28 and NPS 28 - Cultural Resource Management Guideline

These policies outline the basic principles and components for managers, planners, and cultural resource specialists to use in developing and implementing a good park cultural resource management program.

NPS Management Policies 2006

Chapter 5, Section 5.3.1 Protection and Preservation of Cultural Resources stipulates that the National Park Service employ the most effective concepts, techniques, and equipment to protect cultural resources against theft, fire, vandalism, overuse, deterioration, environmental impacts, and other threats without compromising the integrity of the resources.

4.8.2 Assumptions, Methodology and Impact Thresholds

Assessment of the potential effects on the cultural environment was based primarily on criteria defined by regulations for Protection of Historic Properties (Title 36, Code of Federal Regulations, Part 800.5). Those regulations define an effect as a direct or indirect alteration to the characteristics of a historic property that qualify it for inclusion in the NRHP. Effects are adverse when the alterations would diminish the integrity of a property's location, setting, design, materials, workmanship, feeling, or association. Examples of adverse effects include:

- Physical destruction, damage, or alteration of all or part of a property;



- Alteration of a property, including restoration, rehabilitation, repair, maintenance, stabilization, hazardous material remediation, and provisions of handicapped access, that is not consistent with the Secretary of the Interior's Standards for the Treatment of Historic Properties (Title 36, Code of Federal Regulations, Part 68) and applicable guidelines;
- Removal of a property from its physical location;
- Change of the character of the property's use or of physical features in the property's setting that contribute to its historic significance;
- Introduction of visual, atmospheric, or audible elements that diminish the integrity of the properties significant historic features;
- Neglect of a property, which causes its deterioration, except where such neglect and deterioration are recognized qualities of a property of religious and cultural significance to an Indian tribe or Native Hawaiian organization; and
- Transfer, lease, or sale of the property out of Federal ownership or control without adequate and legally enforceable restrictions or conditions to ensure long-term preservation of the property's historic significance [Title 36, Code of Federal Regulations, Part 800.5(a)(2)].

The criteria for adverse effects were applied to each cultural resource identified within the area of potential effects and evaluated as eligible or potentially eligible for the NRHP (Price and others 2009). The following impact thresholds were used for the types of cultural resources assessed in this EIS:

Negligible: Impacts would be barely perceptible and not measurable. For purposes of Section 106, the determination of effect would be *no adverse effect*.

Minor: Impacts would not affect the character defining features of a NRHP-eligible or listed structure or building. For purposes of Section 106, the determination of effect would be *no adverse effect*.

Moderate: Impacts would alter one or more character defining features of the structure or building but would not diminish the integrity of the resource to the extent that its NRHP-defining elements are diminished. For purposes of Section 106, the determination of effect would be *no adverse effect*.

Major: Impacts would alter one or more character defining features of the structure or building in a manner that diminishes the integrity of the property's location, design, setting, materials, workmanship, feeling, or association to a degree that may or may not be reduced or satisfactorily mitigated through consultation with parties participating in the Section 106 review of the project. For purposes of Section 106, the determination of effect would be *adverse effect*.

Analysis Area: The area of analysis for cultural resources is the area of potential effects (APE), as discussed in Section 3.7. The APE includes areas that could be disturbed by construction activities within existing and expanded rights-of-way and temporary construction easements, as well as the properties along the south side of the Tamiami Trail that could be affected by visual changes and access modifications.



4.8.3 Impacts of the Alternatives

No-Action Alternative

Analysis. If the No-Action Alternative is selected as the preferred alternative, there would be no additional direct or indirect short- or long-term impacts on cultural resources other than those already realized from construction of the 2008 LRR/EA preferred alternative (1-mile eastern bridge).

Cumulative Impacts. The goal of on-going and future related projects is to increase water levels in portions of the Everglades ecosystem. Rising water levels can have adverse effects on historic and cultural resources by causing direct damage or changing the setting of the affected resource. Additionally, the historic materials, design, and setting of the affected segment of Tamiami Trail have been altered by prior upgrades, maintenance, widening and improvement of the adjacent The No-Action Alternative is not anticipated to have an effect on cultural resources, however, past, present, and reasonably foreseeable future actions will have overall cumulative effects on cultural resources that are expected to be minor, long-term, and adverse.

Conclusion. No short- or long-term adverse or beneficial effects to cultural resources would result from the selection of the No-Action Alternative. Consequently, there would be no impairment of cultural resources as a result of the No-Action Alternative.

Action Alternatives

Analysis. The impacts of the five action alternatives are described and compared in the following sections. Because Section 106 consultations are ongoing, the discussion of effects and mitigation measures are preliminary, and would be confirmed or revised as the consultations are completed.

Alternative 1

Alternative 1 includes four bridges and one ConSpan that would remove approximately 2.2 miles of the Tamiami Trail (8DA6510). Prior Section 106 consultations for the No-Action Alternative concluded that removal of a section of the historic highway was an adverse effect, but that raising the remaining segments was not. Similarly, removal of additional segments of the highway under Alternative 1 would be a major impact (adverse effect), but raising the height of the remaining segments would be a moderate impact (no adverse effect).

Alternative 1 would require expansion of the highway right-of-way into a small portion of property on the 10-acre Airboat Association of Florida property (8DA6768) to accommodate the widening of the roadway embankment needed to increase the height of the roadway and for a temporary construction easement. Because the three historic buildings on the property are set back from the highway about 150 to 170 feet they would not be directly affected, and the less than 1-foot increase in the height of the highway and widening of the roadbed would be a minor change to the setting of the buildings. The impacts on the Airboat Association of Florida property are likely to be minor (no adverse effect).

The highway in front of the Coopertown Restaurant and Airboat Rides property (8DA6767), as at the Airboat Association of Florida property, would be raised less than 1 foot. The increase in the height of the highway, widening of the roadbed, and placement of temporary construction easements would require expansion of the highway right-of-way into a small portion of the Coopertown 3-acre property. The modifications of the highway would be a minor change to the setting of the two historic buildings at Coopertown. The buildings, however, are only about 55 to 85 feet south of the highway and they might need to be moved farther south on the parcel to accommodate the reduction in the parking area. Because almost all buildings in the Everglades



environment are of a design to accommodate moving, the slight shifting of the building locations is likely to result in a moderate impact to their historic values (no adverse effect).

There are no intact historic buildings at the Osceola Camp (Fred Dayhoff, personal communication). Shovel testing has not been conducted to check for buried cultural resources since fill has been placed at the site. Aerial photography indicates there is a tree island on the north side of the highway, to the north of the camp, which is a candidate for having archeological resources. The Osceola Camp is on the south tail of this tree island and appears to have been developed in a low area that was raised with fill material. As such, the potential for buried archeological resources in the fill is low. If archeological deposits are present at the camp, they have been covered by the recently placed fill. The evaluation of the NRHP eligibility of the Osceola Camp remains incomplete, but for purposes of this project, it was considered potentially eligible. The highway in front of the Miccosukee Osceola Camp would be raised and a small area of the existing property would be converted to highway right-of-way and for use as a temporary construction easement. Those impacts would be outside the existing fence that separates the camp from the highway and are expected to result in only a minor impact to any historic values that the camp might have (no adverse effect).

Alternative 2a

Alternative 2a includes six bridges and one ConSpan that would remove approximately 3.3 miles of the Tamiami Trail (8DA6510), which is 1.2 miles more than Alternative 1 and a major impact (adverse effect). Otherwise the impacts on the Airboat Association of Florida property (8DA6768), Coopertown Restaurant and Airboat Rides property (8DA6767), and Miccosukee Osceola Camp would be the same minor and moderate impacts as described for Alternative 1.

Alternative 4

Alternative 4 includes two bridges that would remove approximately 1.0 mile of the Tamiami Trail (8DA6510), which is 1.2 mile less than Alternative 1, but still a major impact (adverse effect). Otherwise the impacts on the Airboat Association of Florida property (8DA6768), Coopertown Restaurant and Airboat Rides property (8DA6767), and Miccosukee Osceola Camp would be the same minor and moderate impacts as described for Alternative 1.

Alternative 5

Alternative 5 includes three bridges that would remove approximately 1.5 miles of the Tamiami Trail (8DA6510), which is 0.70 mile less than Alternative 1 but still a major impact (adverse effect). Otherwise the impacts on the Airboat Association of Florida property (8DA6768), Coopertown Restaurant and Airboat Rides property (8DA6767), and Miccosukee Osceola Camp would be the same minor and moderate impacts as for Alternative 1.

Alternative 6e

Alternative 6e includes four bridges that would remove approximately 5.5 miles of the Tamiami Trail (8DA6510), which is 3.3 miles more than Alternative 1 and a major impact (adverse effect). The impacts of Alternative 6e on the Airboat Association of Florida property (8DA6768) and the Miccosukee Osceola Camp would be the same minor impacts as described for Alternative 1.

Alternative 6e would involve construction of a bridge across the front of the Coopertown Restaurant and Airboat Rides property (8DA6767), which would require a ramp to provide access to the parcel from the elevated bridge. Additional fill materials would be added to provide parking at the end of the down ramp, and an adjacent segment of the highway would be left in place to provide additional parking on the north side of the new bridge. The historic restaurant building would need to be moved out of the expanded right-of-way, and historic house also might need to be moved. The new elevated bridge immediately across the front of the parcel is likely to result in an adverse visual effect.



All Action Alternatives

Real Estate

There are five privately owned parcels, including Coopertown and the Airboat Association of Florida, located along Tamiami Trail that were originally authorized for acquisition by DOI as part of *Everglades National Park Protection and Expansion Act of 1989*. Specifically, Section 103(d) of the Everglades National Park Protection and Expansion Act of 1989 authorizes DOI to “negotiate and enter into concession contracts with the owners of commercial airboat and tour facilities in existence on or before January 1, 1989.” The *1991 East Everglades Land Protection Plan/EA* provided further guidance for the acquisition of the parcels by stating that “it will be necessary to acquire all within the park addition in fee” to comply with the Congressional intent of Public Law 101-229. The DOI, through the NPS, is evaluating in the GMP/EEWS/EIS, the appropriate use and disposition of these parcels.

Climate Change

The *Second Report and Initial Recommendations* published by the Miami-Dade CCATF states that global warming would result in many changes to the natural environment, “including changing atmospheric circulation and temperature patterns, changes in rainfall and severe weather, changes in biologic community distribution, increased extinction rates, changes in disease and pest distribution, and changes in sea level” (CCATF, 2008). All these environmental impacts would affect South Florida, Everglades National Park, and the project area within the next century, with the key concern for the low topography project area being rising sea level, “with a very high likelihood” that the sea level would rise an additional 1.5 feet in the next 50 years and a cumulative total of three to five feet within a century (CCATF, 2008). Cultural resources would be impacted by increasing water levels as a result of tidal intrusion into interior freshwater marshes of the southern ENP.

For additional information about impacts to cultural resources, refer to **Appendix E** – Cultural Resources Report.

Cumulative Impacts. The goal of on-going and future related projects is to increase water levels in portions of the Everglades ecosystem. Rising water levels can have adverse effects on historic and cultural resources by causing direct damage or changing the setting of the affected resource. Additionally, the historic materials, design, and setting of the affected segment of Tamiami Trail have been altered by prior upgrades, maintenance, widening and improvement of the adjacent Tamiami Canal, and construction of the Water Conservation Area 3 levees on the north side of the canal. The action alternatives (1-6e) of the proposed project will have minor to major adverse effects on historic resources located along the project corridor including Tamiami Trail itself and the Coopertown Restaurant and Airboat Rides property. Therefore, the action alternatives of the proposed project in conjunction with past, present, and reasonably foreseeable future actions will have overall cumulative effects on cultural resources that are expected to be minor, long-term, and adverse,

Conclusion. In summary, the impacts of all the action alternatives are evaluated as having a major impact [adverse effect as defined by regulations for Protection of Historic Properties (Title 36, Code of Federal Regulations, Part 800.5)] because they would remove segments of the historic Tamiami Trail (8DA6510) in addition to the 1 mile of the highway that is being removed under the No-Action Alternative (**Table 4-8**). Because the highway created the blockage of water flows to the Everglades that is being addressed by the Next Steps project, there is no way to address the problem without affecting the highway. The variation among the alternatives in the length of highway that would be removed (ranging from 1.0 to 5.5 miles) is a small fraction of the total length of the Tamiami Highway, which is about 245 miles long.



All action alternatives would have the same minor impacts on the 10-acre Airboat Association of Florida property (8DA6768) and the 5-acre Miccosukee Osceola Camp. The raising of the highway in front of those properties and the relatively small right-of-way expansions and temporary construction easements within those properties are expected to have no adverse effect on their historic values.

Alternatives 1, 2a, 4, and 5 would have similar moderate impacts on the 3-acre Coopertown Restaurant and Airboat Rides property (8DA6767). The parcel is smaller than the Airboat Association of Florida parcel and Miccosukee Osceola Camp and because the two historic buildings on the parcel are closer to the road than are the buildings on the other two properties, they might need to be moved farther south on the parcel. Those impacts are not expected to adversely affect the historic values of the two historic buildings. Alternative 6e would involve construction of an elevated bridge across the front of the property, reducing the overall area of the property and possibly requiring razing and removing the two historic buildings. If the two buildings require moving, this would constitute a major impact (adverse effect).

The evaluated alternatives do not include an operations plan, which would be addressed by a subsequent project. The analysis of an operations plan would address water supply and the actual volume of water that might flow beneath the Tamiami Trail as a result of any increase in capacity provided by an alternative approved by a record of decision at the termination of the Next Steps EIS. That analysis would address potential impacts on cultural resources due to raised water levels south of the Tamiami Trail.

Consultation with the State Historic Preservation Office and other interested parties pursuant to Section 106 of the National Historic Preservation Act is ongoing. It is anticipated that the treatment of the adverse effects of the No-Action Alternative, which involves development of a display within the Shark Valley Interpretive Area of the Everglades National Park to publicly interpret the history of the Tamiami Trail and associated properties, would adequately address the removal of additional segments of the Tamiami Trail under Alternatives 1, 2a, 4, and 5. Alternative 6e would result in additional adverse impacts to the two historic buildings at the Coopertown Restaurant and Airboat Rides property but both buildings have been well recorded and their history has been documented. Additional documentation is not likely to add important information. The Section 106 consultations might conclude that the memorandum of agreement developed for the No-Action Alternative is adequate for addressing the impacts of the Next Steps project, or that it needs to be modified to address the similar but expanded impacts of any Next Steps project action alternative that is approved for construction. That treatment is expected to satisfactorily mitigate the adverse effect. Consequently, there would be no impairment of cultural resources as a result of implementation of any of the alternatives.



