

Modified Water Deliveries to Everglades National Park Tamiami Trail Modifications

**Limited Reevaluation Report
Working Group Briefing
April 28, 2008**

Topics

- Background
- Swale Pilot Project
- Limited Reevaluation Report
 - Alternatives
 - Screening Analysis
 - Evaluation of Final Plans
 - Tentatively Selected Plan
 - LRR Schedule
- Agreements Needed for Construction Start
- MWD Implementation

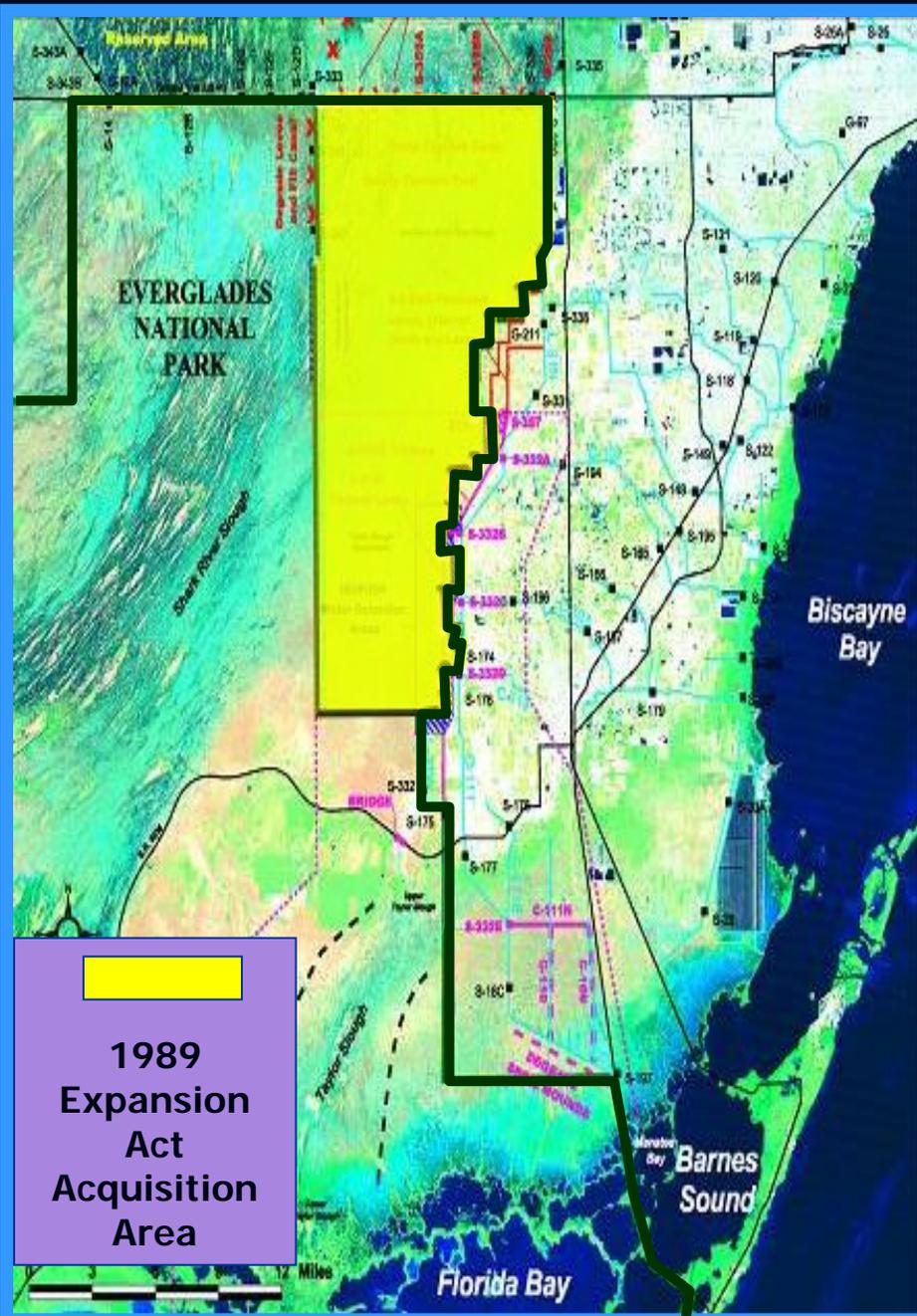
Background

Modified Water Deliveries to Everglades National Park

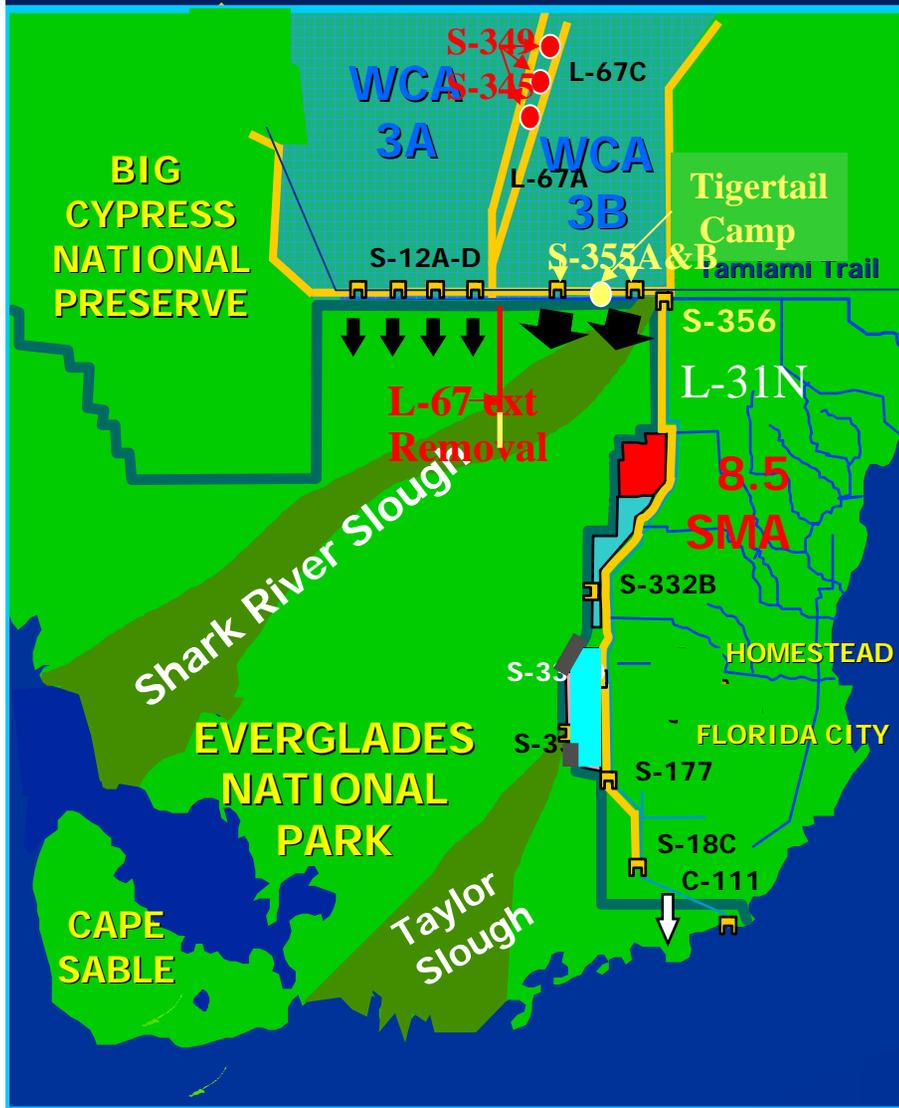
Modified Water Deliveries Authorization

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: Draft LRR/EA complete
- 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

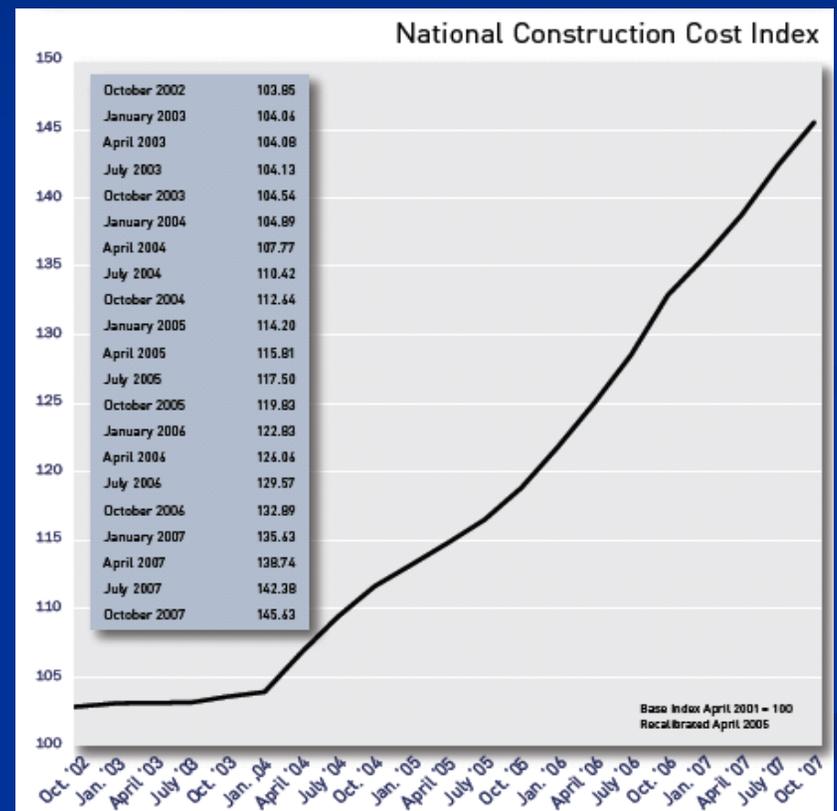
- CSOP: On Hold

Mod Waters: Tamiami Trail History

- 1989 - Everglades National Park Expansion Act
- 1992 - General Design Memorandum (GDM)
 - Assumed existing culverts sufficient to pass flows
- 2003 Dec - GRR for Tamiami Trail
 - Recommended 3,000 foot bridge and increased roadway elevation
- 2005 Nov - RGRR & SEIS for Tamiami Trail
 - Final Plan: 2-mile and 1-mile bridges & higher roadway elevation
- 2007 – Significant cost increase since RGRR plan
 - WRDA 2007 – Re-examine prior reports and evaluate alternatives for increasing flow under highway and into ENP

Why Reevaluate?

- Increases in cost of construction materials caused Tamiami Trail project cost to nearly double
- Directed to reexamine & evaluate alternatives for increasing flows at a lower cost



Flows Through Tamiami Trail

- Currently 55 culverts pass flow through Tamiami Trail
- Two key factors affect ability to move flows through Tamiami Trail
 - L-29 Canal water level (stage)
 - Opening size through Tamiami Trail
- FDOT concerned about impacts to Tamiami Trail when L-29 Canal stage goes above 7.5 feet

Improving Tamiami Trail Conveyance

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

Modified Water Deliveries to Everglades National Park

Tamiami Trail Road Section at Culvert-side View



WCA 3

ENP

Culvert set
under
Tamiami Trail

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
 - ENP hosted technical workshop on Feb 25
 - ENP lead agency on NEPA analysis
- 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 will extend 500'
east & west of culvert set and
30' south.

Actual size will depend on
peat depth.

