

# **Modified Water Deliveries to Everglades National Park Tamiami Trail Modifications**

**Limited Reevaluation Report  
Tentatively Selected Plan (TSP) Briefing  
February 2008**

# Topics

- Background
- Swale Pilot Project
- Limited Reevaluation Report
  - Alternatives
  - Screening Analysis
  - Evaluation of Final Plans
  - Tentatively Selected Plan
  - LRR Schedule
- Construction Start Challenges

# Background

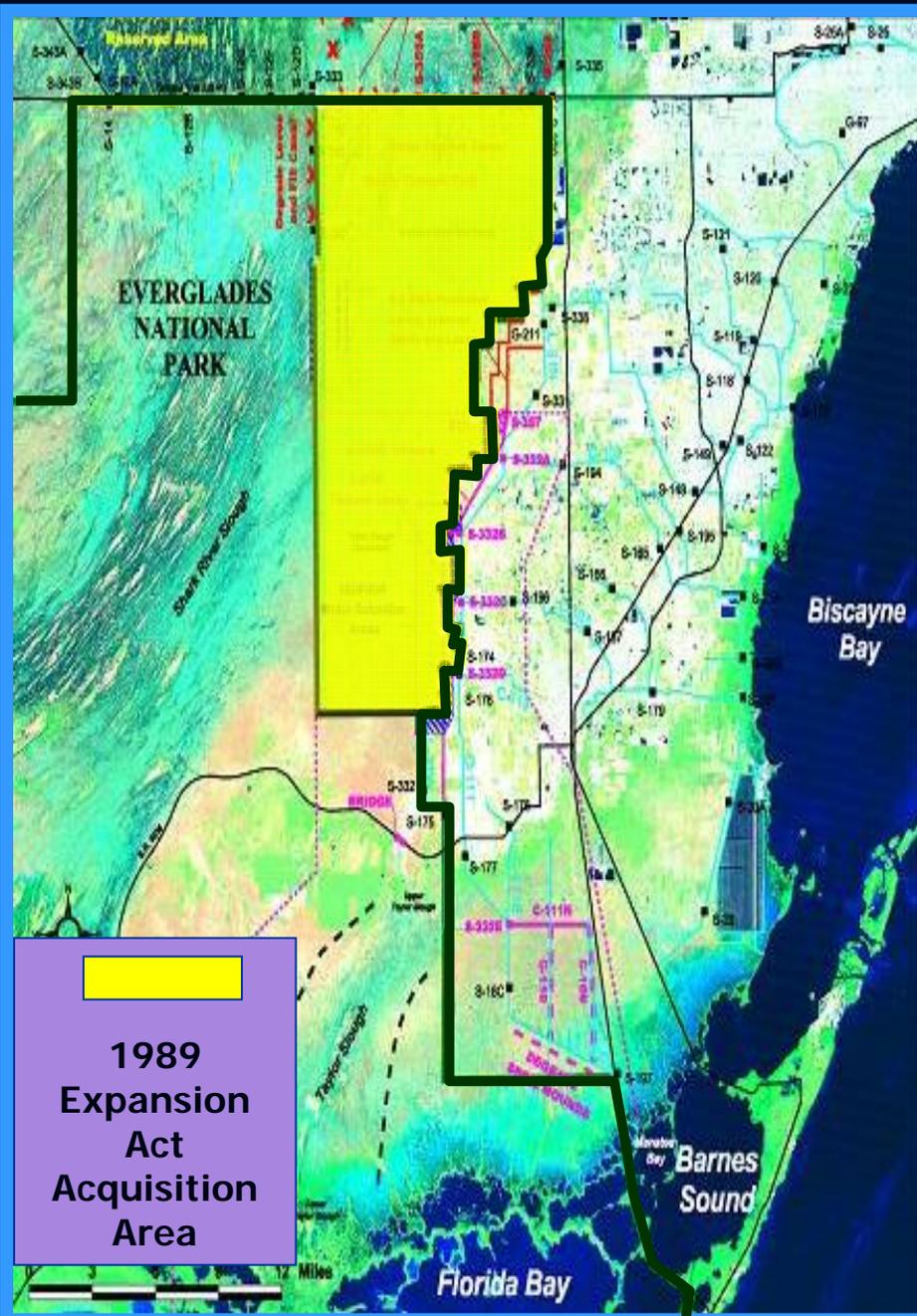
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Modified Water Deliveries to Everglades National Park