Table 4-8 – Summary of Impacts on Cultural Resources

Impacts on Properties Eligible or Potentially Eligible for the National Register of Historic Places						
Alternative	Tamiami Trail (8DA6765)	Coopertown Restaurant and Airboat Rides (8DA6767)	Airboat Association of Florida (8DA6768)	Miccosukee Osceola Camp¹	Effect²	Treatment²
No-Action	adverse: 1 bridge, removal of 1 mile	setting slightly altered by raised roadway and increased water level	setting slightly altered by raised roadway and increased water level	setting slightly altered by raised roadway and increased water level	adverse	interpretive display pursuant to memorandum of agreement; monitor archaeological sites for increased erosion
Impacts in addition to those of the No-Action Alternative						
1	major: 4 bridges and 1 ConSpan, removal of 2.2 miles	moderate: take 0.29 acre of 3-acre parcel for expanded highway right-of-way and 0.1 acre for temporary construction easement, might need to relocate 2 historic buildings	minor: take 0.3 acre of 10-acre parcel for expanded highway right-of-way and 0.1 acre for temporary construction easement, setting slightly altered	minor: use 0.4 acre of 5-acre parcel for expanded highway right-of-way and 0.1 acre for temporary construction easement, setting slightly altered	adverse	same as No-Action
2a	major: 6 bridges and 1 ConSpan, removal of 3.3 miles	moderate: take 0.2 acre of 3-acre parcel for expanded highway right-of-way and 0.1 acre for temporary construction easement, might need to relocate 2 historic buildings	minor: take 0.3 acre of 10-acre parcel for expanded highway right-of-way and 0.1 acre for temporary construction easement, setting slightly altered	minor: use 0.4 acre of 5-acre parcel for expanded highway right-of-way and 0.2 acre for temporary construction easement, setting slightly altered	adverse	same as No-Action
4	major: 2 bridges, removal of 1.0 mile	moderate: take 0.2 acre of 3-acre parcel for expanded highway right-of-way and 0.1 acre for temporary construction easement, might need to relocate 2 historic buildings	minor: take 0.3 acre of 10-acre parcel for expanded highway right-of-way and 0.1 acre for temporary construction easement, setting slightly altered	minor: use 0.4 acre of 5-acre parcel for expanded highway right-of-way and 0.2 acre for temporary construction easement, setting slightly altered	adverse	same as No-Action
5	major: 3 bridges, removal of 1.5 miles	moderate: take 0.2 acre of 3-acre parcel for expanded highway right-of-way and 0.1 acre for temporary construction easement, might need to relocate buildings	minor: take 0.3 acre of 10-acre parcel for expanded highway right-of-way and 0.1 acre for temporary construction easement, setting slightly altered	minor: use 0.4 acre of 5-acre parcel for expanded highway right-of-way and 0.2 acre for temporary construction easement, setting slightly altered	adverse	same as No-Action
6e	major: 4 bridges, removal of 5.5 miles	major: take 0.4 acre of 3-acre parcel for bridge across front of property, add 0.8 acre for replacement parking, visual impacts of elevated bridge likely to be adverse	minor: take 0.3 acre of 10-acre parcel for expanded highway right-of-way and 0.1 acre for temporary construction easement, setting slightly altered	minor: use 0.4 acre of 5-acre parcel for expanded highway right-of-way and 0.2 acre for temporary construction easement, setting slightly altered	adverse	same as No-Action

¹ The eligibility of the Miccosukee Osceola Camp for the National Register of Historic Places is incomplete, but the site was assumed to be potentially eligible under Criterion A and B and impacts were considered.

² The indicated effects and mitigation measures are preliminary, and would be confirmed or revised as the ongoing Section 106 consultations are completed.



4.9 Visitor Use and Experience

4.9.1 Guiding Regulations and Policies

NPS Management Policies 2006

Chapter 8, Section 8.2, Visitor Use, addresses “enjoyment of park resources and values by the people of the United States” as “part of the fundamental purpose of all parks.” The NPS is committed to “providing appropriate, high-quality opportunities for visitors to enjoy the parks,” by maintaining “an atmosphere that is open, inviting, and accessible” (NPS 2006). Section 8.2.2 of the *NPS Management Policies 2006* discusses recreational activities within the parks and specifically addresses visitor use issues applicable to the Tamiami Trail Modifications: Next Steps project.

Section 8.2.5.1 discusses visitor safety in the parks, stating that while “Park visitors must assume a substantial degree of risk and responsibility for their own safety when visiting areas that are managed and maintained as natural, cultural, or recreational environments ... The saving of human life would take precedence over all other management actions as the [NPS] strives to protect human life and provide for injury-free visits” (NPS 2006). This concern is limited by the constraints of the 1916 Organic Act, which only allows discretionary management activities to be undertaken to the extent that they would not impair park resources and values (NPS 2006). While the NPS acknowledges that there are limitations on its ability to protect park employees and visitors from all hazards, the Service would strive to “provide a safe and healthful environment” (NPS 2006). “When practicable and consistent with congressionally designated purposes and mandates, the Service would reduce or remove known hazards and apply other appropriate measures” (NPS 2006). The NPS would conduct such actions to have the least possible impact on park resources and values (NPS 2006).

Architectural Barriers Act Accessibility Standards (ABAAS)

As outlined in the *NPS Management Policies 2006* and *Director’s Order #42: Accessibility for Visitors with Disabilities in NPS Programs and Services*, as of May 8, 2006, the relevant law for NPS regarding visitors with disabilities is the ABAAS. The Architectural Barriers Act requires that buildings and facilities covered by the law meet standards for accessibility by disabled persons. Such access “would be provided consistent with preserving park resources and providing visitor safety and high quality visitor experiences” (NPS 2006).

4.9.2 Assumptions, Methodology and Impact Thresholds

General information on visitors to southern Florida and Everglades National Park was collected from NPS visitor statistics and previous studies at Everglades National Park. These data were used to make a qualitative evaluation of the potential impacts to visitor use and experience under each alternative.

The following thresholds were used to assess impacts to visitor use and experience:

Negligible: Visitors would not be affected and/or changes in the experience would be below levels of detection. Visitors would likely be unaware of any effects associated with implementation of the alternative. There would be no noticeable change in visitor use and experience or in any defined indicators of visitor satisfaction or behavior.

Minor: Changes in visitor use and/or experience would be slight but detectable. The changes would not appreciably limit or enhance critical characteristics of the visitor experience. Visitors would be aware of the effects associated with the alternative, but the effects would be slight.



Moderate: Some characteristics of the desired visitor experience would change and/or the number of participants engaging in an activity would be altered. The visitor would be aware of the effects associated with implementation of the alternative and would likely be able to express an opinion about the changes. Visitor satisfaction would begin to either decline or increase as a direct result of the effect.

Major: Multiple critical characteristics of the desired visitor experience would change and/or the number of participants engaging in an activity would be greatly reduced or increased. The visitor would be aware of the effects associated with implementation of the alternative and would likely express a strong opinion about the change. Visitor satisfaction would markedly decline or increase.

Analysis Area: The area of analysis for visitor use and experience includes direct impacts to visitor use activities that occur along the 10.7-mile project corridor along Tamiami Trail, the L-67 extension levee, the L-30 levee and canal, the L-31N levee, and the L-29 levee and canal. The area of analysis for visitor use and experience also includes indirect impacts to visitor use areas such as the Shark Valley Information Center, the FFWCC Francis S. Taylor Wildlife Management Area, and greater Everglades National Park, accessed by visitors via Tamiami Trail.

4.9.3 Impacts of the Alternatives

No-Action Alternative

Analysis. If the No-Action Alternative is selected as the preferred alternative, there would be no additional direct or indirect short- or long-term impacts on visitor use and experience other than those already realized from construction of the 2008 LRR preferred alternative (1-mile eastern bridge). Visitor use activities (i.e. boating, airboating, fishing, wildlife observation, etc.) would be expected to continue as currently practiced within the study area. Additionally, no impacts would be expected to the number of visitors who currently patron Everglades National Park.

Cumulative Impacts. Many facets of visitor experience would be greatly enhanced by the cumulative effect of the hydrologic restoration efforts currently underway and planned for the future. Increased connectivity, reduced habitat fragmentation, and restored hydrologic flow within the Everglades ecosystem brought about by the cumulative restoration projects currently occurring and planned for the future could be expected to increase the quality of habitat and the quality/quantity of wildlife within Everglades National Park and elsewhere in the Everglades and in turn, increase the quality of the visitor experience. The No-Action Alternative will not affect visitor use and experience, however past, future, and reasonably foreseeable future projects will have a beneficial cumulative effect on visitor use and experience.

Conclusion. No short- or long-term adverse or beneficial effects to visitor use and experience would result from the selection of the No-Action Alternative.

Action Alternatives

Analysis. Minor to moderate, short-term, localized, adverse impacts and long-term beneficial effects to visitor use and experience would be realized from the implementation of any of the action alternatives (Alternatives 1 through 6e). Since no visitor use facilities would be directly impacted by any of the proposed action alternatives, the only difference in impacts experienced between the various action alternatives would be related to the length of bridging of each of the alternatives. The action alternative with the shortest length of proposed bridging (Alternative 4) would experience of least amount and shortest duration of construction-related adverse impacts as well as the least amount of beneficial long-term effects and vice versa for the alternative with the longest length of proposed bridging (Alternative 6e). However, since bridge length is the



only variable factor between the action alternatives, the thresholds for both short- and long-term impacts would be the same for all of the action alternatives.

In regards to short-term impacts caused by construction of any of the bridging alternatives (Alternatives 1 through 6e), visitors utilizing the section of Tamiami Trail within the project corridor would experience minor to moderate inconveniences such as lane closures; reduced speed limits; reduced accessibility to visitor facilities/activities (i.e. four commercial airboat operations, FFWCC Francis S. Taylor Wildlife Management Area, Flight 592 Memorial, bank fishing, etc.); construction-related noise and vibration; reduced quality of wildlife-related recreational activities (i.e., wildlife viewing, hunting, fishing, frogging, etc.) caused by construction-related noise and vibration impacts that cause wildlife to flee from construction areas; construction-related dust and fumes; and the visual presence of construction vehicles and heavy equipment in construction zones. These adverse effects would be noticed by visitors utilizing Tamiami Trail to access any of the visitor features located within the construction corridor or beyond in areas such as the Everglades National Park visitor centers.

Short-term transportation-related impacts such as lane closures, reduced speed limits, and reduced accessibility to visitor facilities/activities would be limited to the areas currently under construction and would be mitigated by measures such as a Maintenance of Traffic (MOT) plan and construction scheduling during off-peak traffic hours. Additionally, at least one access route to all public and commercial visitor use facilities (including boat launch ramps) would be kept open at all times during construction. However, recreational bank fishing by visitors and subsistence fishing by locals would be limited to bank areas not under construction. A more detailed discussion of transportation impacts is detailed in Section 4.13.3 and transportation mitigation measures that would be implemented during construction of any of the action alternatives are discussed in further detail in Section 2.3.13.

Minor short-term impacts from construction-related noise and vibration would be experienced by visitors traveling along the project corridor and participating in visitor activities in proximity to the project area. Construction-related noise impacts and abatement/mitigation measures have been thoroughly evaluated for this project and can be found in Sections 2.3.11 and 4.11.3 of this document. Generally, construction-related noise and vibration would comply with all noise regulations and would be limited to the project area and close proximity only during periods of active construction. Therefore, visitors should experience minor to moderate direct impacts from construction-related noise and vibration.

Visitors would also experience moderate indirect impacts from construction-related noise and vibration impacts in the form of reduced quality of wildlife-related recreational activities (i.e., wildlife viewing, hunting, fishing, frogging, etc.) caused by construction-related noise and vibration impacts that cause wildlife to flee from construction areas and the close proximity. However, these adverse effects are expected to be limited to the timeframe of construction and wildlife is expected to fully return to the project area following completion of construction activities. Therefore, these adverse impacts to the visitor use and experience quality of the project area are expected to be moderate and short-term in nature.

The air quality of the area within the project corridor is a valuable park resource, enhancing visitation quality by providing clean air and high visibility to match the unique ecosystem experience. Everglades National Park is a designated Class I air quality area under the Clean Air Act, which dictates the most stringent air quality regulations for the park that only permit very limited increases in pollution in the vicinity. If any of the action alternatives are implemented, short-term emissions generated from transport and construction equipment would be mitigated and would not measurably contribute adversely to air quality conditions or adversely affect visitor use and experience conditions. Because of the high water table, it is unlikely that large



quantities of dust would be generated, and any occurrence of fugitive dust would be localized and very transient. If dust were generated during construction, best management practices for dust suppression would be initiated. Emissions from construction equipment would be kept to a minimum by restricting idling time. Therefore, adverse impacts to visitor use experienced as a result of construction-related dust would be negligible.

Finally, minor short-term adverse effects to the aesthetics would be experienced by visitors along the project corridor. While many visitors patron Everglades National Park in order to experience the unique aesthetics of the area, the views on both sides of the project segment along Tamiami Trail are somewhat limited and constrained by the L-29 Canal, the L-29 Levee, several water control structures, Tigertail Camp, and tall invasive exotic vegetation. Therefore, the short-term impacts of the visual presence of construction vehicles and heavy equipment in construction zones along the project corridor should only cause minor disturbances to visitor use and experience.

While all of the construction-related impacts to visitor use and experience would be short-term in nature, visitors would also experience some long-term beneficial effects from the implementation of any of the action alternatives. However, most aspects of visitor use and experience would experience no change or a negligible change due to the implementation of any of the action alternatives proposed for the project.

The area that comprises SCORP Region 11 (7,500 square miles) should experience either no long-term impacts or very negligible long-term impacts to visitor use and experience as a result of the implementation of any of the proposed action alternatives. Additionally, public visitor use facilities in close proximity to the project corridor (e.g., the Shark Valley Information Center, the FFWCC Francis S. Taylor Wildlife Management Area, and the Flight 592 Memorial) and commercial visitor use facilities/activities in close proximity to the project corridor (e.g., the four commercial airboat operators and the Airboat Association of Florida) would experience either no long-term impacts or very negligible long-term impacts to visitor use and experience as a result of the implementation of any of the proposed action alternatives. Other facilities such as boat ramps, wildlife viewing areas, and picnicking areas along the project corridor would also experience either no long-term impacts or very negligible long-term impacts to visitor use and experience as a result of the implementation of any of the proposed action alternatives. Everglades National Park should also not be expected to experience any changes in the number or duration of stay of patrons visiting the park due to implementation of any of the action alternatives.

The only visitor use activity that might be expected to suffer negligible consequences from project implementation of any of the action alternatives would be recreational and subsistence bank fishing. Since any of the action alternatives includes the bridging of some areas along the 10.7-mile project corridor that are currently utilized to participate in recreational and subsistence bank fishing, some of these areas would be unavailable for bank fishing following project implementation of any of the action alternatives. However, impacts would be expected to be negligible since there appears to be adequate area along the unbridged portion of the roadway (under any of the action alternatives) to which fishermen could relocate.

Long-term beneficial effects would occur as a result of project implementation of any of the action alternatives in terms of consumptive recreational activities (i.e., hunting, fishing, frogging, etc.) and non-consumptive recreational activities (i.e., wildlife viewing, camping, boating, airboating, picnicking, etc.). Negligible to minor improvements in ground-dwelling wildlife quantity may be observed in the area following project implementation of any of the action alternatives due to the increased connectivity between Everglades National Park and the Water Management Areas north of Tamiami Trail. Additionally, the potential for a future increase in



number and diversity of wildlife species in proximity to the project area is possible if a water operations plan is implemented in the area of the project. However, this benefit cannot be realized as a part of this project until a water operations plan is developed.

The long-term effects to the aesthetics experienced by visitors along the project corridor could be expected to greatly improve due to the implementation of any of the action alternatives. Since the views along both sides of the project segment are currently somewhat limited and constrained, bridging of sections of Tamiami Trail (and thus raising the height of the roadbed that vehicles travel along) would allow visitors to bypass at least some of the existing obstructions and experience a more panoramic view of the Water Management Areas to the north of the project corridor and Everglades National Park to the south of the project corridor. Thus, effects to the aesthetics along the project corridor would be considered to be moderate in intensity with the implementation of any of the proposed action alternatives.

Additionally, the NPS received much public interest in incorporating a bike path along Tamiami Trail. A preliminary evaluation of the feasibility of adding such a feature to the project showed that it would add to both the cost of the project and the project duration. The cost for adding a bike trail was determined to be approximately \$6 million per mile (bridge) and \$600,000 per mile (road). The budgetary costs and impacts of a bike path have not been included in this analysis because the feature has not been included in the current design of the project. Additional analysis of impacts would be required if this feature is added to the final design of the project.

The *Second Report and Initial Recommendations* published by the Miami-Dade CCATF states that global warming would result in many changes to the natural environment, “including changing atmospheric circulation and temperature patterns, changes in rainfall and severe weather, changes in biologic community distribution, increased extinction rates, changes in disease and pest distribution, and changes in sea level” (CCATF, 2008). All these environmental impacts would affect South Florida, Everglades National Park, and the project area within the next century, with the key concern for the low topography project area being rising sea level, “with a very high likelihood” that the sea level would rise an additional 1.5 feet in the next 50 years and a cumulative total of three to five feet within a century (CCATF, 2008). Visitor use and experience would be impacted as a result of shifting vegetation types and increasing water levels due to sea level rise which would alter the activities and experiences that visitors currently enjoy.

Combined, all of these effects to the various aspects of visitor use and experience along the project corridor would improve overall visitor experience along the project corridor.