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Google

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

Streaming ||||| 100%

Eye alt 647 ft

Limited Reevaluation Report

Modified Water Deliveries to Everglades National Park

Tamiami Trail Reanalysis

A reanalysis of alternatives was conducted to:

- Address the WRDA 2007 language
- Provide information on the cost increases since 2005 RGRR plan record of decision
- Develop possible cost saving options
- Reanalyze alternatives for completing Tamiami Trail

LRR Formulation of Alternatives

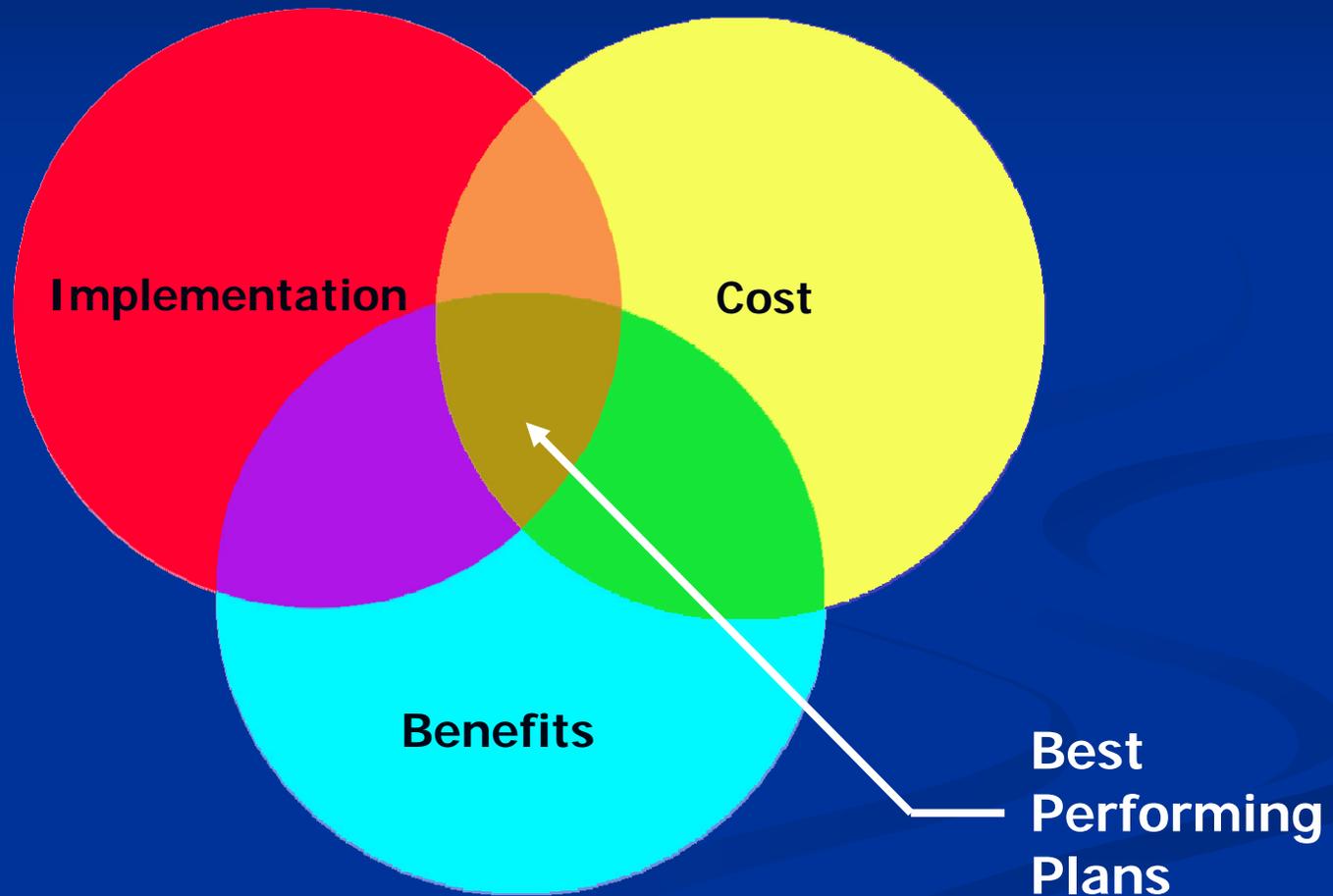
- Capitalized on data collected and work completed to date on the 2005 recommended plan including:
 - Geotechnical survey data & design information
- Adjusted the two key factors that affect ability to move water through Tamiami Trail to generate 27 alternatives
 - L-29 Canal stage
 - 6 inch increments: 7.5 feet, 8.0 feet, 8.5 feet, and 9.7 feet
 - Opening size through Tamiami Trail
 - Currently 55 culverts
 - Additional culverts, 1-mile bridge (eastern and western), 1-mile eastern and 2-mile western bridges

Reevaluation Alternatives

- 27 alternatives (including no-action) considered
- Organized into 5 groups:
 1. Constrain L-29 Canal 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

Evaluation of Alternatives



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
1 No roadway raising (note 2)												
1.1	no action (19 culvert sets)	7.5	1250	0.0%	1.8%	2.8%	0	N/A	0		-	-
1.2	spreader swales (30ft x 1000ft - bottom dimensions)	7.5	1371	4.6%	2.5%	2.4%	187	5155	17		Early	○
1.3	add culvert sets (19 - 3x5ft dia) with swales (note 3)	7.5	1371	6.4%	3.3%	2.6%	238	14532	73		Early	○
1.4a	add 1-mile eastern bridge	7.5	1410	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	◐
2 Roadway improvements - Crown 11.05ft (note 4)												
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	42.2%	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	◐
3 Roadway improvements - Crown 11.55ft (note 4)												
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	101.1%	65.0%	84.3%	18972	955	561		Early	◐
4 Roadway improvements - Crown 12.75ft (note 4)												
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	428		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	557	452	Early	●
4.2.4	10.7-mile bridge (RGRR)	9.7	4036	167.1%	100.0%	100.0%	53010		1648		Late	●
5 Structural alternatives and/or road realignment (note 4)												
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	●