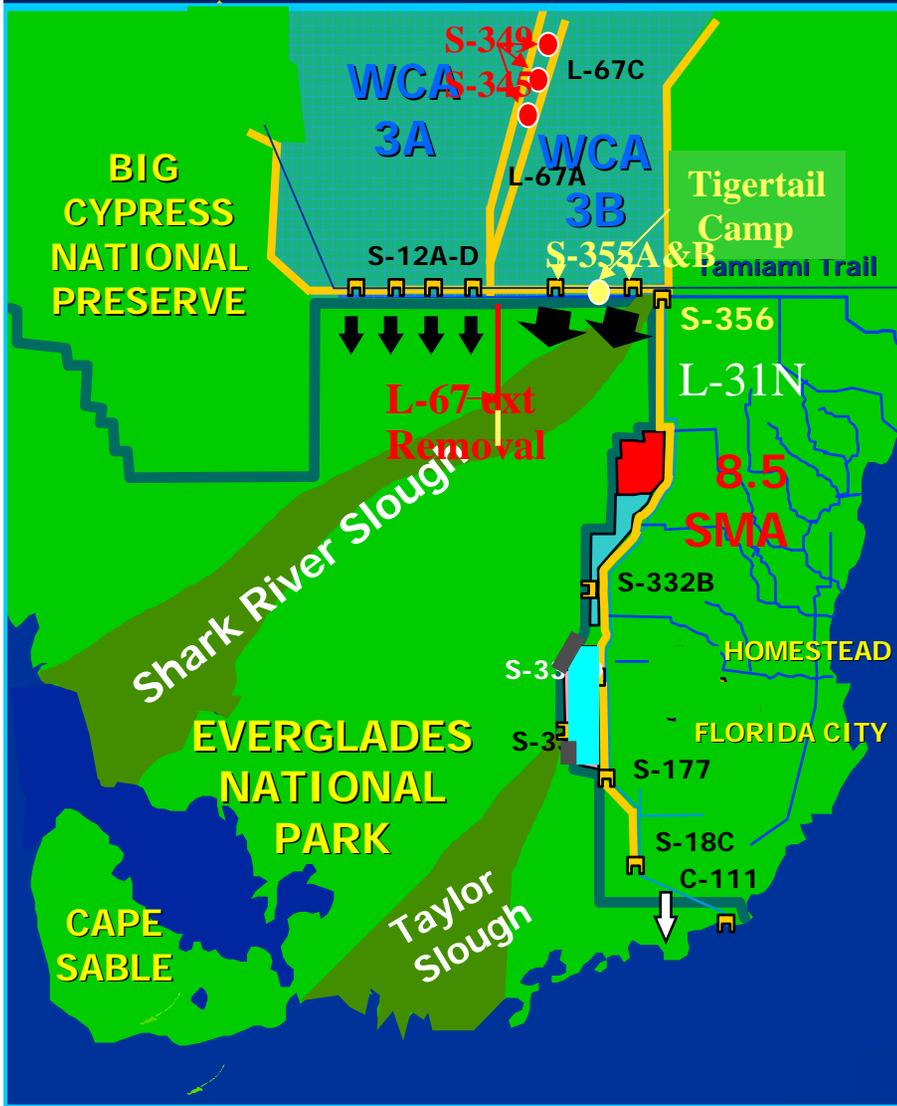
# Modified Water Deliveries Authorization

The Everglades National Park Protection and Expansion Act of 1989....

- Authorized the acquisition of 109,000 acres
- Authorized the Secretary of the Army to make modifications to C&SF Project "to improve water deliveries into the park and shall, to the extent practicable, take steps to restore the natural hydrological conditions within the Park."



# Modified Water Deliveries Project



## Conveyance Features

- S-355A & S-355B (L-29): Complete
- S-333 Mods: Complete
- L-67 Extension: 4 of 9 miles complete
- Tamiami Trail: LRR underway
- L-67A: S-349s & S-345s: EDR
- L-67C: Gaps: EDR
- L-29: Weirs: EDR

## Seepage Features

- S-356 (L-31N): Complete

## Mitigation Features

- 8.5 Square Mile Area: Final Stages
- Tigertail Camp: Complete
- Osceola Camp: DOI Negotiations