Cumulative Impacts. The cumulative effect of any of the proposed action alternatives combined with other restoration projects would be long-term and beneficial since the action alternatives all provide some length of bridging which (with the future implementation of a water operations plan) would allow for increased hydrologic connectivity in the Everglades. While visitor use activities (i.e. boating, airboating, fishing, wildlife observation, etc.) would be expected to continue as currently practiced within the greater Everglades and Everglades National Park, many facets of visitor experience would be greatly enhanced by the cumulative effect of the hydrologic restoration efforts currently underway and planned for the future. Increased connectivity, reduced habitat fragmentation, and restored hydrologic flow within the Everglades ecosystem brought about by the cumulative restoration projects currently occurring and planned for the future could be expected to increase the quality of habitat and the quality/quantity of wildlife within Everglades National Park and elsewhere in the Everglades and in turn, increase the quality of the visitor experience.



Conclusion. Short-term impacts caused by construction of any of the bridging alternatives (Alternatives 1 through 6e) would cause visitors utilizing the section of Tamiami Trail within the project corridor to experience minor to moderate inconveniences such as lane closures; reduced speed limits; reduced accessibility to visitor facilities/activities; construction-related noise and vibration; reduced quality of wildlife-related recreational activities caused by construction-related noise and vibration impacts that cause wildlife to flee from construction areas; construction-related dust and fumes; and the visual presence of construction vehicles and heavy equipment in construction zones. Visitors would also experience some long-term beneficial effects (i.e., increased wildlife, increased aesthetic qualities, etc.) from the implementation of any of the action alternatives. However, most aspects of visitor use and experience would experience no change or a negligible change due to the implementation of any of the action alternatives proposed for the project. Therefore, minor to moderate, short-term, localized, adverse impacts and long-term beneficial effects to visitor use and experience would result from the implementation of any of the action alternatives (Alternatives 1 through 6e).

4.10 Park Management and Operations

Park management and operations refers to the current staff available to adequately protect and preserve vital park resources and provide for an effective visitor experience. This topic also includes the operating budget necessary to conduct park operations.

4.10.1 Guiding Regulations and Policies

Direction for management and operations at Everglades National Park is set forth in the park's enabling legislation, *NPS Management Plan 2006, Strategic Plan (2000)*, the *Superintendent's Compendium (NPS 2008)*, and the *Everglades National Park General Management Plan/East Everglades Wilderness Study/Environmental Impact Statement (in development)*.

Education and Interpretation

The Organic Act of 1916 created the NPS to conserve park resources and "provide for the enjoyment of the same in such manner and by such means as would leave them unimpaired for future generations." The purpose of NPS interpretive and educational programs is to advance this mission by providing memorable educational and recreational experiences that would (1) help the public understand the meaning and relevance of park resources, and (2) foster development of a sense of stewardship (NPS 2006).

The *NPS Management Policies 2006* provides guidance and direction in establishing an interpretive and educational program. Section 7 of the *NPS Management Policies 2006* states: "Every park would develop an interpretive and educational program that is grounded in (1) park resources, (2) themes related to the park's legislative history and significance, and (3) park and Service-wide mission goals. The intent would be to provide each visitor with an interpretive experience that is enjoyable and inspirational within the context of the park's tangible resources and the meanings they represent. In addition, visitors should be made aware of the purposes and scope of the national park system."

Maintenance

The *NPS Management Policies 2006* provides guidance and direction for the park's maintenance programs. Section 9.1.4 of the *NPS Management Policies 2006* states: "the [NPS] would conduct a program of preventive and rehabilitative maintenance and preservation to (1) provide a safe, sanitary, environmentally protective, and aesthetically pleasing environment for park visitors and employees; (2) protect the physical integrity of facilities; and (3) preserve or maintain facilities in their optimum sustainable condition to the greatest extent possible.



Preventive and rehabilitative maintenance programs would incorporate sustainable design elements and practices to ensure that water and energy efficiency, pollution prevention, and waste prevention and reduction are standard practice.”

Enforcement

The NPS law enforcement program is managed and supervised in accordance with all applicable laws and regulations; Part 446 of the Department of the Interior Manual; all applicable Secretarial directives, the NPS *Management Policies 2006*; and *Director’s Order #9: Law Enforcement Program* and Reference Manual #9 (or U.S. Park Police General Orders, as appropriate). The authority and responsibility to manage the NPS Commissioned Park Ranger program and U.S. Park Police operations would flow in a logical order from the Director and in accordance with departmental policy. To help sustain the high level of public trust necessary for an effective law enforcement program, commissioned employees would adhere to the Department of the Interior’s law enforcement code of conduct and the standards of ethical conduct found in Reference Manual 9.

4.10.2 Assumptions, Methodology and Impact Thresholds

Park management and operations, for the purpose of this analysis, refers to the quality and effectiveness of park staff to maintain and administer park resources and provide for an effective visitor experience. This includes an analysis of the projected need for NPS staff time and materials in relation to the visitor services provided under each of the alternatives. The analysis also considers possible staff changes necessary to address the actions proposed under the alternatives and details the adverse or beneficial effects that may occur.

The following thresholds for evaluating impacts on park operations and management were defined and applied to adverse impacts:

Negligible: Park operations would not be affected or an action would have no measurable impact on operations in the park unit.

Minor: Effects to park operations would not be readily apparent and difficult to measure. The impacts on park operations and budget would have little material effect on other ongoing park operations.

Moderate: Effects to park operations would be readily apparent and would measurably affect park operations. The changes would be noticeable to park staff and visitors. Mitigation measures would probably be necessary to compensate for adverse effects and would likely be successful.

Major: Effects to park operations would be readily apparent and would result in a substantial change to park operations. The changes would be noticeable to park staff and visitors and be markedly different from existing operations. Mitigation measures would be necessary to compensate for adverse effects, and their success would not be guaranteed.

Analysis area: The area of analysis for park management and operations includes direct impacts to park management and operations as a result of project activities that would occur along the 10.7-mile project corridor along Tamiami Trail. The area of analysis for park management and operations also includes indirect impacts to park management and operations within Everglades National Park that occur as a result of activities associated with the project.



4.10.3 Impacts of the Alternatives

No-Action Alternative

Analysis. If the No-Action Alternative is selected as the preferred alternative, there would be no additional direct or indirect short- or long-term impacts on park management and operations other than those already realized from construction of the 2008 LRR preferred alternative (1-mile eastern bridge). Activities associated with park management and operations (e.g., education and interpretation, maintenance, and enforcement) would be expected to continue as currently practiced within Everglades National Park.

Cumulative Impacts. Past, present, and reasonably foreseeable future actions would not affect park management or operations by causing changes in the way the park is currently managed or operated. The No-Action Alternative is also not anticipated to have any impact on park management or operations. Therefore, the No-Action Alternatives and other related actions will have no cumulative impact on park management or operations.

Conclusion. No short- or long-term adverse or beneficial effects to park management and operations would result from the selection of the No-Action Alternative.

Action Alternatives

Analysis. Activities associated with park management and operations (e.g., education and interpretation, maintenance, and enforcement) would experience no long-term change due to the implementation of any of the action alternatives (Alternatives 1 through 6e) proposed for the project. A minor impact on park management might occur in the short-term due to oversight of the project that would be required as a result of implementation of any of the action alternatives. Since bridge length is the only variable factor between the action alternatives, the thresholds for both short- and long-term impacts would be the same for all of the action alternatives.

Short-term impacts to park management and operations would be limited to the project management and oversight required by NPS personnel during the design and construction phases of the project. Personnel from the park would be required to coordinate permitting of the project, oversee and contribute to decisions associated with project design, respond to any public inquiries associated with the project, and oversee construction of any of the action alternatives. Since this requirement would be limited to the time-frame of the project and such a project falls under the normal duties of park staff, the impact to park management as a whole would be expected to be short-term and minor.

All education and interpretation activities currently provided and conducted by NPS would be expected to continue as currently practiced within Everglades National Park. All visitor use activities provided by the NPS would also be expected to continue as currently practiced with the exception of the minor limiting circumstances mentioned in the discussion of impacts to visitor use and experience (Section 4.9.3). Therefore, there would be no long-term impact on the education and interpretation responsibility of park management as a result of the implementation of any of the action alternatives.

The 264-mile section of U.S. Highway 41 referred to as Tamiami Trail is currently managed and maintained by the Florida Department of Transportation (FDOT) under the jurisdiction of the U.S. Department of Transportation. Coordination concerning long-term management of the roadway post-construction of the project has been conducted with FDOT representatives since project inception and throughout the project scoping process. Coordination efforts with FDOT representatives indicated that FDOT would own the roadway and bridges at the conclusion of any construction completed for this project and FDOT would continue to be responsible for maintenance activities associated with the roadway and bridges. Therefore, there would be no



long-term impact on the maintenance responsibility of park management as a result of the implementation of any of the action alternatives. If any visitor use facilities are added to this project (i.e., such as a visitor's kiosk) as an optional feature, the NPS be responsible for the maintenance of those facilities or responsible for contracting another entity to maintain those facilities. However, no such facilities are currently planned as a part of any of the proposed action alternatives.

Illegal activities that have occurred or may occur along the section of Tamiami Trail within the project area which may require enforcement consist of: littering and improper disposal of waste along the roadway; illegal fishing activities in the surrounding waterways; tampering with or harassing threatened and endangered wildlife; trespassing on private or government property; and traffic-related infractions. However, none of these activities would typically fall under the enforcement jurisdiction of the NPS. The local law enforcement agencies that currently have jurisdiction of the areas along the project corridor would continue to have the jurisdiction and responsibility for enforcement activities during and after any project construction. If necessary, these law enforcement agencies could coordinate with the appropriate federal, state, or local environmental agencies (e.g., EPA, USFWS, FDEP, FFWCC, and DERM) for any issues that arise regarding impacts to wildlife or the environment. Any environmental issues arising within the boundaries of Everglades National Park could be handled by NPS staff at the park, but since these activities would be expected to fall under the realm of activities ordinarily conducted for the park, no additional long-term impact would be expected to result from implementation of any of the action alternatives. Therefore, there would be no long-term impact on the enforcement responsibility of park management as a result of the implementation of any of the action alternatives.

The *Second Report and Initial Recommendations* published by the Miami-Dade CCATF states that global warming would result in many changes to the natural environment, "including changing atmospheric circulation and temperature patterns, changes in rainfall and severe weather, changes in biologic community distribution, increased extinction rates, changes in disease and pest distribution, and changes in sea level" (CCATF, 2008). All these environmental impacts would affect South Florida, Everglades National Park, and the project area within the next century, with the key concern for the low topography project area being rising sea level, "with a very high likelihood" that the sea level would rise an additional 1.5 feet in the next 50 years and a cumulative total of three to five feet within a century (CCATF, 2008). Park management and operations would be impacted by shifting ecosystems and the increased water levels within the park that would result from saltwater intrusion into the interior freshwater marshes of the southern ENP.

Combined, all of these effects to the various aspects of park management and operations would cause no long-term impact.

Cumulative Impacts. Past, present, and reasonably foreseeable future actions would not affect park management or operations by causing changes in the way the park is currently managed or operated. The action alternatives (1-6e) of the proposed project also are not anticipated to have any impact on park management or operations. Therefore, the No-Action and action alternatives of the proposed project in conjunction with other actions will have no cumulative impact on park management or operations.

Conclusion. Activities associated with park management and operations (e.g., education and interpretation, maintenance, and enforcement) would experience no long-term impact due to the implementation of any of the action alternatives (Alternatives 1 through 6e) proposed for the project. A minor, localized, adverse impact on park management might occur in the short-term



due to oversight of construction activities that would be required as a result of implementation of any of the action alternatives.

4.11 Noise/Soundscapes

4.11.1 Guiding Regulations and Policies

In accordance with NPS *Management Policies* (2006) and *Director's Order-47: Sound Preservation and Noise Management* (NPS 2000), an important part of the NPS mission is preservation of natural soundscapes associated with national park units. Natural soundscapes exist in the absence of human-caused sound. The natural ambient soundscape is the aggregate of all the natural sounds that occur in park units, together with the physical capacity for transmitting natural sounds. Natural sounds occur within and beyond the range of sounds that humans can perceive and can be transmitted through air, water, or solid materials.

As stated in the *Director's Order-47*, natural sounds are intrinsic elements of the environment that are often associated with parks and park purposes. They are inherent components of the "scenery and the natural and historic objects and the wildlife" protected by the NPS Organic Act. Intrusive sounds are of concern to the NPS because they can impede the NPS's ability to accomplish its mission.

By definition, noise is human-caused sound that is considered unpleasant and unwanted. Whether a sound is considered unpleasant depends on the individual who hears the sound and the setting and circumstance under which the sound is heard. While performing certain tasks, people expect and, as such, accept certain sounds that are considered unpleasant under other circumstances. For example, if a person works in an office, sounds from printers, copiers, telephones, and keyboards are generally acceptable and not considered unduly unpleasant or unwanted. By comparison, when resting or relaxing, these same sounds may be intolerable.

Sound levels are usually measured in A-weighted decibels (dBA), and descriptors such as the energy equivalent noise level (Leq) and the day-night average noise level (Ldn) are commonly used to account for fluctuations of sound over time. Generally, a 3 dBA increase in ambient sound levels is considered the minimum threshold at which most people can detect a change in the sound environment; an increase of 10 dBA is perceived as a doubling of the ambient sound level.

Sounds found desirable during times of rest and relaxation are referred to as natural quiet, and include natural, outdoor ambient sounds, without the intrusion of human-caused sounds. Natural sounds throughout Everglades National Park – including flowing water, animals, and rustling leaves – are not considered noise. The enjoyment of natural sounds in Everglades National Park enhances the visitor's experience, and natural quiet can be essential in order for some individuals to achieve a feeling of peace and solitude.

Since this project involves modifications to a Federally funded State highway, Federal and State (FDOT) highway noise regulations were referenced in performing the highway noise analysis for nearby noise sensitive sites. The Federal highway noise impact regulation is 23CFR772, the State of Florida regulation is Florida Statute Chapter 335.17. In accordance with these regulations, FHWA and FDOT criteria were used to assess highway noise impacts.

4.11.2 Assumptions, Methodology and Impact Thresholds

For the purposes of this analysis, impacts to the natural ambient soundscape would reference visitor experiences and existing conditions. Context, time of day, duration and intensity of noise together determine the level of impact for an activity associated with human-generated sound.



The following thresholds for evaluating impacts on soundscapes were defined and applied to adverse impacts:

Negligible: Natural sounds would prevail; activities associated with noise (human-generated sound) would be very infrequent or absent.

Minor: Natural sounds would predominate within the human-generated sounds from appropriate recreational activities can be heard occasionally.

Moderate: Natural sounds would predominate, but activities associated with noise would occur occasionally at low to moderate levels. Human activity associated with noise is consistent with park objectives, noise would predominate during daylight hours during periods of peak use. Noise (activity) would not be overly disruptive to noise-sensitive visitor activities and natural sounds could still be heard.

Major: Natural sounds would be impacted by activities associated with noise frequently or for periods of extended time. Where activities associated with human-generated noise are consistent with park objectives, the natural soundscape would be impacted most of the day throughout the week during the peak season. Noise would disrupt conversation for long periods of time, and make enjoyment of other activities in the area difficult.

Short-Term: Impacts to the natural soundscape occurring during the period of construction.

Long-Term: Impacts that affect visitor use patterns and consequently the associated impacts of human generated noise on the natural soundscape for years to come.

Impairment: The level of noise would be heard consistently and would be readily perceived by other visitors throughout the day during the peak season such that a visitor to the park during the peak season within this zone would rarely have an opportunity to experience the natural soundscape. In addition, these adverse, major impacts to park resources and values would contribute to deterioration of the park's soundscape to the extent that the park's purpose could not be fulfilled as established in its enabling legislation; affect resources key to the park's natural or cultural integrity or opportunities for enjoyment; or affect the resource whose conservation is identified as a goal in the park's general management plan or other planning documents.

Analysis area: The area of analysis for soundscapes is within approximately 1,500 feet of the alignment of the Tamiami Trail. Beyond this distance, highway noise levels are expected to drop off to nearly background levels and be minimally intrusive.