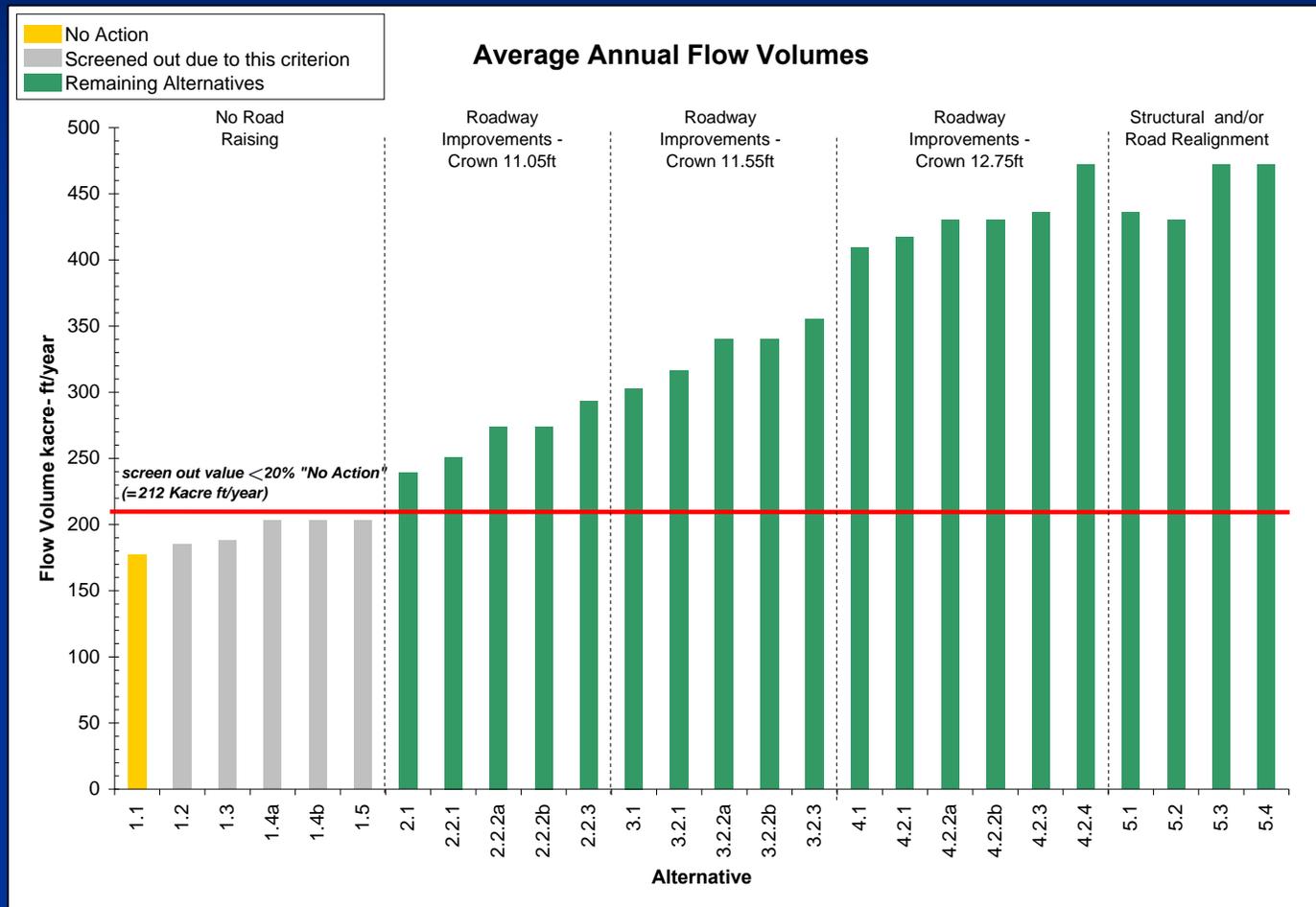
Notes: 2 Existing road has 19 culvert sets resulting in an average culvert set spacing of ~3000 feet.
 3 Reduces the average culvert set spacing to approximately 1500 feet.
 4 All road improvements require 3.05 feet between road crest and L-29 design elevation.

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

Screening of Alternatives

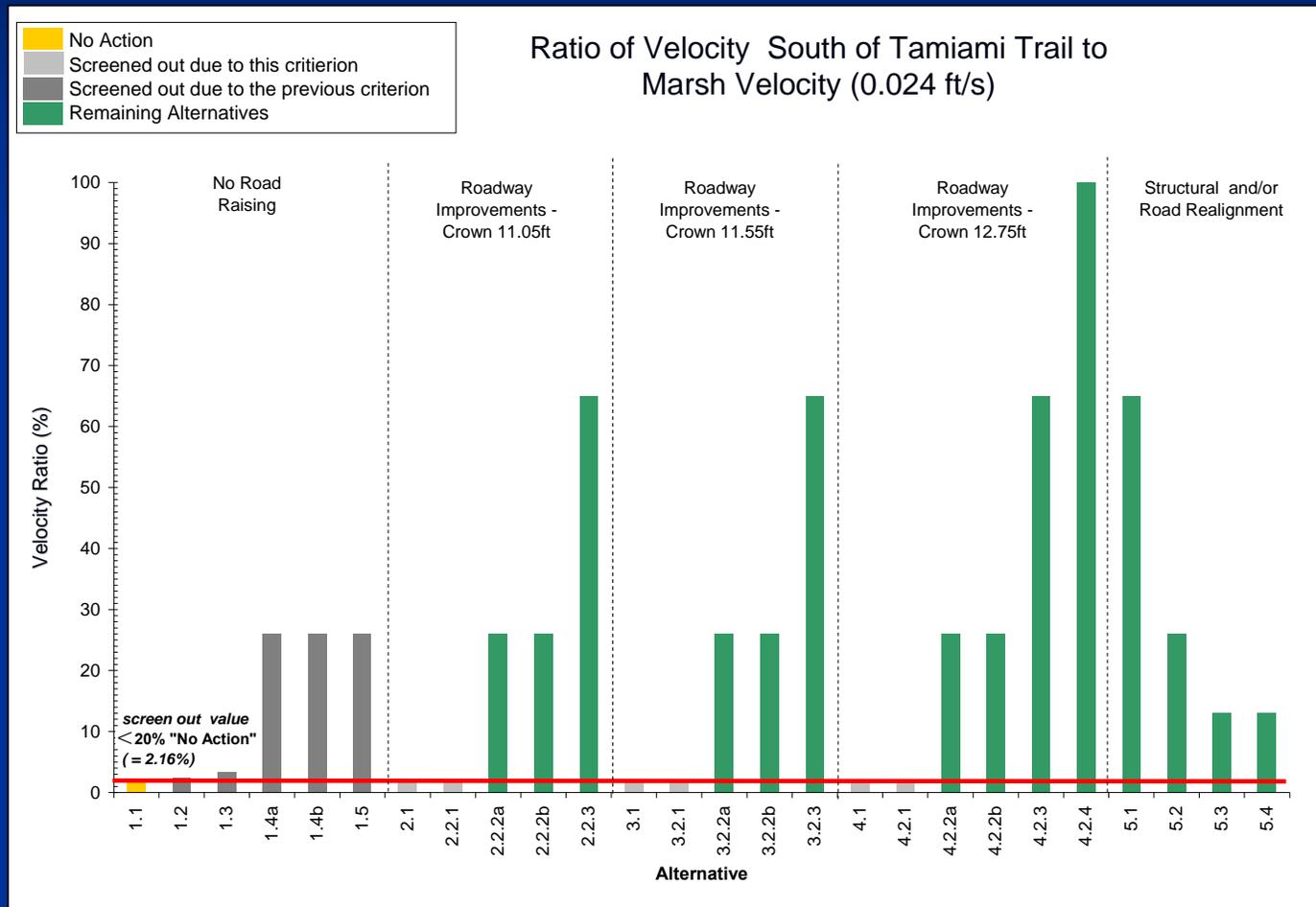
- Worked to narrow the alternatives considered
- Used scoping comments to develop screening criteria
- Screening criteria focused on combined benefits, then costs
 - Hydrologic performance (1 and 2)
 - Marsh connectivity (3)
 - Downstream ecological response (4)
 - Cost considerations (5)