## Other Project Activities

- CSOP: On Hold

# MWD Project

WCA 3A

L-67A  
L-67C

WCA 3B

Tamiami Trail

ENP

North East Shark River  
Slough

8.5  
SMA

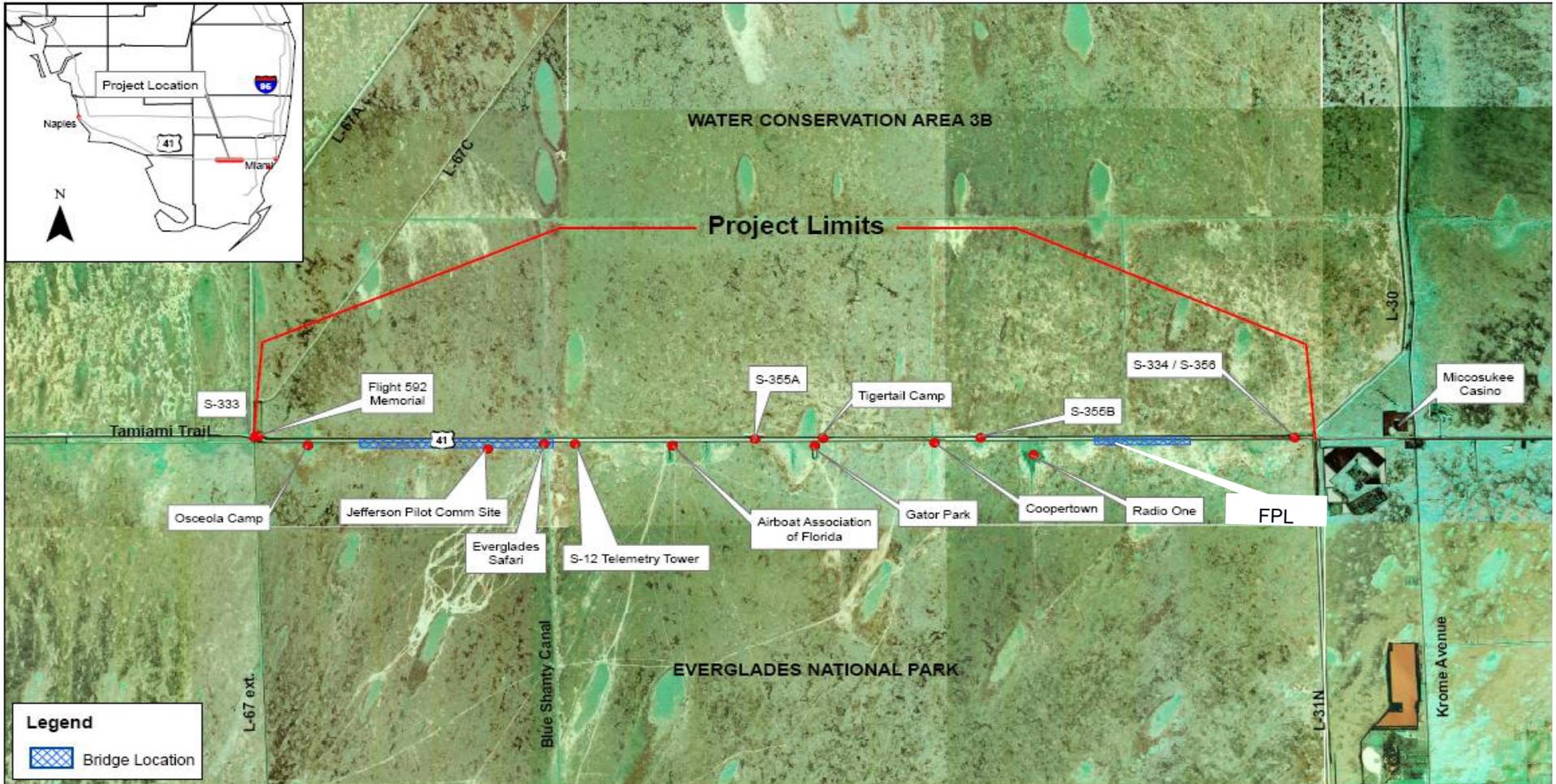


# Mod Waters: Tamiami Trail History

- 1989 - Everglades National Park Expansion Act
- 1992 - General Design Memorandum (GDM)
  - Tamiami Trail: Assumed existing culverts sufficient to pass flows
  - 8.5 SMA: Land acquisition limited to original perimeter levee
- 2003 Dec - GRR for Tamiami Trail
  - Recommended 3,000 foot bridge and increased roadway elevations
  - Withdrawn after public and agency comments
- 2005 Nov - RGRR & SEIS for Tamiami Trail
  - ROD signed January 2006 (2-mile and 1-mile bridges)
- 2007 – Significant increase in cost of RGRR plan

# 2005 Tamiami Trail RGRR Approved Plan

## 2-mile Bridge West and 1-mile Bridge East



### ALTERNATIVE 14

Two-Mile Bridge West and One Mile Bridge East (Recommended Plan)  
 Revised General Re-evaluation Report / Supplemental Environmental Impact Statement, Tamiami Trail  
 Modified Water Deliveries to Everglades National Park, Florida

Quadrangle Coopertown NW/NE (1000)



Figure: 10  
 Date: August 2005  
 Scale: 1 inch equals 1 mile  
 Source: GEC  
 Map Author: G. Sigrest

# WRDA 2007

## Conference Report Language

- Directs Chief of Engineers to take steps upon completion of 8.5 SMA to increase flows to Park of at least 1400 cubic feet per second (cfs) without significantly increasing risk of roadbed failure
- Directs Chief of Engineers to re-examine prior reports and evaluate alternatives for increasing the flow of water under the highway and into the Park
  - Directs that flow to the Park have a minimum target of 4000 cfs
  - Take into account subsequent modifications to be done under CERP
  - Avoid modifications not compatible or duplicative with CERP
  - Submit recommendations to Congress by July 1, 2008
- Initiate evaluation of Tamiami Trail component of CERP as soon as practicable
  - Recommendations to include evaluation of modifying Tamiami Trail from Krome Avenue to boundary of BCNP

# Flows Through Tamiami Trail

- Currently 19 sets of culverts (55 culverts total) pass flow through Tamiami Trail
- Two key factors affect ability to move flows through Tamiami Trail
  - L-29 stage
  - Opening size
- L-29 stage is controlled by G-3273 gage, 9 miles south of Tamiami Trail
- FDOT concerned about impacts to Tamiami Trail when L-29 stage goes above 7.5 feet

# Improving Tamiami Trail Conveyance

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Two concurrent activities to address WRDA 2007 Conference Report and improve flows across Tamiami Trail

- Swale Pilot Project
- Limited Reevaluation Report (LRR)