Methodologies used to evaluate highway noise impacts for nearby noise sensitive sites such as residences were taken from 23CFR772 and Part 2, Chapter 17 of the FDOT PD&E Manual. The FHWA has developed Noise Abatement Criteria (NAC) for most common land use types. In conjunction with the FHWA NAC, highway noise impacts were also assessed using the FDOT's Noise Abatement Approach Criteria (NAAC). The FDOT defines "approach" as meaning within 1.0 dBA of the NAC for each Land Use Activity Category (LUAC). Noise abatement is considered for projects where highway noise levels approaching or exceeding the FHWA NAC are predicted to occur as a result of increased roadway capacity or significant alterations to the roadway geometry. The FHWA NAC and FDOT Noise Abatement Approach Criteria (NAAC) are presented in **Table 4-9**. Noise abatement is also considered when a substantial noise level increase is predicted to occur. A substantial noise level increase is defined by the FDOT and accepted by FHWA for use in Florida as one where the existing noise level is predicted to be exceeded by 15 dBA or more as a result of a transportation improvement project.

The FHWA's Traffic Noise Model (TNM) was used to predict highway noise levels for the three areas identified in Section 3.10 of this EIS. Model receiver locations within these areas were



selected based upon site characteristics including topography, number of buildings, building arrangement, recreation or other outdoor use areas, building location with respect to the highway, and site features such as fences and walls. Please refer to **Table 3-16** in Chapter 3 for a description of the model receiver sites used for this analysis. Model input data for other project features, such as roadways and canals, were taken from the project’s roadway design concepts and from aerial photographs of the project study area. Peak-hour highway noise levels were predicted for all of the Design Year alternatives, including the No-Action Alternative. Since all of the action alternatives are functionally the same with regard to highway noise levels at the three noise sensitive areas, they are treated as a single “action alternative” for the purposes of the noise analysis.

Table 4-9 – FHWA Noise Abatement Criteria and FDOT Noise Abatement Approach Criteria

Land Use Activity Category	FHWA NAC (L _{Aeq1h})	FDOT NAAC (L _{Aeq1h})	Description of Activity Category
A	57 dBA (Exterior)	56 dBA (Exterior)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose
B	67 dBA (Exterior)	66 dBA (Exterior)	Picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries, RV parks, day care centers and hospitals.
C	72 dBA (Exterior)	71 dBA (Exterior)	Developed lands, properties, or activities not included in Categories A or B above
D	Not Defined	Not Defined	Undeveloped lands
E	52 dBA (Interior)	51 dBA (Interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums

According to 23CFR772 and Part 2, Chapter 17 of the FDOT PD&E Manual, the reasonableness and feasibility of noise abatement must be considered for noise sensitive sites where the FHWA’s NAC is approached or exceeded. Potential abatement measures that were considered include the following:

Traffic Management Measures (e.g. traffic control devices and signing for prohibition of certain vehicle types, time-use restriction for certain vehicle types, modified speed limits, and exclusive lane designations);

Alignment Modifications;

Construction of Noise Barriers Within the Highway Project's Right-of-Way;

Acquisition of Property Rights (either in fee or lesser interest) for Construction of Noise Barriers by Donation, by Purchase or by Condemnation;

Acquisition (by purchase or condemnation) of Right-of-Way for Landscaping Adjacent to Noise Barriers and for Buffer Zones; and,



Acquisition (by purchase or condemnation) of the Balance of a Noise-Sensitive Property from Which There is a Taking, if Acquisition is Less Expensive and Disruptive than the Methods Shown Above.

The FDOT specifies a FHWA accepted design noise level reduction goal of 10 dBA and minimum acceptable reduction of 5 dBA for assessing the feasibility of noise abatement along State highways. Noise barrier costs are estimated using the current FDOT statewide cost estimate for noise barrier construction (\$30.00 per square foot). A maximum cost guideline of \$42,000 per benefitted receiver site as presented in Chapter 17 of Part 2 of the FDOT PD&E Manual is used in assessing the cost reasonableness of any noise barriers.

4.11.3 Impacts of the Alternatives

Predicted design-year (2038) highway noise levels for all of the nearby noise sensitive sites are presented in **Table 4-10**.

Table 4-10 – Predicted Design Year Highway Noise Levels

LOCATION	RECEIVER NUMBER	FHWA LAND USE ACTIVITY CATEGORY	PREDICTED DESIGN YEAR (2038) HIGHWAY NOISE LEVELS* (dBA)	
			No-Action	Action
Flight 592 Memorial	Flt592	B	58.2	59.3
Osceola Camp	OC-1	B	68.2	69.0
	OC-2	B	59.3	62.1
	OC-3	B	55.7	58.1
	OC-4	B	60.1	63.0
	OC-5	B	61.7	62.9
Tiger Tail Camp	TTC-1	B	58.2	59.5
	TTC-2	B	59.2	60.5

*Bold numbers indicate noise levels approaching or exceeding the FHWA NAC.

No-Action Alternative

Analysis. If the No-Action Alternative is selected as the preferred alternative, there would be no additional direct or indirect short- or long-term impacts on soundscapes other than those already realized from construction of the 2008 LRR/EA preferred alternative (1-mile eastern bridge). Traffic levels along the Tamiami Trail are predicted to grow from the current level of 5,800 vehicles per day (vpd) to 7,200 vpd by 2038 regardless of project construction. Design Year highway noise levels at noise sensitive sites (Flight 592 Memorial, Osceola Camp, and Tiger Tail Camp) along the project corridor are predicted to only increase by an average of approximately 1 dBA from the existing conditions, far less than the 3 dBA minimum threshold where most people can detect a change in the sound environment. This slight noise level increase is due to naturally occurring growth in traffic volumes expected by 2038.



Cumulative Impacts. Past, present, and reasonably foreseeable future actions are not expected to appreciably affect existing noise levels, additionally the No-Action Alternative will have no impact on noise or soundscapes. Therefore, Cumulative effects on noise as a result of related actions would be negligible.

Conclusion. No short-term impacts and localized, negligible, long-term, adverse impacts to soundscapes would result from the selection of the No-Action Alternative. Consequently, there would be no impairment to soundscapes as a result of the No-Action Alternative.

Action Alternatives

Analysis. The short-term effects of the action alternatives related to highway noise are primarily due to construction of the project. There are no known businesses particularly sensitive to construction noise along the project corridor. No known County or local ordinances that set specific limitations on construction noise levels are applicable to this project. In accordance with NPS Management Practices, construction activities would be limited to the smallest area possible in order to minimize impacts, including noise impacts. Also, the contractor would be required to adhere to the latest edition of FDOT *Standard Specifications for Road and Bridge Construction*. Specifications include noise screening guidelines for stationary equipment, exhaust noise, noise from loose equipment parts, and excessive tailgate banging. It is anticipated that short-term noise impacts during construction would be moderate and localized to areas near the construction zone.

The long-term effects of the action alternatives with regard to highway noise are primarily due to operation of the project. Highway noise levels with the action alternatives are predicted to increase slightly due to planned minor horizontal and vertical realignment of the roadway and due to greater traffic volumes expected by 2038. Design Year, peak-hour noise levels at the Flight 592 Memorial are predicted to be 59.3 dBA with the action alternatives, representing increases of 2.0 dBA above the existing conditions and 1.1 dBA above the No-Action noise levels. At the Osceola Camp, Design Year, peak-hour noise levels are predicted to range from 58.1 to 69.0 dBA with the action alternatives. The action alternative noise levels at the Osceola Camp are predicted to increase by 2.0 dBA above the existing conditions and 1.0 dBA above the No-Action noise levels. Design Year, peak-hour noise levels in the Tiger Tail Camp are predicted to range from 59.5 to 60.5 dBA with the action alternatives. The action alternative noise levels are predicted to increase by 2.3 dBA above the existing conditions in the Tiger Tail Camp and 1.3 dBA above the No-Action noise levels.

Compared to the noise levels predicted with the No-Action Alternative, Design Year highway noise levels with the action alternatives are predicted to increase by far less than the 3 dBA minimum threshold where most people can detect a change in the sound environment. Furthermore, none of the action alternative noise levels are predicted to increase substantially from existing noise levels. Thus, none of the noise sensitive sites are expected to experience noticeable noise level increases with the action alternatives and the overall impact to the natural soundscape is expected to be negligible in comparison to the No-Action Alternative.

With the exception of one (1) first row residence at the Osceola Camp, the predicted noise levels with the action alternatives do not exceed the FDOT NAAC or the FHWA NAC. According to 23CFR772 and Chapter 17 of the FDOT PD&E Manual, the reasonableness and feasibility of noise abatement must be considered for the residence in the Osceola Camp where the FHWA's NAC was exceeded. Traffic management measures and alignment modifications were considered in order to abate highway noise but were found to be infeasible and ineffective given the function and location of Tamiami Trail. The noise abatement measures incorporating property acquisition are also not considered feasible given the proximity of the Osceola Camp to



Tamiami Trail. Construction of a long continuous noise barrier located within highway right-of-way as close as possible to the one (1) impacted residence was considered further. The FHWA's TNM model was used to develop conceptual noise barrier designs.

A noise barrier up to 22 feet tall was evaluated along the south side of Tamiami Trail adjacent to the Osceola Camp. In order to maintain access to the camp through the main driveway entrance, two noise barrier segments extending at least 180 feet from the driveway in both directions would be required. It was found that it would not be possible to reduce noise levels by at least 5 dBA at the impacted residence due to the required driveway opening. In addition, it would not be possible to benefit enough residences in this community with a noise barrier that costing less than the FDOT's noise barrier cost threshold of \$42,000 per benefited site. Thus, it was determined that it was not possible to provide reasonable and feasible noise abatement for the one (1) impacted residence in the Osceola Camp and a noise barrier would not be considered further for this community.

Cumulative Impacts. Cumulative effects on noise would be negligible because the localized minor impacts associated with the action alternatives (1-6e) of the proposed project would not add to noise impacts of related actions in other locations.

Conclusion. By following the NPS management practices and FDOT standards, no impairment or unacceptable impacts to noise sensitive sites in the project study area are expected to occur as a result of construction of this project. Likewise, considering the existing conditions and the long-established presence of traffic along the Tamiami Trail, the negligible increase in highway noise predicted to occur with the action alternatives is not expected cause operation and maintenance of this project to result in impairment or unacceptable impacts to nearby noise sensitive sites or the park's soundscape. Therefore it is concluded that the proposed project would cause short-term, moderate, adverse, localized, effects to the park's soundscape associated with project construction; however, there would be no long-term effects associated with the project's operation.

4.12 Socioeconomics

4.12.1 Guiding Regulations and Policies

Executive Order 12898

In February 1994, the President of the United States issued Executive Order 12898 requiring federal agencies to analyze and address, as appropriate, disproportionately high adverse human health and environmental effects of federal actions on ethnic and cultural minority populations and low income populations, when such analysis is required by the National Environmental Policy Act of 1969.

The U.S. Environmental Protection Agency (USEPA) defines environmental justice as:

The fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means that no group of people, including racial, ethnic, or socioeconomic group should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of federal, state, local, and tribal programs and policies.

“Meaningful involvement” means that: (1) potentially affected community residents have an appropriate opportunity to participate in decisions about a proposed activity that will affect their environment and/or health; (2) the public's contribution can influence the regulatory agency's



decision; (3) the concerns of all participants involved will be considered in the decision-making process; and (4) the decision-makers seek out and facilitate the involvement of those potentially affected.

An adverse effect on minority and/or low-income populations occurs when: 1) The adverse effect occurs primarily to a minority and/or low income population; or 2) the adverse effect suffered by the minority and/or low-income population is more severe or greater in magnitude than the adverse effect suffered by the non-minority and/or non-low-income populations.

4.12.2 Assumptions, Methodology and Impact Thresholds

The following five elements were considered in the socioeconomic impact analysis:

- The socioeconomic profile of the study area;
- The anticipated effects of the alternative bridge configurations on the national economic development account;
- An evaluation of the project costs versus the project benefits;
- An evaluation of the regional economic development effects; and
- Other social effects that may be realized by the implementation of the alternatives.

This EIS is responsible for considering a variety of social conditions relevant to the project. These conditions are interconnected with the economics of the project; and are inclusive of elements such as demographics, water demand, and a variety of other considerations.

Socioeconomic Profile of the Study Area

This profile includes population and economic forecasts for the region, using a GIS delineated zone of concern surrounding the project footprint.

Anticipated Effects of Alternative Projects on the National Economic Development Account

Alternative plans could result in positive or negative impacts to net national economic efficiency due to project induced impacts to the following in South Florida:

- Agricultural Water Supply
- Municipal and industrial water supply
- Flood protection
- Recreation
- Commercial and recreational fishing
- Transportation

Regional Economic Development (Red) Effects

The Regional Economic Development (RED) effects of the alternatives include changes in income, employment, or economic output of the region.

This project analysis examines the potential effects of the alternative plans on the RED account. The RED account registers indirect and secondary effects to the region that are expected to result from the direct expenditures of the alternative plans. Direct economic effects represent the impacts of economic stimuli in terms of changes in regional industrial output, earnings, or employment. Indirect economic impacts represent the resultant economic changes in the industries that support and rely upon the industries directly affected by the stimuli. In addition,



induced economic impacts are those impacts experienced by all local industries as direct and indirect effects alter household income and ultimately change local household spending patterns.

A regional input-output model, *IMPLAN*, was used to estimate the RED effects of the alternative plans. Regional input-output (I-O) analysis provides the classic tool for tracing economic impacts throughout the regional economy. Based on the region's industrial structure, I-O analysis tracks the expected inter-industry flow of goods and services. For the RED analysis, the regional economy was defined as encompassing Miami-Dade County using *IMPLAN*. Using county-level economic data, which was procured from the software vendor, the model was used to estimate the economic effects of the alternatives on wages, employment, and production output (sales). Specifically, *IMPLAN* was employed in a four-part methodology to: (1) describe the study area economy, (2) create economic scenarios, (3) introduce economic changes, and (4) estimate resulting direct, indirect, and induced economic effects.

Real Estate and Effects of Other Land Acquisitions. Real estate sales may result in various impacts to the local economy. The sale of land may be regarded as a simple change in which the owner held the value in real estate and now holds an equal value in cash. If the cash is spent locally or reinvested in regional enterprise, then new economic activity might be stimulated in the region and even more funds might be leveraged by the enterprise.

Alternatively, a real estate transaction resulting in a transfer of funds into a regional bank may experience a general economic expansion in the region as supported through the banking multiplier if the funds are invested locally. If, however, there is foreign or corporate land ownership, then the expansionary effects of large transfers of funds may not occur in the study area. A similar result would occur if funds were held in a foreign bank. Additionally, if the land is owned by a governmental agency, then it may just be a land transfer resulting in very little regional economic effect.

Due to the ambiguity of the ultimate use of real estate funds, the expenditures on land were not input into the *IMPLAN* model. Therefore, the regional impacts of real estate purchases were assumed to be minimal and not calculated. If it were possible to know more about the future use of these funds, expenditures for land, commissions, leases, appraisal fees, title fees, and other administrative activities involved with real estate, those values could be used in the *IMPLAN* analysis or another model. However, even with a higher degree of certainty regarding the future of this knowledge, it is anticipated that the financial inputs would be marginal, and any regional impact model would have significant reliability concerns.

The anticipated Regional Economic Effects would be a one time injection into the local economy, lasting the duration of the construction, and would cease upon the completion of construction.

Other Social Effects (OSE)

The potential social effects of the SAP include effects on minority, elderly, and disadvantaged groups, population displacements, and effects on community cohesion.

Impact Thresholds

The following thresholds were used to assess socioeconomic impacts:

Negligible – The effects on socioeconomic conditions are below or at the level of detection and localized.



Minor – The effect on socioeconomic conditions are slight but detectable, and only affect a small number of national historical park services and/or a small portion of the surrounding population. The impact would be considered slight and not detectable outside the affected area.

Moderate – The effects on socioeconomic conditions are readily apparent. Any effects would result in changes to socioeconomic conditions on a local scale in the affected area.