#1 – Increase Average Annual Flow Volumes (Want More Water)



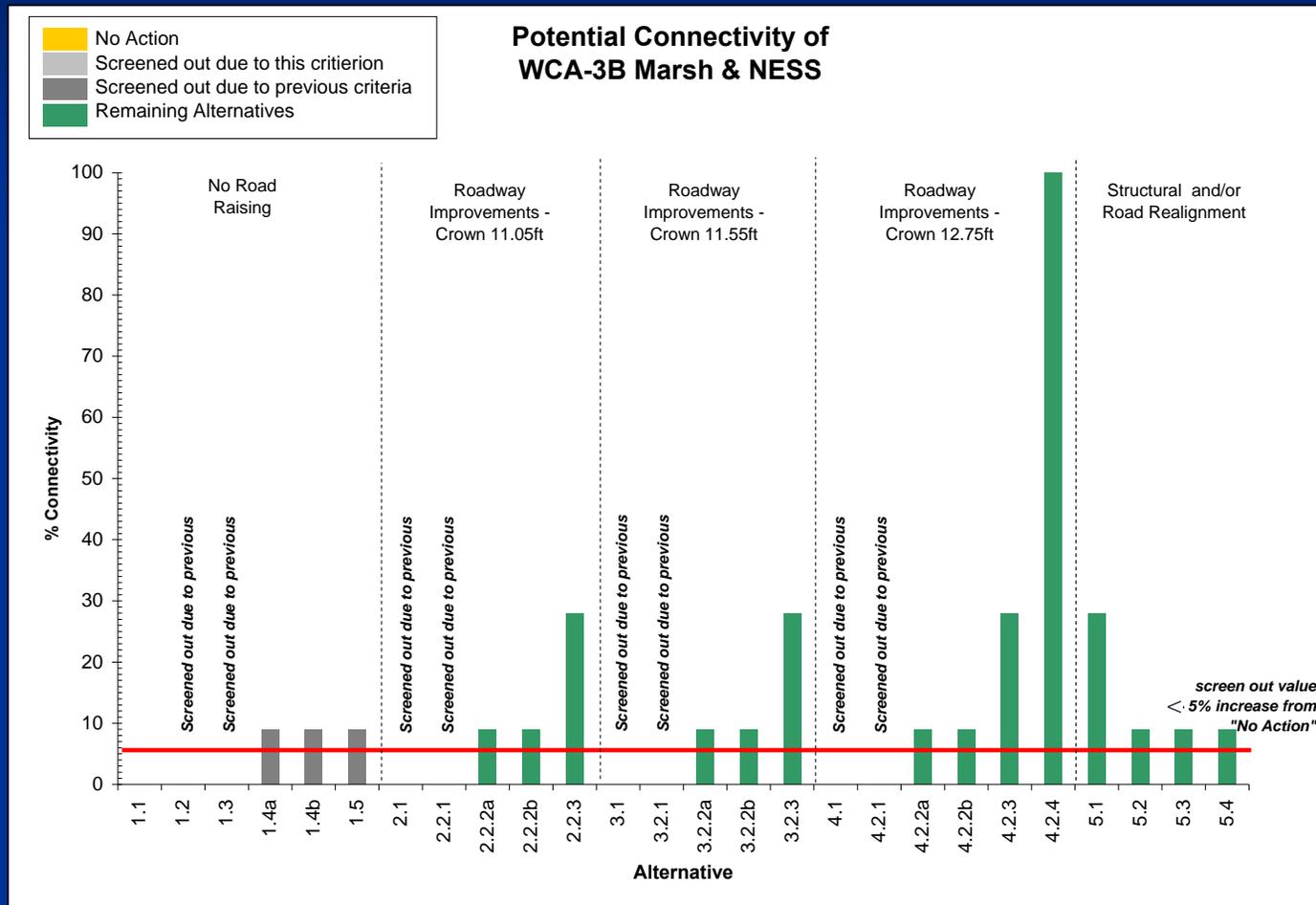
- < 20% increase over 'No Action' removed
- Removed alternatives with the existing stage constraint

#2 – Decrease Velocity at the Road (Reduce Erosion, Improve Sheetflow)