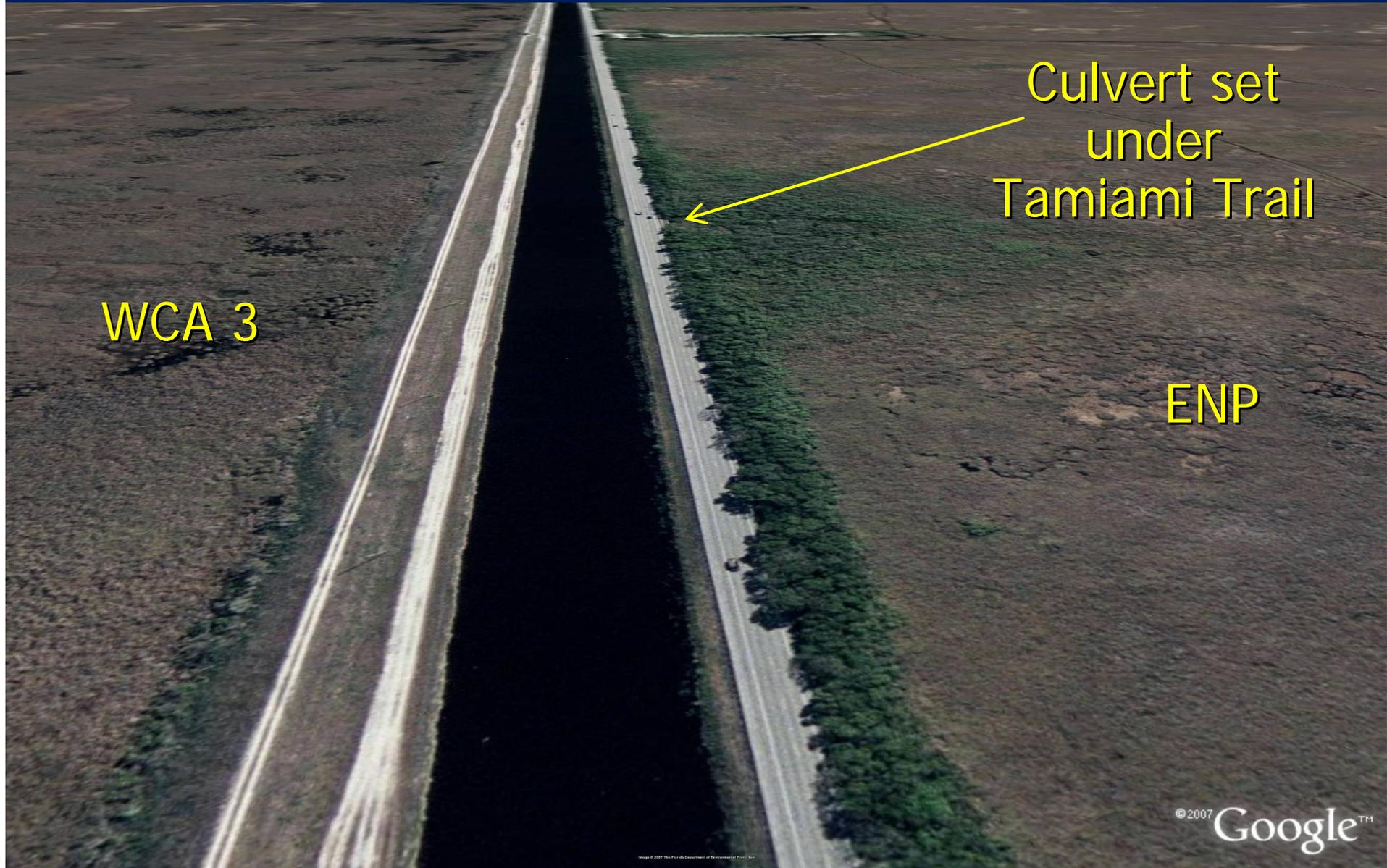
# **Swale Pilot Project**

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**Modified Water Deliveries to Everglades National Park**

# Tamiami Trail

## Road Section at Culvert-Side view



WCA 3

Culvert set  
under  
Tamiami Trail

ENP

# Swale Pilot Project

- ENP and the Corps have agreed to pursue a pilot project at two locations along Tamiami Trail to test the effectiveness of swales
- Corps and ENP will prepare a letter report and the appropriate NEPA document for the pilot project
- Pilot project data will be used to determine the effectiveness of swales for conveyance and whether additional swales should be constructed

# Swale Pilot Project



**Culvert Set**



FDOT

Swale ~ 30' x 1000'



ENP

O&M swale - extend 500'  
east & west of culvert set and  
30' south.

Actual size will depend on  
peat depth.

© 2006 Europa Technologies

Google

Pointer 25°45'39.19" N 80°34'18.81" W elev 3 ft

Streaming ||||| 100%

Eye alt 647 ft

# **Limited Reevaluation Report**

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**Modified Water Deliveries to Everglades National Park**

# Tamiami Trail Re-Analysis

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A re-analysis of alternatives was conducted to:

- Address the WRDA 2007 language
- Provide information on the cost increases for the previously approved plan
- Develop possible cost saving options
- Re-analyze alternatives for completing Tamiami Trail

# LRR Formulation of Alternatives

- Capitalize on data collected and work completed to date on the 2005 approved plan
  - Geotechnical survey
  - 60% design submittals
- Adjust the two key factors that affect ability to move water through Tamiami Trail
  - L-29 Canal stage
  - Opening size
    - Currently 19 culvert sets (55 culverts total)

# Reevaluation Alternatives

- 27 alternatives (including no-action) considered
- Organized into 5 groups:
  1. Constrain L-29 stage to 7.5 feet  
(no roadway improvement, no stage increase)
  2. Raise stage constraint to 8.0 feet  
(minimum roadway improvement)
  3. Raise stage constraint to 8.5 feet  
(moderate roadway improvement)
  4. Raise stage constraint to 9.7 feet  
(major roadway modification)
  5. Other structural alternatives and roadway realignments

Each group includes: road improvement, culvert addition, eastern bridge, western bridge, and two bridge alternatives.

# Total Cost Estimate

$$\begin{array}{r} \text{Construction Cost Estimate} \\ + \text{ Risk \& Uncertainties} \\ + \text{ Pre-construction Engineering and Design (PED)} \\ + \text{ Engineering During Construction (EDC)} \\ + \text{ Supervision and Administration (S\&A)} \\ + \text{ Real Estate} \\ + \text{ Escalation to the midpoint of construction} \\ \hline = \text{ Total Project Cost Estimate} \end{array}$$

- Escalation of construction costs depends on the construction duration and when construction is planned to start.
- Construction costs presented include the results of a risk & uncertainty analysis at the 90% confidence level.