Major – The effects on socioeconomic conditions are readily apparent. Measurable changes in social and economic conditions at the county level occur. The impact is severely adverse or exceptionally beneficial within the affected area.

4.12.3 Impacts of the Alternatives

No-Action Alternative

Analysis. If the No-Action Alternative is selected as the preferred alternative, there would be no additional direct or indirect short- or long-term impacts on socioeconomics other than those already realized from construction of the 2008 LRR preferred alternative (1-mile eastern bridge). Commercial activities would be expected to continue as currently practiced within the study area.

Cumulative Impacts. Past, present, and reasonably foreseeable future actions have resulted in the removal of agricultural lands (sugar cane) from production and the conversion of these lands to wetlands and water treatment reservoirs. This shift of land use can cause downward shifts in employment numbers and tax bases. However, construction of Everglades restoration projects provides employment and revenues to local communities. The implementation of the No-Action Alternative would have a negligible effect on socioeconomics and environmental justice. Therefore, cumulative effects of related actions would be negligible.

Conclusion. No short- or long-term adverse or beneficial effects to socioeconomics would result from the selection of the No-Action Alternative.

Action Alternatives

Analysis.

IMPLAN Regional Economic Effects Results

RED effects have only been calculated for construction expenditures and not for changes resulting from impacts to navigation, water usage, flood control or real estate expenditures. Economic impacts to total industry output and employee compensation are expected to persist through each year of construction. Wages include salaries, non-wage compensation, and benefits. Employment is measured as the number of jobs, not necessarily full-time equivalents.

Table 4-11 and **Table 4-12** present the *IMPLAN* output for direct, indirect, and induced impacts of the alternatives on employee compensation and regional output (sales), and **Table 4-13** provides an indicator of the employment effects of the construction expenditures. These impacts account for less than one percent of total economic activity in each of the different output categories.



Table 4-11 – Direct, Indirect, and Induced Impacts on Employee Compensation as a Result of IMPLAN Model Runs (2007 Dollars)

Alternative	Direct	Indirect	Induced	Total
1	\$35,357,666	\$15,871,179	\$13,481,327	\$64,710,171
2a	\$40,839,474	\$18,331,826	\$15,571,455	\$74,742,755
4	\$23,297,687	\$10,457,753	\$8,883,045	\$42,638,485
5	\$28,231,314	\$12,672,336	\$10,764,160	\$51,667,811
6e	\$71,263,512	\$31,988,422	\$27,171,666	\$130,423,600

Table 4-12 – Direct, Indirect, and Induced Impacts on Regional Output as a Result of IMPLAN Model Runs (2007 Dollars)

Alternative	Direct	Indirect	Induced	Total
1	\$129,000,000	\$45,099,876	\$44,154,139	\$218,254,015
2a	\$149,000,000	\$52,092,105	\$50,999,742	\$252,091,847
4	\$85,000,000	\$29,716,973	\$29,093,813	\$143,810,785
5	\$103,000,000	\$36,009,979	\$35,254,855	\$174,264,834
6e	\$260,000,000	\$90,898,975	\$88,992,839	\$439,891,814

Table 4-13 – Direct, Indirect, and Induced Impacts on Employment as a Result Of IMPLAN Model Runs (2007 Dollars)

Alternative	Direct	Indirect	Induced	Total
1	1,105	365	371	1,841
2a	1,276	422	428	2,126
4	728	241	244	1,213
5	882	292	296	1,470
6e	2,227	736	747	3,710

Other Social Effects

The other social effects account considers the effects of alternative plans in areas that are not already contained in the NED and regional economic development accounts. The alternative plans could result in either beneficial or adverse other social effects within the study area. The categories of effects contained within the other social effects account include:

- Urban and community impacts including effects on income, employment and population distribution
- Life, health, and safety factors (including slowed evacuation during emergencies)
- Displacement, Long-term productivity
- Energy requirements and energy conservation



Project alternatives have the potential to raise property values in the surrounding area, increase attractiveness to the community, increase recreational opportunities, and improve environmental health such as water and air quality among other impacts. All of these factors could influence the demographics of the surrounding community which may or may not have implications for environmental justice issues.

The alternatives of this project all require an increased roadway footprint. Despite the area needed, there is currently very little development and population in the immediate project area; this would help to avoid any adverse social effects. All alternatives are being formulated to minimize impact on the Tigertail and Osceola Camps and the Airboat Association, and limit any adverse impacts to the Florida Gladesmen.

Real Estate

There are five privately owned parcels located along Tamiami Trail that were originally authorized for acquisition by DOI as part of *Everglades National Park Protection and Expansion Act of 1989*. Specifically, Section 103(d) of the Everglades National Park Protection and Expansion Act of 1989 authorize DOI to “negotiate and enter into concession contracts with the owners of commercial airboat and tour facilities in existence on or before January 1, 1989.” The *1991 East Everglades Land Protection Plan/EA* provided further guidance for the acquisition of the parcels by stating that “it will be necessary to acquire all within the park addition in fee” to comply with the Congressional intent of Public Law 101-229. The DOI, through the NPS, is evaluating in the *Everglades National Park General Management Plan/East Everglades Wilderness Study/Environmental Impact Statement*, the appropriate use and disposition of these parcels.

Current owners of these parcels are identified as: Salem Communications radio tower, Coopertown, Gator Park, Everglades Safari Park, and Lincoln Financial radio tower. The Airboat Association of Florida is the owner of a piece of land that lies within the area determined to possibly be affected by the project. A flowage easement would be necessary for project purposes. This particular parcel was specifically excluded from the boundary of the ENP map at or about the time Public Law 101-229 was enacted.

There are also a number of utility companies that have their facilities located in the State owned right-of-way for Tamiami Trail. These consist of electric, telephone and fiber optic cables. The work on the Tamiami Trail would involve raising the roadbed and the construction of bridges. The work would impact all the utility facilities in the highway right of way necessitating their relocation. The FDOT has issued permits to the various utilities to allow placement of their facilities within the right-of-way. The issue becomes whether under local law this gives the utilities a property right.

For additional information about the socioeconomic impacts of the project, refer to **Appendix F** – Socioeconomic Report. For additional information about the impacts of real estate acquisition associated with the project, refer to **Appendix G** – Real Estate Report.

Cumulative Impacts. Past, present, and reasonably foreseeable future actions have resulted in the removal of agricultural lands (sugar cane) from production and the conversion of these lands to wetlands and water treatment reservoirs. This shift of land use can cause downward shifts in employment numbers and tax bases. However, construction of Everglades restoration projects provides employment and revenues to local communities. Cumulative effects of implementation of any of the action alternatives or combined with other past and future projects in the area would have some positive effect on employment, gross output, and the gross regional product of Miami-Dade County; and to a lesser extent, the State of Florida, and any social impacts would be minimal. Additionally, no disproportionate adverse environmental impacts would be expected



to occur to any racial, ethnic, or socioeconomic group. Therefore, overall cumulative impacts from the selection of any of the action alternatives in conjunction with related actions in other areas would be long-term and beneficial.

Conclusion. Implementation of any of the action alternatives would have some positive effect on employment, gross output, and the gross regional product of Miami-Dade County; and to a lesser extent, the State of Florida, and any social impacts would be minimal. Therefore, the long-term impacts from the selection of any of the action alternatives would be beneficial.

4.13 Transportation

4.13.1 Guiding Regulations and Policies

In accordance with NPS *Management Policies* (2006) “the location, type, and design of transportation systems and their components (e.g., roads, bridges, trails, and parking areas), and the use of alternative transportation systems all strongly influence the quality of the visitor experience.” Pursuant to management policy guidance consideration should be given to whether a proposed transportation project would be appropriate and necessary to meet park management needs or to provide for visitor use and enjoyment and would reduce traffic congestion, noise, air pollution and adverse effects on park resources.

Director’s Order #87D: Non-NPS Roads sets up a system where the NPS can be a participant in decision making where non-NPS maintain roads are to be constructed on NPS property. Pursuant to this Order the NPS is to take into consideration all impacts that construction or modification of a non-NPS maintained road would have on park resources.

4.13.2 Assumptions, Methodology and Impact Thresholds

The Federal Highway Administration (FHWA) has designated LOS C as the minimum acceptable LOS standard on federal facilities; however, the FHWA has stated that LOS standards vary by facility type (i.e., urban freeways, mountainous roads, etc.). For this analysis, a peakhour LOS C is taken as the threshold for acceptable traffic operations along the Tamiami Trail.

Impact threshold definitions for traffic are as follows:

Negligible: There would be no change in the number of vehicles. Tamiami Trail would operate at LOS B.

Minor: There would be a small increase in the number of vehicles. Tamiami Trail would continue to operate at LOS B.

Moderate: Increases in the number of vehicles would be apparent. Tamiami Trail would experience a decrease to LOS C.

Major: Increases in the number of vehicles would be noticeable to all motorists. Tamiami Trail would experience a decrease to LOS D or F.

Analysis area: The area of analysis for transportation is the 10.7 mile Tamiami Trail project corridor.

4.13.3 Impacts of the Alternatives

No-Action Alternative

Analysis. If the No-Action Alternative is selected as the preferred alternative, there would be no additional direct or indirect short- or long-term impacts on transportation other than those



already realized from construction of the 2008 LRR preferred alternative (1-mile eastern bridge). Transportation/traffic would be expected to remain unchanged.

Cumulative Impacts. On-going and future related actions are not anticipated to impact traffic levels, while the No-Action Alternative is expected not to increase traffic levels within the project area. Therefore, past, present, and reasonably foreseeable actions will have a negligible cumulative effect on traffic.

Conclusion. No short- or long-term adverse or beneficial effects to transportation would result from the selection of the No-Action Alternative.

Action Alternatives

Analysis. Under all action alternatives no increases in traffic levels are anticipated due to the proposed project improvement to Tamiami Trail. Future projected increases in traffic volumes are tied to population growth and not project improvements. Traffic volume along Tamiami Trail within the proposed project area was estimated to be 5,375 vehicles per day in 2000 (USACE 2005) with the latest (2008) traffic estimate at 5,200 vehicles per day (USACE 2009), therefore traffic volume has shown no net increase in almost a decade. By 2018 traffic volume is anticipated to increase to 5,800 vehicles or by only 600 vehicles per day (USACE 2009). Assumed traffic Level of Service for Year 2038 for Tamiami Trail remains at LOS B (USACE 2009). Short-term transportation-related impacts such as lane closures, reduced speed limits, and reduced accessibility to visitor facilities/activities would be limited to the areas currently under construction and would be mitigated by measures such as a Maintenance of Traffic (MOT) plan and construction scheduling during off-peak traffic hours.

Cumulative Impacts. On-going and future related actions are not anticipated to impact traffic levels, while the action alternatives (1-6e) of the proposed project are expected not to increase traffic levels within the project area. Therefore, the proposed action alternatives along with related projects will have a negligible cumulative effect on traffic.

Conclusion. Transportation effects associated with the action alternatives (1-6e) would be adverse, local, minor, and short-term and primarily associated with traffic delays related to construction activities. Mitigation of these effects would be through implementation of maintenance of traffic (MOT) plans. No long-term increases in traffic levels are associated with any of the action alternatives.

4.14 Hazardous, Toxic, and Radioactive Waste

4.14.1 Guiding Regulations and Policies

Park Service Resource Protection Act (PSRPA) – This act provides the NPS separate authority to collect damages for injury to park resources and is not restricted to damage from hazardous substances but from damage in all circumstances. This act imposes strict liability on individuals who cause injury to park resources and allows NPS to recover damages and costs to restore injured park resources.

NPS Management Policies 2006

NPS *Management Policies 2006* (Section 3, Land Protection) states that:

The National Park Service will use all available authorities to protect lands and resources within units of the national park system, and the Park Service will seek to acquire nonfederal lands and interests in land that have been identified for acquisition as promptly as possible. For lands not in federal ownership, both those that have been identified for acquisition and other non federally owned lands within a park unit's



authorized boundaries, the Service will cooperate with federal agencies; tribal, state, and local governments; nonprofit organizations; and property owners to provide appropriate protection measures. Cooperation with these entities will also be pursued, and other available land protection tools will be employed when threats to resources originate outside boundaries.

Chapter 4, Section 4.11, Chemical Information and Odors states:

The Service will preserve, to the greatest extent possible the natural flow of natural chemical information and odors by preventing (1) the release of human-generated chemicals that can block the release, deposition, or perception of natural chemicals; and (2) human actions that disrupt or commingle the pathways through which natural chemicals are dispersed.

This section also notes that the NPS must comply with all applicable laws and regulations when undertaking activities that disrupt the natural flow of natural chemicals.

Director's Order #14: Resource Damage Assessment and Restoration provides guidance on ameliorating damage to natural resources as a result of releases of hazardous substances. The Director's Order describes policy and sets forth a plan of action under which the NPS can collect civil damages for injury to park system resources and collect appropriate costs incurred by the NPS for response actions and assessment.

4.14.2 Assumptions, Methodology and Impact Thresholds

Maps showing the Tamiami Trail project area and communications with NPS staff were used to identify land use in the project area. Available information was also taken from other NPS and non-NPS resources to describe these resources in more detail.

The thresholds for the intensity of an impact are defined as follows:

Negligible: Proposed construction of facilities and/or location or introduction of recreational or other activities in all cases pose very little contamination concerns to the existing properties, any existing city or county zoning, and existing easements, licenses, rights-of-way, and leases. No remediation of contaminants would be required.

Minor: Proposed construction of facilities and/or location or introduction of recreational or other activities in all cases pose little contamination concern to the existing properties, any existing city or county zoning, and existing easements, licenses, rights-of-way, and leases. Remediation of contaminants may be required; however remediation efforts are minor and easily accomplished.

Moderate: Proposed construction of facilities and/or location or introduction of recreational or other activities in all cases pose some contamination concerns to the existing properties, any existing city or county zoning, and existing easements, licenses, rights-of-way, and leases. These concerns can be remediated to bring them into conformance; however, such remediation efforts are difficult and expensive and may result in substantial changes to the proposal.

Major: Proposed construction of facilities and/or location or introduction of recreational or other activities in all cases pose considerable contamination concerns to the existing properties, any existing city or county zoning, and existing easements, licenses, rights-of-way, and leases, and constitutes a conflicting use. Mitigation measures cannot be implemented to change the level of conformance.

Analysis area: The focus of this analysis is the area that would be directly affected by the proposed actions, primarily the project footprint.



4.14.3 Impacts of the Alternatives

No-Action Alternative

Analysis. If the No-Action Alternative is selected as the preferred alternative, there would be no additional direct or indirect short- or long-term impacts from hazardous, toxic, or radioactive wastes other than those already realized from construction of the 2008 LRR/EA preferred alternative (1-mile eastern bridge). Status of existing contamination would remain unchanged

Cumulative Impacts. The No-Action Alternative will have no effect on the environment due to hazardous, toxic, and radioactive wastes. Hazardous, toxic, and radioactive wastes associated with other related actions will have a negligible effect on the environment as they will be remediated during construction. Therefore, cumulative impacts of hazardous, toxic, and radioactive wastes as a result of related actions are negligible.

Conclusion. No short- or long-term adverse or beneficial effects resulting from the presence of hazardous, toxic or radioactive wastes would result from the selection of the No-Action Alternative.

Action Alternatives

Analysis.

Alternative 1

Alternative 1 proposes the construction of four (4) Bridges (A1, B1, C1, & E1) and a ConSpan (H1) for a total of 2.2 miles of bridging. According to the Draft Phase I Assessment completed in September 2009, two sites, Gator Park and Everglades Safari, were identified in the western half of the project corridor as having groundwater contamination. The Phase I Report classified the two sites as RECs, assigning the risk rating for the Gator Park site and Everglades Safari as “High”.

Everglades Safari is located midway between proposed Bridges B1 and C1 approximately 0.38 miles to the west of Bridge C1, approximately 0.40 miles to the east of Bridge B1 and approximately 1 mile east of Bridge A1. The Everglades Safari site may pose moderate contamination risk for Bridge C1 but creates a negligible contamination risk to the proposed construction of Bridge A1 or B1 based on its distance and location.