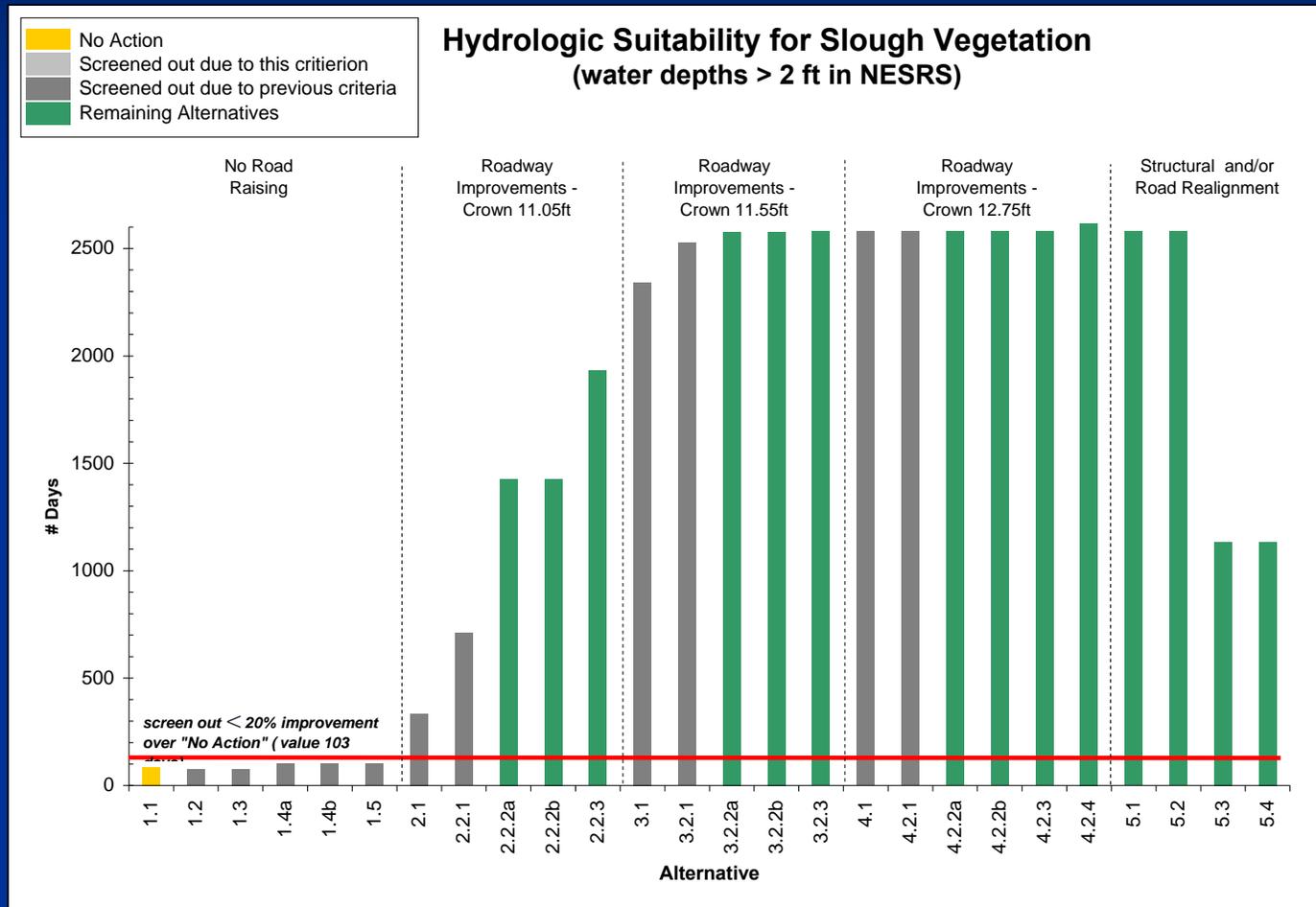
- Alternatives with similar velocity ratios as No Action were removed

#3 – Improve Marsh Connectivity (More Natural Flow Pattern)



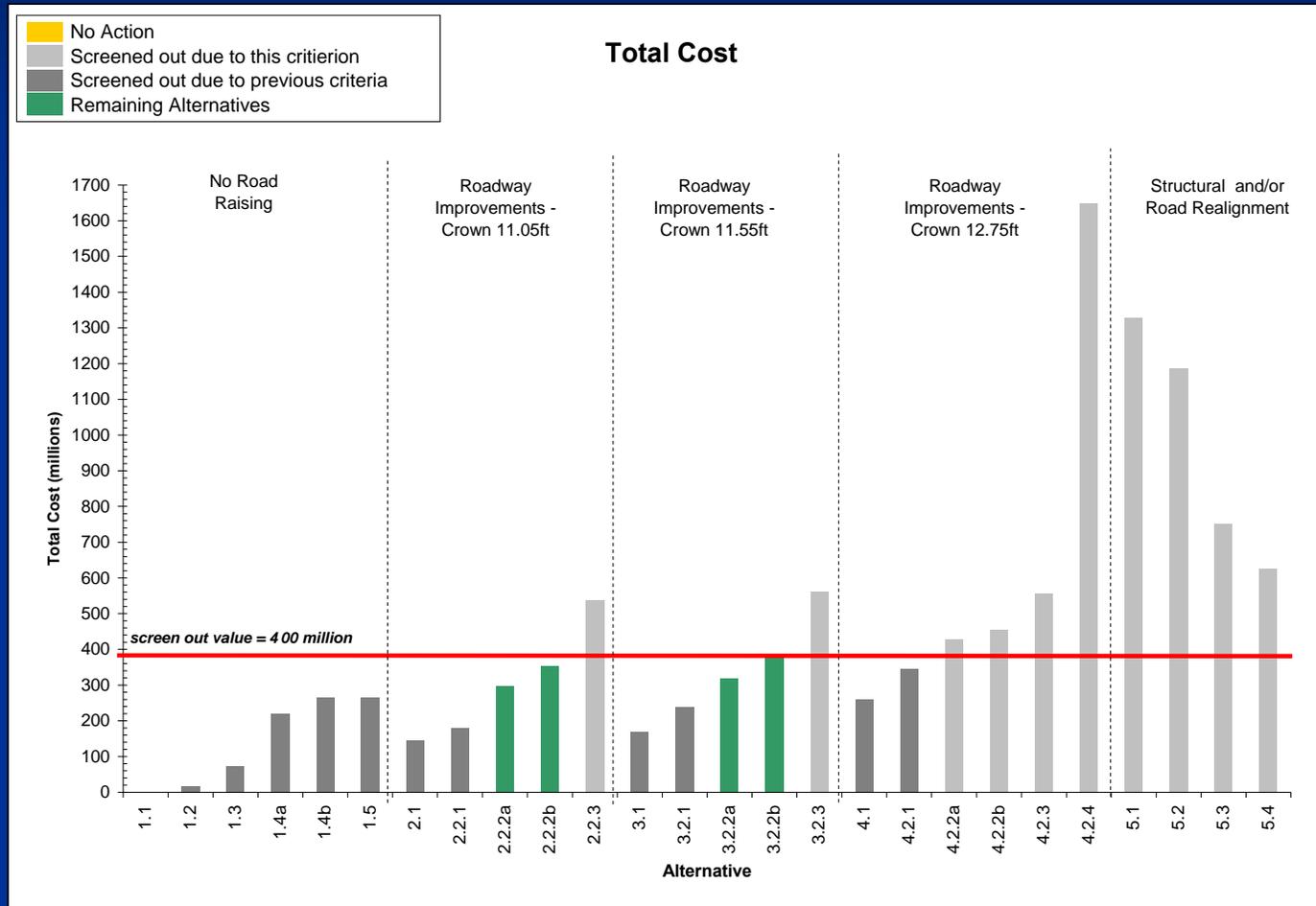
- Reduced wildlife mortality with improved connectivity
- Verified previously screened out alternatives