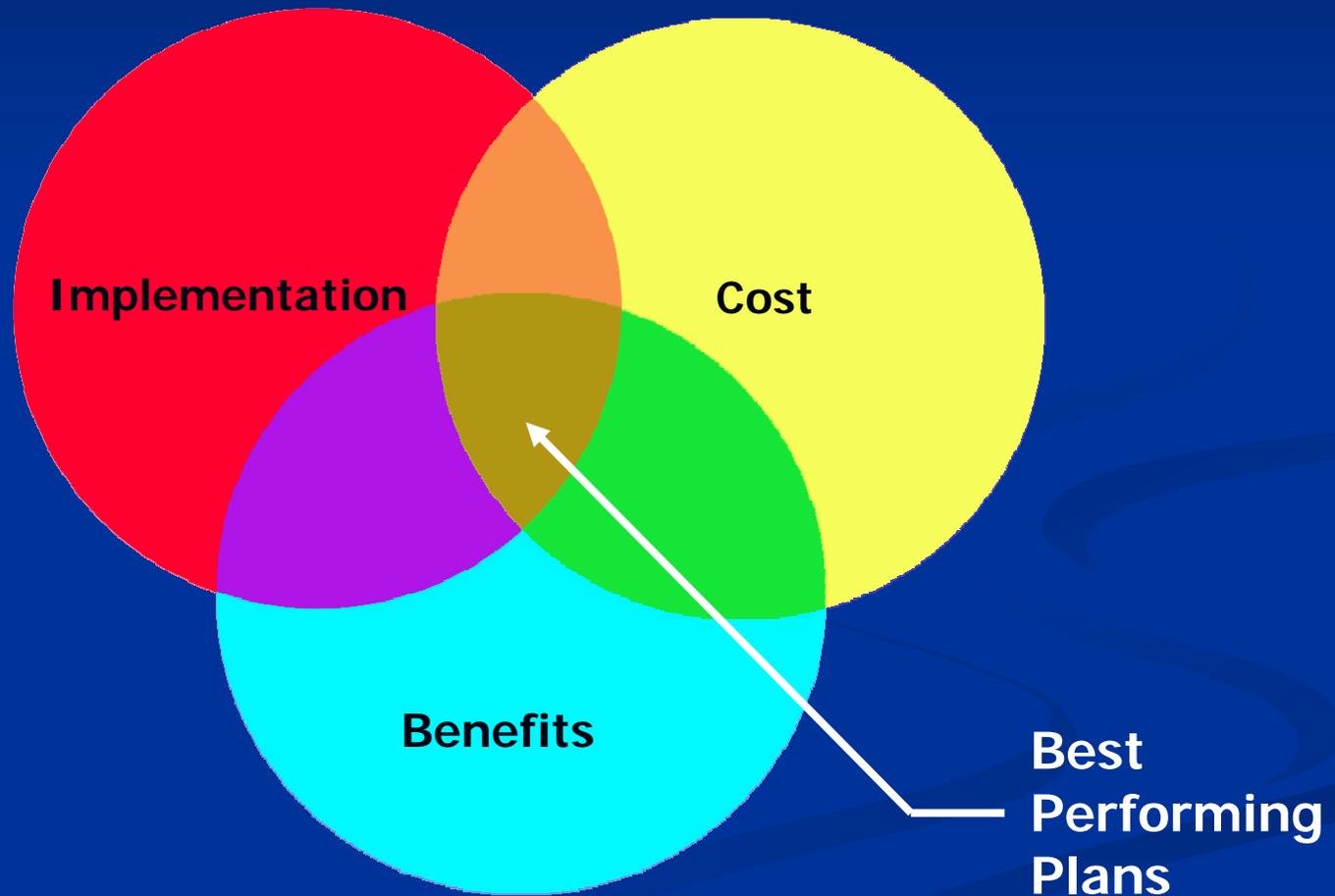
# Cost Estimate Comparison

- Quantities and unit pricing are similar between Corps and FDOT
- Diverge with risk & uncertainty analysis
- Economic outlooks differ
  - Construction costs have increased significantly over the past five years.
  - Cost of fuel and oil-based products continues to be extremely volatile.
  - Industry experts expect this trend to continue.
  - Corps used this data and extrapolated past trends into the future.
- Contract mechanisms differ
- Corps unable to apply additional funds without going back to Congress

# Screening of Alternatives

- Established Evaluation Factors
  - Cost
  - Ecological performance
  - Hydrologic performance
  - Implementation – timely completion
- Screening Criteria
  - Project cost greater than \$300M
  - Low performance (ecological and hydrologic)
  - Inability to implement before 2010