Gator Park lies approximately 0.8 miles to the east from the proposed western end of Bridge E1. The Gator Park site creates a negligible contamination risk to the proposed construction of Bridge E1 based on its distance and cross gradient location.

Implementation of Alternative 1 could have long-term, adverse, moderate, localized effects associated with the construction of Bridge C1 in the vicinity of the Everglades Safari property. Additionally, implementation of Alternation 1 may have long-term, adverse, negligible, localized effects associated with the construction of Bridges A1, B1, and E1.

Alternative 2

Alternative 2 proposes the construction of six (6) proposed bridges (A1, B1, C1, E1, I1, & J1) for a total of 3.3 miles of bridges. Four of these bridges are located in the western half of the corridor (A1, B1, C1, & E1), between Gator Park and Osceola Camp. Two (I1, & J1) are located in the eastern half of the corridor between the Salem Communications radio tower and the S-354/S-356 control structure.

Everglades Safari is located midway between proposed Bridges B1 and C1 approximately 0.38 miles to the west of Bridge C1, approximately 0.40 miles to the east of Bridge B1, and approximately one mile east of Bridge A1. The Everglades Safari site creates a moderate



contamination risk to Bridge C1 but creates a negligible contamination risk to the proposed construction of Bridge B1 based on its distance and location.

Gator Park lies approximately 0.8 miles to the east from the proposed western end of Bridge E1. The Gator Park site creates a negligible contamination risk to the proposed construction of Bridge I1 based on its distance, cross gradient location, and its LOW ranking as a REC.

The Salem Communications radio tower site lies approximately 0.06 miles west of Bridge I1. The Coopertown site lies approximately 0.87 miles west from Bridge I1. The Coopertown site creates a negligible contamination risk to the proposed construction of Bridge I1 based on its distance, cross gradient location, and its LOW ranking as a REC. However, the Salem Communications radio tower site could create a moderate contamination risk to the proposed construction of Bridge I1 based on its distance and documented contamination if dewatering activities were to be conducted at the proposed Bridge I1 construction site. Based on the available information, the identified sites could create a negligible contamination risk to the proposed construction of Bridge J1.

Implementation of Alternative 2 could have long-term, adverse, moderate, localized effects associated with the construction of Bridge C1 in the vicinity of the Everglades Safari property and Bridge I1 in the vicinity of the Salem Communications radio tower property. Additionally, implementation of Alternation 2 may have long-term, adverse, negligible, localized effects associated with the construction of Bridges B1, and J1.

Alternative 4

This alternative includes 2 bridges: A1 and B1 (for a total of 1.0 mile), as described for Alternative 1. The bridges would create a conveyance opening through Tamiami Trail by removing the sections of the existing highway and embankment under the bridges and ConSpan. The bridges would be constructed over the openings to replace the removed sections of road and maintain motor vehicle traffic. The remaining highway embankment (approximately 8.70 miles) would be reconstructed to raise the crown elevation to 12.3 feet, the minimum required based on the design high water of 9.7 feet and the roadway cross section geometry.

Everglades Safari is located approximately 0.40 miles to the east of Bridge B1 and approximately 1 mile east of Bridge A1. The Everglades Safari site could create a negligible contamination risk to the proposed construction of Bridges A1 or B1 based on its distance and cross gradient location.

Implementation of Alternative 4 could have a long-term, adverse, negligible, localized effect associated with the construction of Bridges A1 and B1 in the vicinity of the Everglades Safari property.

Alternative 5

Alternative 5 consists of 3 bridges; bridges A1, B1, and C1 (for a total of 1.5 miles) as described for Alternative 1. The three proposed bridges (A1, B1, & C1) are located in the Western half of the corridor and would be located between Gator Park and Osceola Camp.

Everglades Safari is located midway between proposed Bridges B1 and C1 approximately 0.38 miles to the west of Bridge C1, approximately 0.40 miles to the east of Bridge B1, and approximately 1 mile east of Bridge A1. The Everglades Safari site could create a moderate contamination risk to Bridge C1 but poses a negligible contamination risk to the proposed construction of either Bridge B1 or A1 based on its distance and location.

Implementation of Alternative 5 could have long-term, adverse, moderate, localized effects associated with the construction of Bridge C1 in the vicinity of the Everglades Safari property.



Additionally, implementation of Alternation 5 may have long-term, adverse, negligible, localized effects associated with the construction of Bridges A1 and B1.

Alternative 6e

Alternative 6e is the maximum bridging option and consists of four bridges totaling 5.5 miles and elevating the remaining roadway. The bridge configurations include: (1) a 2.60 mile bridge located between the Osceola Camp and the Airboat Association (A1-B2), (2) a 0.376 mile bridge located between the Airboat Association and the Tiger Tail Camp (E1), (3) a 1.77 mile bridge located between the Tiger Tail Camp and the existing one-mile bridge (G1-I1), and (4) a 0.66 mile bridge located between the existing 1-mile bridge and the S-334 structure (J1).

Everglades Safari is located midway along bridge segment B2 and approximately 1 mile east of bridge segment A1. The Everglades Safari site could create a moderate contamination risk to bridge segment B2 but poses a negligible contamination risk to the proposed construction of bridge segment A1 based on its distance and location.

Gator Park lies approximately 0.8 miles to the east from the proposed western end of Bridge E1. The Gator Park site poses a negligible contamination risk to the proposed construction of Bridge E1 based on its distance, cross gradient location, and its LOW ranking as a REC.

The Salem Communications radio tower lies approximately 0.06 miles west of bridge segment I1. The Coopertown site lies approximately 0.87 miles west from bridge segment I1. The Coopertown site poses a negligible contamination risk to the proposed construction of bridge segment I1 based on its distance, cross gradient location, and its LOW ranking as a REC.

However, the Salem Communications radio tower site could create a moderate contamination risk to the proposed construction of bridge segment I1 based on its distance and documented contamination if dewatering activities were to be conducted at the proposed bridge segment I1 construction site. Based on the available information, the sites identified with contamination concerns pose a negligible contamination risk to the proposed construction of Bridge J1.

The proposed eastern and western Bridge Access Ramps could be impacted by the existing contamination at the Coopertown site and Everglades Safari site, moderately, respectively.

Implementation of Alternative 6e could have long-term, adverse, moderate, localized effects associated with the construction of bridge segment B2 in the vicinity of the Everglades Safari property and bridge segment I1 in the vicinity of the Salem Communications radio tower property. Additionally, implementation of Alternation 6e may have long-term, adverse, negligible, localized effects associated with the construction of Bridges E1, and J1 and bridge segment A1.

Cumulative Impacts. Cumulative effects of Hazardous, Toxic, and Radioactive Wastes on the environment would be negligible because the localized adverse impacts associated with implementation of the action alternatives (1-6e) of the proposed project would be remediated during construction and would not add to Hazardous, Toxic, and Radioactive Waste effects of related actions in other locations.

Conclusion. The Implementation of Action Alternatives 1, 2a, 5 and 6e may lead to a long-term, adverse, negligible to moderate, localized affects to the environment due to contamination by hazardous or toxic waste. The implementation of Action Alternative 4 may lead to a long-term, adverse, negligible, localized effect to the environment due to contamination by hazardous or toxic waste. A Phase II Environmental Assessment is strongly recommended for three properties adjacent to the Tamiami Trail Bridge Project Corridor. Groundwater sampling for VOAs and VOCs should be conducted at Everglades Safari, Gator Park, and at the entrance to the Salem Communications radio tower.



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**EVERGLADES NATIONAL PARK
TAMIAMI TRAIL MODIFICATIONS: NEXT STEPS
DRAFT ENVIRONMENTAL IMPACT STATEMENT**



**CHAPTER 5
ENVIRONMENTAL COMPLIANCE FOR
THE PREFERRED ALTERNATIVE**

CHAPTER 5: ENVIRONMENTAL COMPLIANCE FOR THE PREFERRED ALTERNATIVE

5.1 Unavoidable Adverse Environmental Impacts

Implementation of any of the action alternatives would lead to unavoidable adverse environmental impacts. Project construction would cause unavoidable short-term adverse impacts to soils, water quality, wetlands, floodplains, wildlife, and special status species. Additionally, project construction and operation would cause unavoidable long-term adverse impacts to soils, wetlands, special status species including the wood stork, and cultural resources.

5.2 Irreversible and Irrecoverable Commitment of Resources

NEPA regulations (40 CFR 1502.16) require an EIS to address the irreversible and irretrievable commitment of resources caused by the alternatives. An *irreversible* commitment of resources is defined as the loss of future options. The term applies primarily to the effects of using nonrenewable resources (such as minerals or cultural resources) or resources that are renewable only over long periods (such as soil productivity). It could also apply to the loss of an experience as an indirect effect of a “permanent” change in the nature or character of the land. An *irrecoverable* commitment of resources is defined as the loss of production, harvest, or use of natural resources; irretrievable resource commitments may or may not be irreversible.

5.2.1 Irreversible Commitment of Resources

The potential to have to move or remove historic structures would have an irreversible impact. However, prior to the removal or disturbance of these resources, documentation and data recovery would be completed, thus maintaining the historical record and limiting the impact to the loss of or change to the physical structure and historic associations.

5.2.2 Irrecoverable Commitment of Resources

Wetlands, soils, and vegetation would be adversely affected as a result of construction of the proposed project. This represents an irretrievable commitment of these resources at least for the duration of the operation of the roadway. It is possible to rehabilitate these affected resources and return them to their preconstruction state some time in the future if the roadway is removed. Nonrenewable resources and energy used during construction of the project represent irretrievable commitment of these resources.

5.3 Relationship between Local Short-Term Uses of the Human Environment and the Maintenance and Enhancement of Long-Term Productivity

NEPA regulations (40 CFR 1502.16) require an EIS to consider the relationship between short-term uses of the environment and the maintenance and enhancement of long-term productivity. Special attention should be given to impacts that narrow the range of beneficial uses of the environment or pose a long-term risk to human health or safety.

No-Action Alternative and Action Alternatives

Short-term, minor adverse impacts to water quality, wetlands, soils, wildlife/habitats, and special status species would consist of construction related impacts such as soil disturbance, filling and excavation of wetlands, increased erosion, and noise from construction equipment. However, the long-term productivity of all these resources would be enhanced by all proposed project alternatives including the No-Action Alternative since the restoration of more natural sheet flow patterns would lead to long term benefits to water quality, wetlands, soils, and wildlife habitats, and the increase in ecological connectivity would benefit wildlife and special status species.



5.4 Effects on Energy Requirements and Conservation Potential

In the short term, fuel consumption would increase as a result of construction activities associated with the implementation of the project. However, long-term energy requirements would not be affected as the road improvements would not result in an increase of traffic. No conservation potential is anticipated with implementation of the project as fuel efficiency standards have not been implemented for construction equipment.

5.5 Compatibility with Federal, State, and Local Objectives

The proposed project is consistent with the overall goals and objectives stated in the Comprehensive Everglades Restoration Plan. The project is also consistent with the water management goals and objectives of the South Florida Water Management District. The project has also been coordinated with agencies of Federal and state governments. Agency representatives have participated in workshops and scoping meetings. There is no known incompatibility with the objectives of Federal, state, or local entities.

5.6 Conflicts and Controversy

Comments received throughout the public scoping portion of the project have identified the following areas of conflict and controversy (in no particular order):

- Comments were received which expressed the need for adequate clearance under any proposed bridging to allow access for airboats with the Miami-Dade County Fire Department in emergency situations (i.e., a plane crash).
- Several individuals and affiliated organizations expressed a strong concern for the safety of pedestrians/bicyclists that utilize Tamiami Trail and requested that a pedestrian/bicycle path be included as a design element for each of the action alternatives.
- Several respondents requested that non-motorized boating access features be included as a design element for each of the action alternatives.
- Many individuals and organizations expressed a concern about the cost/benefit of the project, project funding availability, and the lack of a cost cap for the project.
- Numerous comments were received which advocated the selection of the longest possible bridging alternative, while comments were also received which supported the No-Action Alternative and offered the alternate option of cleaning out the existing culvert sets under Tamiami Trail as an alternative.
- Comments were received from individuals and organizations which expressed a concern about the project decision-making process and advocated a purely science-based decision-making process with no influence from political factors.
- A few respondents (including federal agency representatives) showed a concern about flooding and seepage control and requested that flood protection and impacts to floodplains should be thoroughly evaluated in the EIS.
- Several respondents mentioned the anticipated benefits of restored hydrologic flow within the Everglades (and specifically Shark River Slough) and requested that management/operations of hydrology be evaluated as part of the EIS.
- Numerous comments were received regarding the need for an analysis and avoidance of impacts to natural resources (i.e., water quality and quantity, special status species, and wildlife) and cultural resources [historic structures (AAoF property and Coopertown),



“Gladesman” and American Indian Tribe cultures, and American Indian Tribal camps (Osceola and Tiger Tail)].

- Comments were received which requested an evaluation of climate change/sea level rise effects on the project.
- Many respondents expressed a concern that visitor access to recreational activities (i.e. fishing, boating, etc.) along Tamiami Trail be maintained throughout and following the project. Comments were also received regarding the visitor conflicts between motorized and non-motorized boating in ENP.
- Much concern was expressed by business owners and commercial interests about the potential for private property acquisition associated with the project and the potential economic impact of the project.
- The Miccosukee Tribe of Indians had concerns about the following topics: the limited area of analysis for the project; adverse impacts from construction on the Tiger Tail and Osceola camps; the lack of a water control operational plan; floodplain and flooding impacts; seepage control; restoration of Shark River Slough; the impacts of “unconstrained flows” and volume of water; consideration of a non-bridging culvert alternative; water quality impacts; endangered species impacts; amount and cost of land acquisition; the lack of a cost cap for the project; and the compatibility of the proposed action alternatives with CERP and non-CERP projects.

5.7 Uncertain, Unique, or Unknown Risks

The direct site-specific impacts of the proposed project can be predicted with a high degree of certainty; therefore, uncertainty is minimized. However, predictions of cumulative impacts are, to a degree, inherently uncertain. This project is based on the best available scientific and engineering information, and although no significant adverse impacts are expected, a low probability of risk is always present. The project design is not unique; thus, it should not create unique risks.

5.8 Precedent and Principle for Future Actions

This project would not establish a precedent for future actions with significant effects or represent a decision in principle for future considerations.

5.9 Environmental Commitments

The NPS commits to avoiding, minimizing, or mitigating for adverse effects during construction activities by requiring commitments be placed in contract specification. Environmental commitments made for this project include:

Threatened and Endangered Species

1. Survey protocol and protective measures would be implemented for manatees prior to initiation and during installation as discussed including curtains and waterway closures.
2. Guidelines for wood stork protection detailed in Section 4.6.3 would be followed during all phases of project construction.
3. The USFWS *Draft Snail Kite Management Guidelines* (2006) would be followed during all phases of project construction.
4. Species protective measures would be implemented to avoid construction related disturbance to the eastern indigo snake.



5. Construction contractors would receive training on federally and state listed species and measures to protect these species.

Water Quality

1. Standard protection measures would be taken during all phases of construction to contain any sediment runoff from soil disturbance, excavation, pile driving, and filling. Best management practices such as construction precautions and sediment curtains would be implemented. If sediment runoff is detected reaching the marsh or surface waters, project operations would be halted and corrective action taken to eliminate the problem.

2. A spill prevention, control, and countermeasures plan would be completed and implemented for any fuel storage tanks, which would meet all applicable standards for construction and leak detection. Areas used for refueling would be limited to areas where these activities currently occur.

3. Monitoring of surface water would be conducted to include water quality parameters that could be detrimental to native biota including turbidity.

5.10 Environmental Compliance

Anadromous Fish Conservation Act

Anadromous fish species would not be affected by this project. This act is not applicable.

Bald Eagle Protection Act

No bald eagles are known to occur in the project area. This project is in compliance with the Act.

Clean Air Act of 1972

The proposed project is in full compliance with section 309 of the Clean Air Act. No air permit would be required for the construction. Because Miami-Dade County is in attainment with National Ambient Air Quality Standards (NAAQS), the project is in compliance with the Clean Air Act Conformity Rule.