#4 – Improve Slough Vegetation Habitat (More Water for Longer Periods)



- Validated previous screening criteria
- Improved habitat for water lilies

#5 – Project Cost < \$400M



- Removed longer bridge spans, new alignments, and new structures

4 Remaining Alternatives & No Action

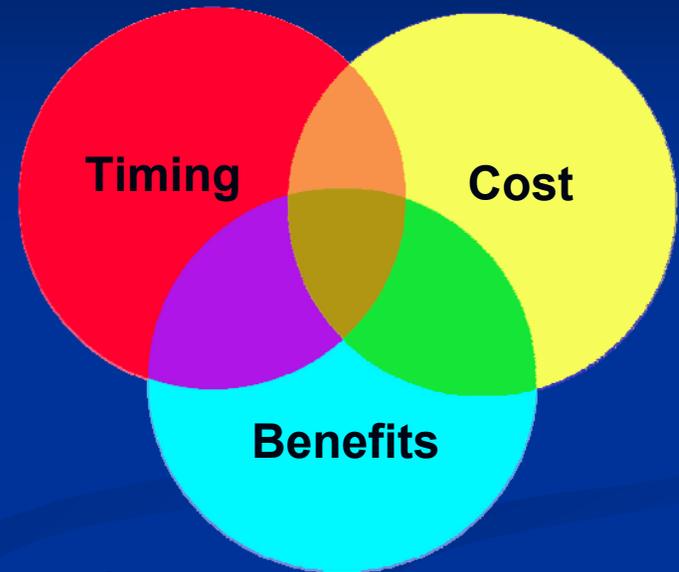
<u>Alternative</u>	<u>Description</u>
■ 1.1	No Action
■ 2.2.2a	Add 1-mile eastern opening (bridge), allow 8.0 ft stage, and mitigate the road for the 8.0 ft stage
■ 2.2.2b	Add 1-mile western opening (bridge), allow 8.0 ft stage, and mitigate the road for the 8.0 ft stage
■ 3.2.2a	Add 1-mile eastern opening (bridge), allow 8.5 ft stage, and mitigate the road for the 8.5 ft stage
■ 3.2.2b	Add 1-mile western opening (bridge), allow 8.5 ft stage, and mitigate the road for the 8.5 ft stage

Tentatively Selected Plan

Modified Water Deliveries to Everglades National Park

Selecting the TSP

- Screening
 - Focused on benefits
 - Removed most expensive
 - Left with 4 alternatives
- Want plan that:
 - Maximizes benefits for money spent
 - Minimizes cost
 - Can be constructed sooner than later
- Looked for cost savings
- Compared alternatives for implementation



Cost Estimate Considerations

- Quantities and unit pricing
- Risk & uncertainty analysis
- Economic outlook
 - 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
- Corps unable to apply additional funds without going back to Congress

Cost Risk Factors

- Fuel
- Asphalt
- Aggregate Material
 - Lake Belt litigation impacts
 - Transportation (fuel)
- Pre-stressed Concrete Beams
 - Global demand

Potential Cost Savings Applied to 4 Remaining Alternatives

Assumption: cost estimates for the 4 remaining alternatives included the following 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
- Road reinforcement (road mitigation) to follow FDOT Pavement Design Manual
- Swales removed
 - Pilot project will determine effectiveness and feasibility of swales
 - Decision to proceed with swales will depend on results of swale pilot project

East-West Bridge Location Comparison

Eastern bridge alternatives are recommended over western bridge alternatives due to:

- Costs - eastern bridge less expensive; western soil conditions will require additional foundation work – greater cost risk
- Impacts - 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 – earlier construction start & finish

Cost Comparison of 1-Mile Eastern Bridge/Road Reinforcement TSP Alternatives

Total <u>Construction</u> Cost (millions)	+ 25% Contingency		90% Confidence	
	1st Cost	Escalated Cost	1st Cost	Escalated Cost
2.2.2a (allow 8.0 ft stage)	92.2		125.6	
3.2.2a (allow 8.5 ft stage)	99.3		153.9	
Total <u>Project</u> Cost (millions)	+ 25% Contingency		90% Confidence	
	1st Cost	Escalated Cost	1st Cost	Escalated Cost
2.2.2a (allow 8.0 ft stage)	107.7	137.9	144.7	185.3
3.2.2a (allow 8.5 ft stage)	115.6	148.1	176.0	225.4

- 90% confidence that cost will be at or below value
- Assumes 2008 start, 3-year duration, sunk costs excluded