# Screening



### Tamiami Trail Plan Formulation Matrix

ALTERNATIVE			BENEFIT SUMMARY					COST INFORMATION			CONSTRUCTION	
Alt	ALTERNATIVES	L-29 DESIGN STAGE (FEET)	PEAK FLOW (cfs)	% VOLUME INCREASE	RIDGE AND SLOUGH PROCESSES	SLOUGH VEGETATION SUITABILITY	AVG ANNUAL LIFT (HU)	AVG ANNUAL COST PER HU (\$/HU)	TOTAL TTM COST (\$M)	COST W/ SAVINGS MEASURES (\$M)	Start	Duration
<b>1 No roadway raising (note 2)</b>												
1.1	no action (19 culvert sets)	7.5	1250	0.0%	1.8%	8.8%	0	N/A	0		-	-
1.2	spreader swales (30ft x 1000ft - bottom dimensions)	7.5	137	4.6%	2.5%	2.4%	187	5155	17		Early	○
1.3	add culvert sets (19 - 3x5ft dia) with swales (note 3)	7.5	37	6.4%	3.3%	2.5%	238	14532	73		Early	○
1.4a	add 1-mile eastern bridge	7.5	410	15.2%	26.0%	3.3%	3616	2775	219		Early	○
1.4b	add 1-mile western bridge	7.5	1410	15.2%	26.0%	3.3%	4209	2587	266		Early	○
1.5	raise western section of road to 12.75ft (crown) and add 1-mile western bridge	7.5	1410	15.2%	26.0%	3.3%	4209	>2587+	>266+		Early	◐
<b>2 Roadway improvements - Crown 11.05ft (note 4)</b>												
2.1	raise road (low points only)	8.0	1434	35.6%	1.8%	11.0%	2594		144		Early	○
2.2.1	raise low points, add culvert sets with swales	8.0	1508	52.9%	1.8%	23.3%	3715	1976	181		Early	◐
2.2.2a	raise road, add 1-mile eastern bridge	8.0	1577	54.9%	26.0%	46.7%	8559	1409	298	241	Early	◐
2.2.2b	raise road, add 1-mile western bridge	8.0	1577	54.9%	26.0%	46.7%	9154	1398	354		Early	◐
2.2.3	raise low points, add 2-mile + 1-mile bridges	8.0	1577	65.7%	65.0%	63.1%	15681	1111	539		Early	◐
<b>3 Roadway improvements - Crown 11.55ft (note 4)</b>												
3.1	raise road	8.5	1577	71.7%	1.8%	76.6%	8621		169		Early	○
3.2.1	raise road, add culvert sets with swales	8.5	1577	79.1%	1.8%	82.6%	9412	1030	239		Early	◐
3.2.2a	raise road, add 1-mile eastern bridge	8.5	1848	92.4%	26.0%	84.3%	13109	985	319		Early	◐
3.2.2b	raise road, add 1-mile western bridge	8.5	1848	92.4%	26.0%	84.3%	13705	1007	381		Early	◐
3.2.3	raise road, add 2-mile + 1 mile bridges	8.5	1869	91.1%	65.0%	84.3%	18972	955	561		Early	◐
<b>4 Roadway improvements - Crown 12.75ft (note 4)</b>												
4.1	raise road	9.7	2024	131.7%	1.8%	84.4%	17543		260		Early	○
4.2.1	raise road, add culvert sets with swales	9.7	2104	136.1%	1.8%	84.4%	18874	664	346		Early	◐
4.2.2a	raise road, add 1-mile eastern bridge (RGRR)	9.7	2181	143.8%	26.0%	84.4%	22585	685	478		Early	◐
4.2.2b	raise road, add 1-mile western bridge (RGRR)	9.7	2181	143.8%	26.0%	84.4%	23184	709	455		Early	◐
4.2.3	raise road, add 2-mile + 1-mile bridges (RGRR)	9.7	2331	146.9%	65.0%	84.4%	28361	708	525	452	Early	◐
4.2.4	10.7-mile bridge (RGRR)	9.7	4036	167.1%	100.0%	100.0%	53010		1648		Late	●
<b>5 Structural alternatives and/or road realignment (note 4)</b>												
5.1	northern alignment of Alt 14	9.7	2331	146.9%	65.0%	84.4%	28361	969	1328		Late	●
5.2	northern alignment with 1-mile bridge	9.7	2181	143.8%	26.0%	84.4%	23228	1183	1187		Late	●
5.3	northern alignment with 1-mile bridge and relocation of L-67 levee - Crown 13.00ft	9.7	4036 (west) 956 (east)	167.1%	13.0%	37.1%	4871	4463	751		Late	●
5.4	current alignment with 1-mile bridge and relocation of L-67 levee - Crown 13.00ft	9.7	4037 (west) 956 (east)	167.1%	13.0%	37.1%	4871	4157	626	533	Late	●
5.5	pump stations along L-29										Late	●

Low Benefits

Favorable

Low Benefits

High Cost

Late Start

Notes: 2 Existing road has 19 culvert sets resulting in an average culvert set spacing of ~3000 feet.  
 3 Reduces the average culvert set spacing to approximately 1500 feet.  
 4 All road improvements require 3.05 feet between road crest and L-29 design elevation.

○ 2.5 years or less  
 ◐ 2.5 - 5 years  
 ● > 5 years

# Final Four + No Action

- 1.1 No Action
- 2.1 Raise Road (low points only)
- 2.2.1 Raise Road, Add Culverts
- 2.2.2a Raise Road, Add 1-mile Eastern Bridge
- 2.2.2b Raise Road, Add 1-mile Western Bridge

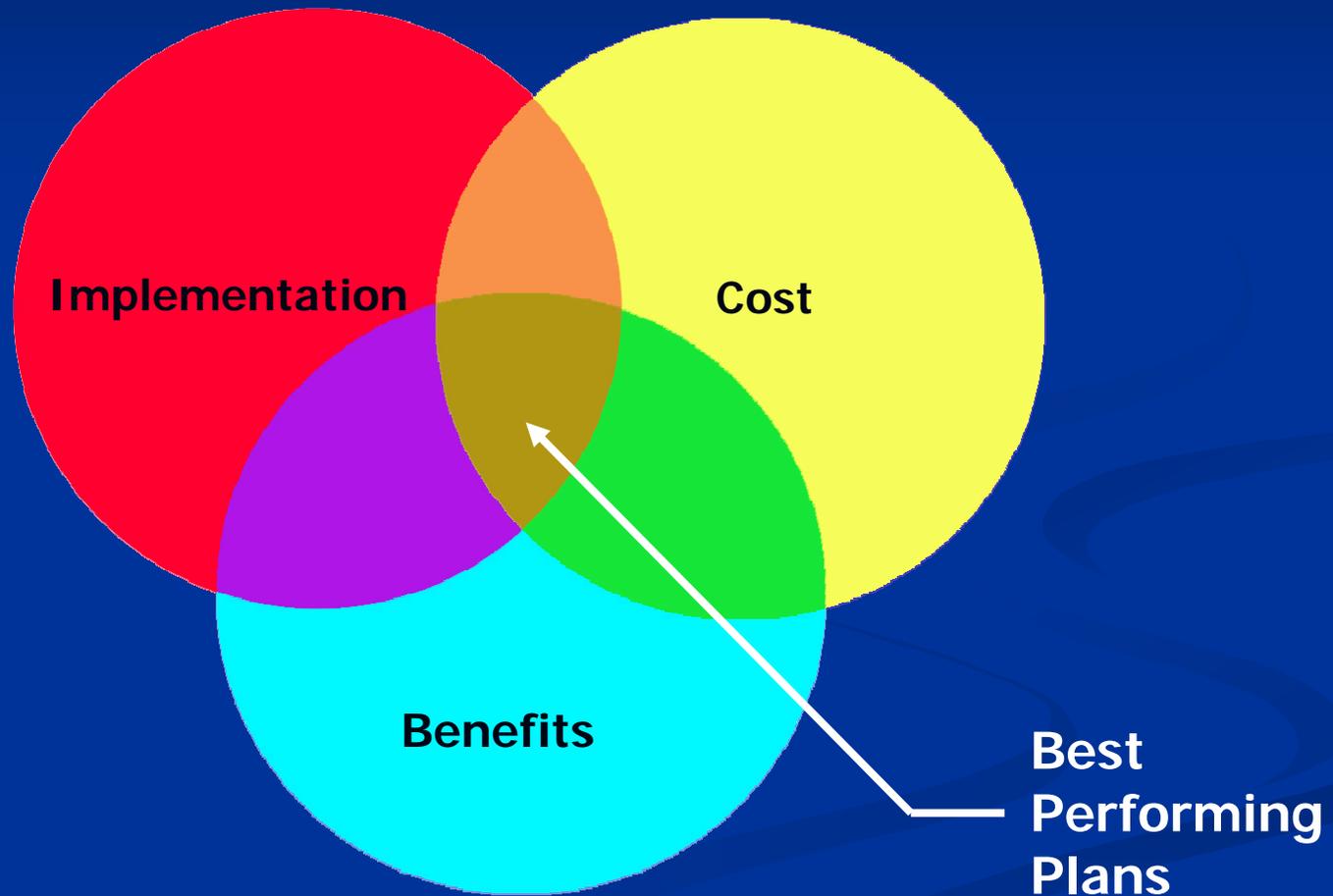
Note: All Group 2 alternatives have an L-29 Canal stage of 8.0 feet