Clean Water Act of 1972

Full compliance with this Act would be achieved upon the issuance of a Section 401 water quality certification and National Pollutant Discharge Elimination System (NPDES) permits from the State of Florida.

Coastal Barrier Resources Act and Coastal Barrier Improvement Act of 1990

There are no designated coastal barrier resources in the project area that would be affected by this project. These acts are not applicable.

Coastal Zone Management Act of 1972

A federal consistency determination in accordance with 15 CFR 930 Subpart C is required for all projects. The State's consistency review for this project would be performed during the coordination of this EIS. Full compliance would occur with the issuance of the WQC by the State of Florida.

Endangered Species Act of 1973

This project would comply with the Endangered Species Act of 1973, as amended, 16 U.S.C. 1531, *et seq.*; PL 93-205. Since Federally-listed threatened and endangered species are located within the study area and would be affected by the proposed project, a Biological Assessment would be required by the USFWS for this project. Through ongoing coordination



efforts with the USFWS (see Section 6.2.2), it has been agreed that the requirements for the Biological Assessment can be met through this EIS document. The NPS has also made a commitment to providing ornithological observers during construction and to stage construction such that it does not interrupt nesting activities at the three wood stork rookeries located in close proximity to Tamiami Trail. The USFWS informally concurred with the USACE “may affect, not likely to adversely affect” determinations for all listed species except the Florida panther (USACE, 2003 GRR/SEIS). Subsequently (2005 RGR/SEIS), the USFWS concluded that the project may affect, but is not likely to adversely affect the Florida panther. The draft EIS would be coordinated with USFWS to update special status species determinations. Documentation of compliance with the ESA is provided in **Appendix H**.

Estuary Protection Act of 1968

No designated estuary would be affected by project construction activities however; operations of the project may benefit Florida Bay. Full compliance with the Act would occur upon review of this EIS by the NMFS.

Farmland Protection Policy Act of 1981

No prime or unique farmland would be impacted by implementation of this project. The project is in compliance.

Federal Water Project Recreation Act

This project is in full compliance with the Federal Water Project Recreation Act, as amended, 16 U.S.C 460-1 (12), *et seq.*, P.L. 89-72.

Fish and Wildlife Coordination Act of 1958

This project has been extensively coordinated with the USFWS. Fish and Wildlife Coordination Act (FWCA) reports were submitted by the USFWS for the 1994 GRR, 2002 IOP FEIS, 2006 IOP FSEIS, and 2008 LRR/EA. The draft EIS for this project would also be coordinated with the USFWS. This project is in compliance with the Act.

Magnuson-Stevens Fishery Conservation and Management Act

This project is inland and not expected to adversely affect Essential Fish Habitat. Full compliance with the Act would occur upon review of this EIS by the NMFS.

Marine Mammal Protection Act of 1972

The West Indian manatee is not likely to be adversely affected by the project. Coordination with USFWS would continue as construction and operational guidelines are incorporated to avoid impacts to this species. Full compliance with the Act would occur after review of this EIS by the USFWS

Marine Protection, Research and Sanctuaries Act (MPRSA)

The term “dumping” as defined in the Act (33 USC. 1402] (f)) does not apply to this project. Therefore, the MPRSA does not apply.

Migratory Bird Treaty Act and Migratory Bird Conservation Act

No migratory birds would be adversely affected by project activities. The project would be in compliance with these acts upon review of this EIS by the USFWS.

National Environmental Policy Act of 1969

The park elicited public participation in the discussion of issues, area to be studied, and potential alternatives. A Notice of Intent (NOI) to Prepare an Environmental Impact Statement



was published in the Federal Register on May 29, 2009. A project scoping newsletter was distributed by the NPS by U.S. mail and electronic mail also in May 2009. This notice announced the Park's proposal and described preliminary alternative and resource considerations, and identified opportunities for public participation in the EIS process. A public scoping meeting was held on June 2, 2009, at the South Dade Regional Library in Miami, Florida. The structure of the meeting allowed individuals interested in participating in the planning process to be directly involved. Each of the information stations had a flip chart where comments could be provided, in addition those attending the meeting were also directed to the EIS newsletter, which provided additional opportunities for comment on the project, including direct comments by mail, e-mail, or through the NPS's Planning, Environment, and Public Comment (PEPC) website.

A draft Environmental Impact Statement (EIS) has been prepared and would be coordinated with the agencies and through the public. The project is in compliance with the National Environmental Policy Act.

National Historic Preservation Act of 1966 (Inter Alia) (PL 89-665, the Archeology and Historic Preservation Act (PL 93-291), Archeological Resources Protection Act of 1979, Native American Graves Protection and Repatriation Act of 1990, and Executive Order (EO) 11593)

Archival research, field work and consultation with the SHPO have been conducted in accordance with statutes protecting archaeological, cultural, and historic resources. The Tamiami Trail, and structures on the Coopertown and Airboat Association of Florida properties have been identified as eligible for NRHP listing. Additionally, the Osceola Camp is potentially eligible for NRHP listing. A Memorandum of Agreement with SHPO would be signed, and documentation of historic structures would be completed. This project complies with the provisions of the above statutes and executive orders.

Resource Conservation and Recovery Act (RCRA) as amended by the Hazardous and Solid Waste Amendments (HSWA) of 1984, Comprehensive Environmental Response Compensation and Liability Act (CERCLA) as amended by the 5.26.21 Superfund Amendments and Reauthorization Act (SARA) of 1996, Toxic Substances Control Act of 1976

A preliminary Phase I HTRW assessment was conducted in late 2006 to address the potential for the occurrence of HTRW in the study area. No specific sites were identified within the footprint of the proposed project. The project is in compliance with these Acts.

Rivers and Harbors Act of 1899

The proposed work would not obstruct navigable waters of the United States. The project is in full compliance.

Submerged Lands Act of 1953

The project would not occur on submerged lands of the State of Florida. This Act does not apply.

Wild and Scenic River Act of 1968

No designated Wild and Scenic river reaches would be affected by project related activities. This act is not applicable.

Executive Order 11514, Protection of Environment

E.O. 11514 directs federal agencies to "*initiate measures needed to direct their policies, plans and programs so as to meet national environmental goals.*" This project is in compliance.



Executive Order 11988, Flood Plain Management

This E.O. instructs Federal Agencies to avoid development in flood plains to the maximum extent feasible. A determination has been made by the NPS that there is no alternative location for this project. This project is in compliance.

Executive Order 11990, Protection of Wetlands

The locations that would be used for construction of bridges, approaches, and construction access areas are a mosaic of wetlands with small tree island uplands. A permanent loss of wetlands is expected, but this project would result in an overall improvement in the quality of several thousand acres of wetlands. This project complies with the goals of this executive order.

Executive Order 12962, Recreational Fisheries

Executive Order 12962 requires the evaluation of federally funded, permitted, or authorized actions on aquatic systems and recreational fisheries. This project is in compliance.

Executive Order 12898, Environmental Justice

This E.O. directs federal agencies to provide for full participation of minorities and low-income populations in the federal decision-making process and further directs agencies to fully disclose any adverse effects of plans and proposals on minority and low-income populations. Efforts were made to avoid, minimize, or compensate for any adverse effect of this project on the Native Americans living in the project area. The project would not result in disproportionately high and adverse human health or environmental effects on minority populations and low income populations. The project is in compliance with this E.O.

Executive Order 13045, Protection of Children

Executive Order 13045, requires each Federal agency to “identify and assess environmental risks and safety risks [that] may disproportionately affect children” and ensure that its “policies, programs, activities, and standards address disproportionate risks to children that result from environmental health risks or safety risks.” This project has no environmental or safety risks that may disproportionately affect children. The project is in compliance with the E.O.

Executive Order 13089, Coral Reef Protection

No coral reefs would be impacted by this project. This E.O. does not apply.

Executive Order 13112, Invasive Species

The project would help reduce the abundance and variety of invasive plant species in the project area. The project is in compliance with this E.O.

Executive Order 13186, Responsibilities of Federal Agencies to Protect Migratory Birds

The project has been coordinated with the USFWS. The project is expected to benefit migratory birds by improved habitat and increased availability of forage species (amphibians, fish, aquatic invertebrates) for wading birds. The project is in compliance.

Executive Order 13423 and 13514 –Environmental, Energy, Transportation, and Economic Management

This project is in compliance with Executive Orders 13423 and 13514, which require federal agencies to “conduct their environmental, transportation, and energy-related activities under the law in support of their respective missions in an environmentally, economically and fiscally sound, integrated, continuously improving, efficient, and sustainable manner.”



**EVERGLADES NATIONAL PARK
TAMIAMI TRAIL MODIFICATIONS: NEXT STEPS
DRAFT ENVIRONMENTAL IMPACT STATEMENT**



CHAPTER 6: CONSULTATION AND COORDINATION

Everglades National Park staff place a high priority on meeting the intent of public and interested agency involvement, both internal and external, in the NEPA process. In addition to giving the public an opportunity to comment on proposed actions, regulatory agency comments, interested party comments, and comments from NPS staff familiar with the proposed project were highly encouraged. As part of the NPS NEPA process, issues associated with the action were identified during scoping meetings with NPS staff, coordination with other affected agencies, public meetings, and public comment periods.

During the development of the EIS, the Park has actively involved the public in the process. The Park's goals for public participation include: understanding and acceptance of the EIS by the public; substantive and valuable input to help guide Park decisions; and minimization of conflicts through dissemination of information and initiating discussion.

The Park places a high value on maintaining a meaningful dialogue with interested parties, agencies, and organizations. The Park elicited public participation in the discussion of alternatives for the EIS. Scoping, public, and agency involvement efforts included open house meetings, press releases, website postings, and dissemination of information and gathering of comment through the internet.

6.1 Scoping Process and Public Involvement

The NPS divided the scoping process into three categories: internal scoping (NPS staff and individuals working directly on the project), external scoping (public), and agency/organizational scoping (federal and state agency, and Tribal staff). Internal scoping for this EIS involved discussions among the NPS and other federal and state agencies and Tribes regarding the purpose and need for the project, issues, objectives, management alternatives, mitigation measures, appropriate level of documentation, lead and cooperating agency roles, and other related dialogue. Public scoping for this EIS included the early involvement of the interested and affected public in the environmental analysis process. The public scoping process helps ensure that individuals have been given an opportunity to comment and contribute early in the decision-making process. Finally, agency scoping consisted of meetings and ongoing coordination with state and federal agency and Tribal staff since the inception of the project to ensure that the project meets all regulatory requirements and to allow agency and Tribal staff the opportunity to provide early and ongoing input on the project.

6.1.1 Internal Scoping

An internal scoping meeting for the Tamiami Trail Modifications: Next Steps project was conducted on May 20, 2009, at the NPS Krome Center, South Florida Ecosystem Office in Homestead, Florida. A field visit was conducted on May 19, 2009. Participants that took part in the internal scoping process included staff from NPS and their contractor [URS Corporation (URS)], USACE, SFWMD, FDEP, and FDOT.

The purpose of internal NPS scoping activities was to develop a framework for the planning process and the fundamental foundation (e.g., purpose and need for the plan, plan objectives, area of effect) needed to prepare the EIS for the Tamiami Trail Modifications: Next Steps project. This scoping supports the planning process by ensuring that the requirements of NEPA and NPS *Director's Order #12* would be fulfilled throughout the planning process.

Prior to the internal scoping meeting, NPS ENP staff and their contractor reviewed the scope of work, assembled a workshop briefing package, and drafted the internal scoping meeting agenda



via phone, email conversations, and a pre-internal scoping meeting. These staff, facilitated by the NPS and the contractor, worked collectively to:

- Define the purpose and need for action for the project
- Define the objectives for the project
- Identify the issues and concerns related to the project
- Discuss and refine the alternatives presented in the 2005 RGRR/SEIS and the 2008 LRR/EA
- Define the performance measures for the evaluation of alternatives
- Determine which impact topics should be analyzed in the EIS and which impact topics should be dismissed

The scoping process was implemented by recording individual comments and responses to questions posed by the facilitator. Discussions during internal scoping examined the range of potential natural and cultural resources that might be of concern or might be affected during the planning and impact assessment processes. The results of the internal scoping team's collaborative efforts have been incorporated into the appropriate sections of this EIS.

6.1.2 Public Scoping

A project scoping newsletter was distributed by NPS to individuals, organizations, agencies, and American Indian Tribes by U.S. mail and electronic mail in May 2009. This notice announced the Park's proposal and described preliminary alternative and resource considerations, and identified opportunities for public participation in the EIS process. The notice invited interested parties to submit their initial views or concerns regarding the project to the Park. The scoping period was scheduled from May 21 through June 12, 2009.

A public scoping meeting was held on June 2, 2009, at the South Dade Regional Library in Miami, Florida, to initiate public involvement early in the planning stage and to obtain community feedback regarding the initial concepts for the development of the Tamiami Trail Modifications: Next Steps EIS. A total of 47 public participants and 13 project personnel attended.

The purpose of the public scoping meeting was to solicit input from the community on the project purpose, need, and objectives; to identify issues and concerns to be addressed in the EIS; and to receive comments on potential alternatives for the Tamiami Trail Modifications: Next Steps project. The public meeting included numerous methods for the community to provide comment. Each of the information stations had a flip chart where comment could be provided. Those attending the meeting were also directed to the EIS newsletter, which provided additional opportunities for comment on the project, including directing comments by mail, e-mail, or through the NPS's Planning, Environment, and Public Comment (PEPC) website at <http://parkplanning.nps.gov/ever>. Public comments received are detailed in the following sections of this report.

During the comment period, 2,355 pieces of correspondence were received with 2,623 comments. Correspondence was received by one of the following methods: e-mail, hard copy letter, or entered into the PEPC website. Letters received by e-mail or hard copy, as well as comments from the public meeting transcript, were entered into the PEPC system for analysis. Each of these letters or submissions is referred to as correspondence.



6.1.3 Scoping Comments

Correspondence from respondents regarding the Tamiami Trail Modifications: Next Steps project ranged from strong support to strong opposition to the project. Based on all of the scoping comments received, 96.7% percent of respondents were strongly in favor of the project and 0.4% of respondents were generally in favor of the project but had concerns or questions about certain aspects of the project. Approximately 0.8% of respondents expressed a strong opposition to the project and 0.8% of respondents were generally in opposition to the project but expressed concerns or questions that, if resolved, could garner their support for the project. The remaining 1.4% of respondents raised questions about the project but did not express an opinion supporting or opposing the project. These concerns, addressed in this EIS, are discussed below.

Comments in favor of the project were mostly directed towards Everglades restoration, including restoration of sheet flow hydrology, restoration of habitat for wildlife, protection of threatened and endangered species, and preservation of the Everglades for future generations. Those respondents in opposition to the project voiced concerns about project costs, the planning process, potential unforeseen environmental impacts (i.e. floodplain impacts), and potential socioeconomic and cultural impacts. The comments, concerns, and suggestions of the respondents fell into several categories including alternatives, consultation and coordination, the cost/benefit value of the project, environmental impacts, socioeconomic impacts, historic/cultural impacts, and visitor use and experience.

Correspondence regarding the proposed alternatives for the project included suggestions for engineering elements applicable to all alternatives such as the use of ConSpans, the inclusion of a pedestrian/bicycle trail and non-motorized boating access features, and bridge clearance height for the passage of airboats. Several respondents strongly supported Alternative 6 (the longest bridging alternative), while several respondents stated that they did not support implementation of any of the proposed action alternatives, since all included at least some length of bridging. Comments opposed to any bridging suggested the cleaning out of culvert sets as a viable alternative.

Many comments were received regarding the cost/benefit value of the project. Comments included concerns about the use of taxpayer funds for implementation of the project; the need for a thorough cost/benefit analysis; and the costs of mitigation versus acquisition of private properties along Tamiami Trail. The potential costs of inflation from the time of the EIS to the time of construction and the methodology for calculating construction costs were also mentioned by respondents.

Consultation and coordination issues were mentioned by a few respondents. One respondent requested that the USFWS be added to the project as a cooperating agency, while another respondent requested that the Federal Highway Administration be sought out as a cooperating agency for the project. Several comments were also received requesting and encouraging continuous public involvement opportunities with the project.