# Potential Cost Savings Applied

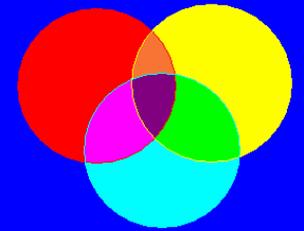
Assumption: cost estimates were calculated for the final four alternatives to include the following potential construction cost savings:

- Additional temporary construction easements for bridge alternatives (ENP & FPL)  
\$12-15M
- Fill Material for bridge approaches (SFWMD)  
\$6-9M
- Bridge clearance reduced from 8 to 6 feet (FDOT)  
\$7-9M
- Reduced asphalt (3.05 → 2.55) (Corps & FDOT)  
\$9-14M

# Evaluation of Final Alternatives

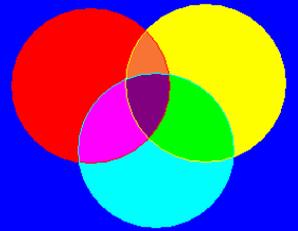


# Final Four Comparison



L-29 Canal Stage = 8.0 feet	2.1 Raise Low Points of Road	2.2.1 Raise Road, Add Culvert Sets	2.2.2a Raise Road, Add 1-Mile Eastern Bridge	2.2.2b Raise Road, Add 1-Mile Western Bridge
Estimated Project Cost with Savings (\$M)	125	167	241	251
% Volume Increase Across Trail	36	42	55	55
Ridge & Slough Processes	1.8	1.8	26	26
Slough Vegetation Suitability	11	23	47	47
Construction Schedule Start	2010	2010	2009	2010
Construction Duration (months)	24	36	36	40

# Final Four Evaluation



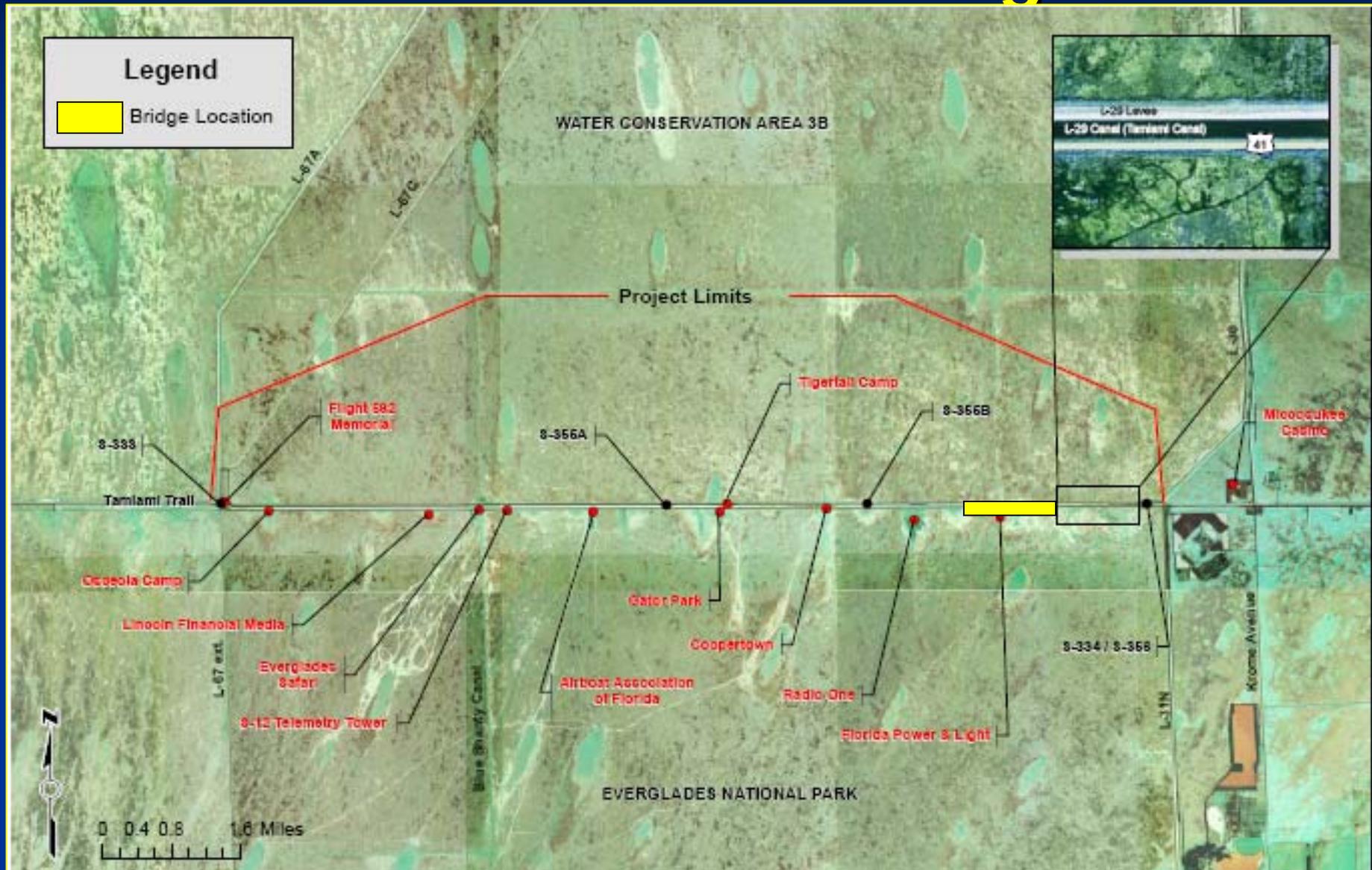
- Greater hydrologic improvement with bridges (2.2.2a and 2.2.2b)
- Ecosystem restoration objectives better achieved with bridges (2.2.2a and 2.2.2b)
- Construction of bridges can start earlier because alternatives use same bridge design as 2005 recommended plan

# Bridge Alternative Comparison

The 2.2.2a (eastern bridge alternative) is recommended over 2.2.2b (western bridge alternative)

- Cost - eastern bridge less expensive; soil conditions in west require additional foundation
- Benefits - greater distance from and less impacts to businesses/residents in the project area
- Implementation - earlier start and completion
  - Nearly all land required for construction is in public ownership
  - Design part of the 2005 RGRR plan
  - Achieve benefits sooner
  - Less cost escalation expected
- Tentatively Selected Plan – Alternative 2.2.2a (eastern bridge alternative)

# TSP : Alternative 2.2.2a 1-mile Eastern Bridge



# Additional Cost Analyses of TSP

Communications with FDOT, SFWMD, and ENP/DOI led to additional cost saving opportunities:

- Start construction in October 2008
- New FDOT roadway criteria applied to Tamiami Trail
- Receive temporary construction easements from ENP and FPL
- Removed swales
  - Pilot project will determine effectiveness and feasibility of swales
  - Decision to proceed with swales will depend on results of swale pilot project

# FDOT New Criteria

- For roadway with crown  $> 11.41$  feet NGVD, mill road 3" and replace with 3" asphalt
- For roadway with crown elevation between 10.41 and 11.41 feet NGVD, mill road 3" and replace with 5" asphalt
- For roadway crown elevation  $< 10.41$  feet NGVD, mill down existing pavement until it is 1 foot above design high water. Then add asphalt base and structural course according to the FDOT design manual

# Revised TSP Cost Estimate

L-29 Canal Stage = 8.0 feet	<i>2.2.2a</i> Raise Road, Add 1-Mile Eastern Bridge (\$M)
Roadway Improvements	22
Bridge	79
Mobilization and MOT	26
Land, PED, EDC, S&A, Escalation	63
<b>Total Project Cost</b>	<b>190</b>
<i>Total Bridge Phase</i>	<i>155</i>
<i>Total Road Phase</i>	<i>35</i>

# Next Steps - LRR

- ITR, EPR, Model Certification Feb
- Draft LRR/EA Public Review Mar-Apr
- Simultaneous HQ Policy Review Mar-Apr
- Incorporate Comments Apr
- Submit Final LRR/EA for approval May
- Sign LRR and FONSI Jun
- HQ/ASA Transmit report to Congress Jun

# Tamiami Trail Goal

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Initiate Tamiami Trail bridge construction  
in Fall 2008

# Tamiami Trail TSP

## Challenges to 2008 Construction Start

- **12 MAY – Corrected Final Design**: Modification of Alternative 14 design. Design Agreement w/FDOT needed.
- **12 MAY – Final WQC**: Pre-application meeting with FDEP conducted on 25 Jan.
- **02 JUN - PCA Amendment**: SFWMD obtains real estate interest needed for operations and maintenance for conveyance.
- **02 JUN - Management Agreement**: Agreement between participating agencies to outline tasks required to construct project. Draft completed.
- **03 JUN - Temporary Construction Easements**: temporary easements south of Tamiami Trail within ENP and FPL will reduce cost and time needed to complete construction.
- **09 JUN - Highway Easement Deed**: Provides real estate interest to FDOT and authorizes construction and O&M in ENP.
- **16 JUN - Relocation Agreement**: FDOT and Corps agreement to allow for road modifications.

# Schedule for Initiating Construction

- Complete Bridge Design May
- Final Water Quality Certification May
- Complete LRR (Sign FONSI) Jun
- PCA Executed Jun
- Management Agreement Jun
- ENP Temp Construction Easement Jun
- FP&L Construction Easement Jun
- Highway Easement Deed Jun
- Corps-FDOT Relocation Agreement Jun
- Advertise Contract Jul
- Bid Opening Aug
- Award Contract Sept
- Notice to Proceed Oct