Correspondence included numerous comments about the environmental impacts and benefits of the project. Most respondents in support of the project commented on the potential environmental benefits of the project such as restored hydrologic flow through Northeast Shark River Slough, restored wildlife habitat, and protection of special status species. A few respondents in opposition to the project commented on the potential negative impacts to habitat and species and voiced the need for more studies before an alternative is selected for implementation. Several respondents, both in favor of and in opposition to the project, mentioned climate change as a factor for selecting a preferred alternative and requested that



the topic be analyzed in the EIS. Impacts to floodplains and water quality issues were also discussed by correspondents.

Based on the correspondence received, the greatest opposition to the project was due to the potential socioeconomic impacts to the airboat concessions along Tamiami Trail. Respondents expressed concerns about NPS acquiring private property for construction of the project, property access routes with all of the alternatives, and the economic impacts from reduced tourism during construction. Several respondents also requested that an economic/socioeconomic study be conducted as part of the EIS for the project. One respondent expressed concern about opposition from commercial businesses along Tamiami Trail influencing the environmental need for the project.

Those commenting on the project also expressed their concern about the potential historic/cultural impacts of the project. Respondents provided comments about the historical significance of both structures and cultural traditions along Tamiami Trail. Comments were received requesting avoidance of the two Miccosukee camps (e.g., Osceola and Tiger Tail) and three airboat concessions along Tamiami Trail. The “Gladesmen” cultural traditions were also mentioned in the correspondence received for the project. Respondents requested a historic/cultural impact study be conducted as part of the EIS for the project.

Correspondence about impacts to visitor use and experience included questions and concerns about continued visitor use activities such as fishing, sight-seeing, walking, bird-watching, and airboating. Concerns were expressed about access issues with each of the action alternatives (i.e., such as access to boat ramps and airboat concessions). Respondents requested that none of these activities be impacted in any way or at any time by implementation of the preferred alternative. Many respondents also voiced concerns about current conflicts in Everglades National Park between motorized boats/airboats and non-motorized boating.

Correspondence from agencies, organizations, and businesses included letters and comments from the following entities with the number of correspondences denoted in parentheses (**Table 6-1**).

Table 6-1 – Agencies, Organizations, and Businesses that Provided Comments during Public Scoping

Airboat Association of Florida (3)	Kayak Jeff, Inc (1)
Audubon (2)	League of Women Voters (1)
Bicycle of Pedestrian Advisory Committee of Miami-Dade County (2)	Little Manatee Kayaking (1)
Caloosa Riders Bicycle Club (1)	Loxahatchee Sierra Club (1)
Caloosahatchee River Citizens Association, Board Member (1)	Miami-Dade County DERM (1)
Center for Biological Diversity (1)	Miccosukee Tribe of Indians of Florida (2)
Coopertown (2)	N/A (113)
COPHA (1)	Naples Pathways Coalition (3)
Elders for Earth's Future (1)	Nature Conservancy (1)
Everglades Bicycle Club (1)	National Parks Conservation Association (2)
Everglades Coordinating Council (2)	National Wildlife Federation (1)



Everglades Park (1)	Palm Beach Kayak Fishing club (1)
Everglades Safari Park (1)	Palm Beach Meeting of the Religious Society of Friends (Quakers) (1)
FLFFC.org (1)	Palm Beach Water Yaks (1)
Florida Atlantic University (1)	Project NatureConnect (1)
Florida Biodiversity Project (2)	River of Grass Greenway Committee (4)
Florida Trail Association (1)	South Florida Anglers for Everglades Restoration (2)
Friends of the Florida Panther Refuge (1)	Sanibel Captiva Conservation Foundation (1)
Federal Transit Administration (1)	Save Boca Raton Green Space (1)
Gladesman Cultural Community (1)	Save It Now Glades (1)
Greater Hollywood Chamber of Commerce (1)	Sierra Club (2,187)
Hendry BPAC (1)	University of California Merced (1)
J.N."Ding" Darling Wildlife Society (1)	University of Miami (1)
Jet Port Conservation & Recreation Club (1)	Wildlands CPR (1)
Kayak Explorers Club (1)	Multiple Organizations (5)

6.2 Agency and Tribal Consultation

Copies of all project correspondence with State and Federal agencies and Tribes have been included for reference in **Appendix H**.

6.2.1 Congressional Representatives

State Representative Mark S. Pafford provided the following comment during the Public Scoping portion of the project:

“As a Florida native and member of the state’s legislature, I am in support of proposal six (6). I feel the proposal provides the most benefit for the Everglades and am confident the project will restore the historic waterflow this improving habitat and quality of water in Florida Bay.”

No formal comments have been received from Federal Congressional representatives to date.

6.2.2 Federal Agencies

The NPS initiated formal consultation with the U.S. Fish and Wildlife Service via electronic mail dated February 25, 2010. The NPS requested an amendment to the Tamiami Trail portion of the Modified Water Deliveries to ENP project Biological Opinion, which was originally issued on January 12, 2006 (and later amended on June 25, 2008). The following comments were provided in the response letter from the USFWS on February 25, 2010:

In the original Biological Opinion dated January 12, 2006 ... the U.S. Army Corps of Engineers (Corps) made a determination that the project “may affect, but is not likely to adversely affect” the wood stork. The Service concurred with this determination since disturbance would be minimized by the Corps’ agreement to manage the construction activities according to the Service’s “Draft Supplemental Habitat Management Guidelines for the Wood Stork in the South Florida Ecological Services Consultation Area.” The Corps agreed to implement the primary and secondary zone restrictions for



the Tamiami West and East colonies however, new information has surfaced regarding the location of a previously unidentified wood stork colony (East 2) within the project area.

This new wood stork colony identified by the USFWS has been analyzed as a part of this EIS. Additionally, the NPS has been informally consulting with the USFWS (Kevin Palmer) about all protected species impacts via telephone and electronic mail throughout the development of the EIS.

6.2.3 American Indian Tribes

The Miccosukee Tribe of Florida provided a letter dated June, 26, 2009, during the Public Scoping portion of the project. This letter expressed concerns about the following topics: the limited area of analysis for the project; adverse impacts from construction on the Tiger Tail and Osceola camps; the lack of a water control operational plan; floodplain and flooding impacts; seepage control; restoration of Shark River Slough; the impacts of “unconstrained flows” and volume of water; consideration of a non-bridging culvert alternative; water quality impacts; endangered species impacts; amount and cost of land acquisition; the lack of a cost cap for the project; and the compatibility of the proposed action alternatives with CERP and non-CERP projects.

A meeting was held on December 11, 2009, between representatives of the NPS, USACE, and Miccosukee Tribe concerning the proposed Tamiami Trail Modifications project. During this meeting, Fred Dayhoff (Miccosukee Tribe of Florida) provided the position of the Tribe on several issues concerning Tamiami Trail. Mr. Dayhoff indicated that the Tribe did not have any specific concerns or cultural resources within the right-of-way footprint of the roadway corridor, with the exception of the Tigertail Camp and the Osceola Camp.

Additionally, in a letter dated March 22, 2010, Mr. Steve Terry (NAGPRA and Section 106 Coordination for Fred Dayhoff), on behalf of the Miccosukee Tribe, expressed “extreme interest” in all tree islands located in the Northeast Shark River Slough National Register Archeological District in terms of cultural and archeological importance to the Miccosukee Tribe.

6.2.4 State of Florida Agencies

No formal comments have been received from state agencies to date.

6.2.5 Local Government Agencies

No formal comments have been received by local government agencies to date.

6.3 List of Preparers and Contributors

The following NPS staff, consultants, and agency personnel contributed to the preparation of this EIS.

Table 6-2 – List of Preparers and Contributors

Name	Title	Agency/Organization
Dan Kimball	Superintendent	NPS Everglades National Park
Keith Whisenant	Deputy Superintendent	NPS Everglades National Park
Bruce Boler	NPS Project Manager	NPS Everglades National Park
David Sikkema	Branch Chief, Project Management	NPS Everglades National Park
Patrick Malone	Natural Resources Specialist	NPS, Denver Service Center



Name	Title	Agency/Organization
Patrick Kenney	Branch Chief, Planning Division	NPS, Denver Service Center
David Hallac	Biologist	NPS Everglades National Park
Melissa Memory	Chief of Cultural Resources	NPS Everglades National Park
Jimi Sadle	Botanist	NPS Everglades National Park
Alicia Logalbo	Supervisory Biologist	NPS Everglades National Park
Gregg Reynolds	Hydrologist	NPS Everglades National Park
Dilip Shinde	Biologist	NPS Everglades National Park
Ernest Clarke	USACE/NPS Everglades National Park Liason	USACE
Bradley Foster	Ecologist	USACE
Gwendolyn Nelson	Engineer	USACE
Susan Conner	Biologist	USACE
Dan Levy	URS Project Manager	URS Corporation
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Valerie Chartier	Senior Environmental Scientist	URS Corporation
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Damon Quesenberry	GIS Specialist	URS Corporation
Babu Madabhushi	Geologist/Contamination Specialist	URS Corporation
Chris Reed	Senior Hydrologist	URS Corporation
Gene Rogge	Senior Cultural Resources Specialist	URS Corporation
Timothy Ogle	Senior Air/Noise Specialist	URS Corporation
Thom Rounds	Senior CBA Specialist	URS Corporation
Tom Lodge	Senior Environmental Scientist	Thomas E. Lodge Ecological Advisors
Dale McGregor	Engineer	HNTB
Greg Smith	Archaeologist	New South Associates
David Price	Historian	New South Associates
Cynthia Thomas	Archaeologist	New South Associates
James Shirk	Senior Environmental Project Manager	OHC Environmental Engineering, Inc.
Amy Swiecichowski	Senior Project Manager	EPJV
Inger Hansen	Watershed Management & Planning Engineer	FDEP
Kevin Palmer	Biologist	USFWS
Barbara Culhane	Senior Environmental Scientist	FDOT
Mary Tery Vilches	Engineer	FDOT



6.4 List of Recipients of the Environmental Impact Statement

The following federal, state, and local government agencies; American Indian Tribes; and organizations have been sent a copy of this EIS. In addition, elected officials, libraries, individuals, businesses, organizations, media outlets, and other groups that have expressed interest in Everglades National Park in the past have been provided notice that this EIS is available for review and comment.

Federal Agencies

- National Park Service
- U.S. Army Corps of Engineers
- U.S. Fish and Wildlife Service
- National Oceanic & Atmospheric Administration - National Marine Fisheries Service
- U.S. Environmental Protection Agency

State Agencies

- Florida Department of Transportation
- Florida Department of Environmental Protection
- South Florida Water Management District
- Florida Fish and Wildlife Conservation Commission
- Florida State Historic Preservation Office

Local Agencies

- Miami-Dade County DERM

Tribes

- Miccosukee Tribe of Indians of Florida
- Seminole Tribe of Florida
- Seminole Nation of Oklahoma

Organizations

- Airboat Association of Florida
- Coopertown
- Everglades Safari Park
- Gator Park
- National Parks Conservation Association
- Sierra Club



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**CHAPTER 7
REFERENCES**

CHAPTER 7: REFERENCES

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**EVERGLADES NATIONAL PARK
TAMIAMI TRAIL MODIFICATIONS: NEXT STEPS
DRAFT ENVIRONMENTAL IMPACT STATEMENT**



**CHAPTER 8
GLOSSARY, ACRONYMS, AND ABBREVIATIONS**

CHAPTER 8: GLOSSARY

Glossary

Affected Environment — The existing environment to be affected by a proposed action and alternatives.

Alternatives – Different options for taking action.

Best Management Practices — Methods that have been determined to be the most effective, practical means of preventing or reducing pollution or other adverse environmental impacts.

ConSpan – A pre-cast arched modular bridge.

Contributing Resource — A building, site, structure, or object that adds to the historic significance of a property or district.

Council on Environmental Quality (CEQ) — Established by Congress within the Executive Office of the President with passage of the *National Environmental Policy Act of 1969*. CEQ coordinates federal environmental efforts and works closely with agencies and other White House offices in the development of environmental policies and initiatives.

Cultural Resources — Prehistoric and historic districts, sites, buildings, objects, or any other physical evidence of human activity considered important to a culture, subculture, or community for scientific, traditional, religious, or any other reason.

Cumulative Impacts — Under NEPA regulations, the incremental environmental impact or effect of an action together with the effects of past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes such other actions (40 CFR Part 1508.7).

Decibels — A unit of relative sound loudness, electric voltage, or current equal to ten times the common logarithm of the ratio of two readings.

Enabling Legislation — National Park Service legislation setting forth the legal parameters by which each park may operate.

Endangered Species — “...any species (including subspecies or qualifying distinct population segment) that is in danger of extinction throughout all or a substantial portion of its range (ESA Section 3(6)).” The lead federal agency, U.S. Fish and Wildlife Service, for the listing of a species as endangered is responsible for reviewing the status of the species on a five-year basis.

Endangered Species Act (ESA) (16 U.S.C. 1531 et seq.) — An Act to provide a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved and to provide a program for the conservation of such endangered species and threatened species.

Environmental Assessment (EA) — An environmental analysis prepared pursuant to the *National Environmental Policy Act* to determine whether a federal action would significantly affect the environment and thus require a more detailed environmental impact statement (EIS).

Environmental Impact Statement (EIS) – An is a document required by the *National Environmental Policy Act* for federal government agency actions significantly affecting the quality of the human environment. A tool for decision making, an EIS describes the positive and negative environmental effects of proposed agency action and analyzes alternatives to the proposed actions.



Executive Order — Official proclamation issued by the President that may set forth policy or direction or establish specific duties in connection with the execution of federal laws and programs.

Finding of No Significant Impact (FONSI) — A document prepared by a federal agency showing why a proposed action would not have a significant impact on the environment and thus would not require preparation of an Environmental Impact Statement. A FONSI is based on the results of an Environmental Assessment.

Floodplain — The flat or nearly flat land along a river or stream or in a tidal area that is covered by water during a flood.

Hydroperiod - The frequency and duration of inundation or saturation of an wetland. The term describes that length of time during the year in which the substrate is either saturated or covered with water.

Impacts (beneficial, adverse) - The effect on a resource or value. Beneficial effects are favorable and adverse impacts are unfavorable.

National Environmental Policy Act (NEPA) — The Act as amended articulates the federal law that mandates protecting the quality of the human environment. It requires federal agencies to systematically assess the environmental impacts of their proposed activities, programs, and projects including the “no action” alternative of not pursuing the proposed action. NEPA requires agencies to consider alternative ways of accomplishing their missions in ways which are less damaging to the environment.

National Historic Preservation Act of 1966 (16 U.S.C. 470 et seq.) — An Act to establish a program for the preservation of historic properties throughout the nation, and for other purposes, approved October 15, 1966 [Public Law 89-665; 80 STAT. 915; 16 U.S.C. 470 as amended by Public Law 91-243, Public Law 93-54, Public Law 94-422, Public Law 94-458, Public Law 96-199, Public Law 96-244, Public Law 96-515, Public Law 98-483, Public Law 99-514, Public Law 100-127, and Public Law 102-575].

National Register of Historic Places (National Register) — A register of districts, sites, buildings, structures, and objects important in American history, architecture, archaeology, and culture, maintained by the Secretary of the Interior under authority of Section 2(b) of the *Historic Sites Act of 1935* and Section 101(a)(1) of the *National Historic Preservation Act of 1966*, as amended.

Organic Act — Enacted in 1916, this Act commits the National Park Service to making informed decisions that perpetuate the conservation and protection of park resources unimpaired for the benefit and enjoyment of future generations.

Scoping — Scoping, as part of NEPA, requires examining a proposed action and its possible effects; establishing the depth of environmental analysis needed; determining analysis procedures, data needed, and task assignments. The public is encouraged to participate and submit comments on proposed projects during the scoping period.

Slough – A creek or area of deeper water located within a marsh or tidal flat. In context of the Everglades, these are areas of deeper water that are surrounded by higher “ridges” of sawgrass dominated wetlands.

Threatened Species — Any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range (ESA Section 3(20)).



Wetlands —Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.