TSP Selection – 3.2.2a

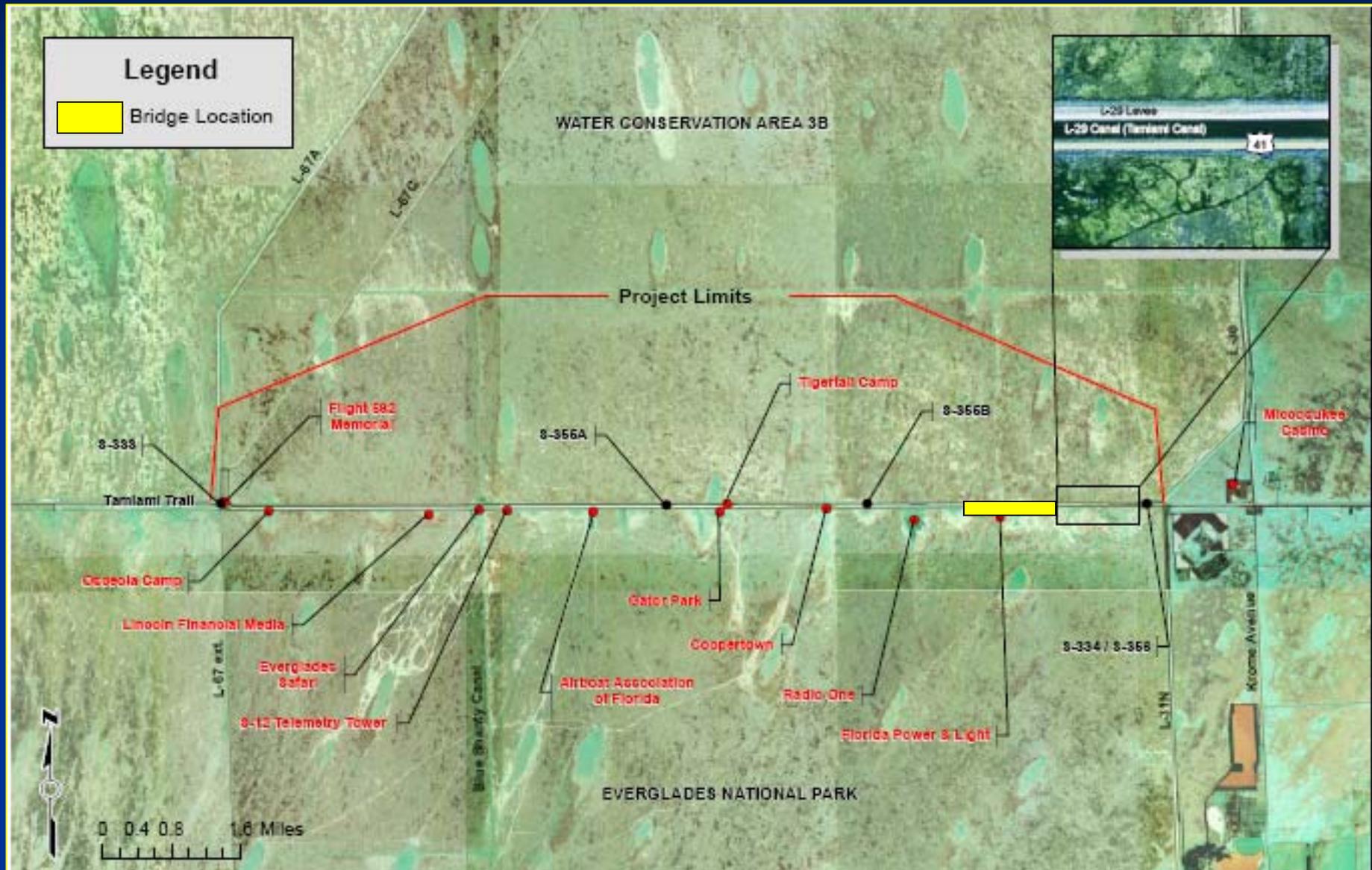
(1-mile Eastern Bridge, Allow 8.5 Foot Stage, & Road Reinforcement for 8.5 Foot Stage)

- Incremental Cost Analysis – best benefits per unit cost
- 1.5 times the benefits of 8.0 foot stage (2.2.2a)
- Additional construction cost ~ \$28M

- Potential to take advantage of current economic climate – FDOT and SFWMD receiving reasonable bids on construction projects

TSP Alternative 3.2.2a

1-mile Eastern Bridge, Allow 8.5 Foot Stage, Road Reinforcement



Next Steps - LRR

- EPR, Model Certification Apr-May 08
- Draft LRR/EA Public Review 9 Apr 08
- Simultaneous HQ Policy Review 9 Apr 08
- Comments Due 9 May 08
- Incorporate Comments May 08
- Sign Documents (LRR & FONSI) Jun 08
- Transmit Report to Congress 30 Jun 08

Agreements Needed for 2008 Construction Start

Five agreements needed to implement the Tamiami Trail project:

1. **Land Management Agreement** - needed to complete the PCA (see item 3 below). Agreement between USACE, DOI, and SFWMD on how to manage the project features where they extend into lands owned by ENP.
2. **FPL Perpetual and Temporary Construction Easements** – agreement between USACE and FPL that conveys rights to USACE to allow construction on their land.
3. **Project Cooperation Agreement Amendment** - legally binding agreement between USACE and SFWMD identifying the SFWMD project duties and obligations.

Agreements Needed for 2008 Construction Start (Continued)

Five agreements needed to implement the Tamiami Trail project (continued):

4. **Highway Easement Deed** - legal mechanism negotiated by DOI, FHWA, FDOT, SFWMD, and USACE to convey lands necessary for the construction and operation of the 1-mile bridge from ENP through FHWA to FDOT.
5. **Relocation Agreement** - final agreement; agreement between USACE and FDOT to acquire the real estate rights to enter onto FDOT lands (from HED) to construct features and modify the existing roadway, a channel improvement easement at the bridge location, and a flowage easement for the entire expanse of roadway within the project limits (i.e., 10.7 miles).

Schedule for Initiating Construction

- Complete Bridge Design May
- Submit Final Water Quality Certification May
- Complete LRR (Sign FONSI) Jun
- PCA Executed Jun
- Land 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

MWD Implementation

- 8.5 Square Mile Area
 - S-357 Pump Station, Perimeter Levee and Seepage Canal, Flow-way and STA near completion
 - Finalize Interim Operations
- Tamiami Trail Modifications
- Conveyance and Seepage Control Features
 - S-331 Command and Control
 - L-67A/C Features: S-345s and S-349s
 - Complete L-67 Extension Removal
 - Spreader Swales? – dependent on Pilot Study
- Osceola Camp Raising
- Operations (CSOP)

**Draft Tamiami Trail LRR/EA
available at:**

<http://www.saj.usace.army.mil/dp/mwdenp-c111/index.htm#ttm>

Public Comment Period ends 9 May 08

Send comments to: TTMComments@usace.army.mil



WRDA 2007

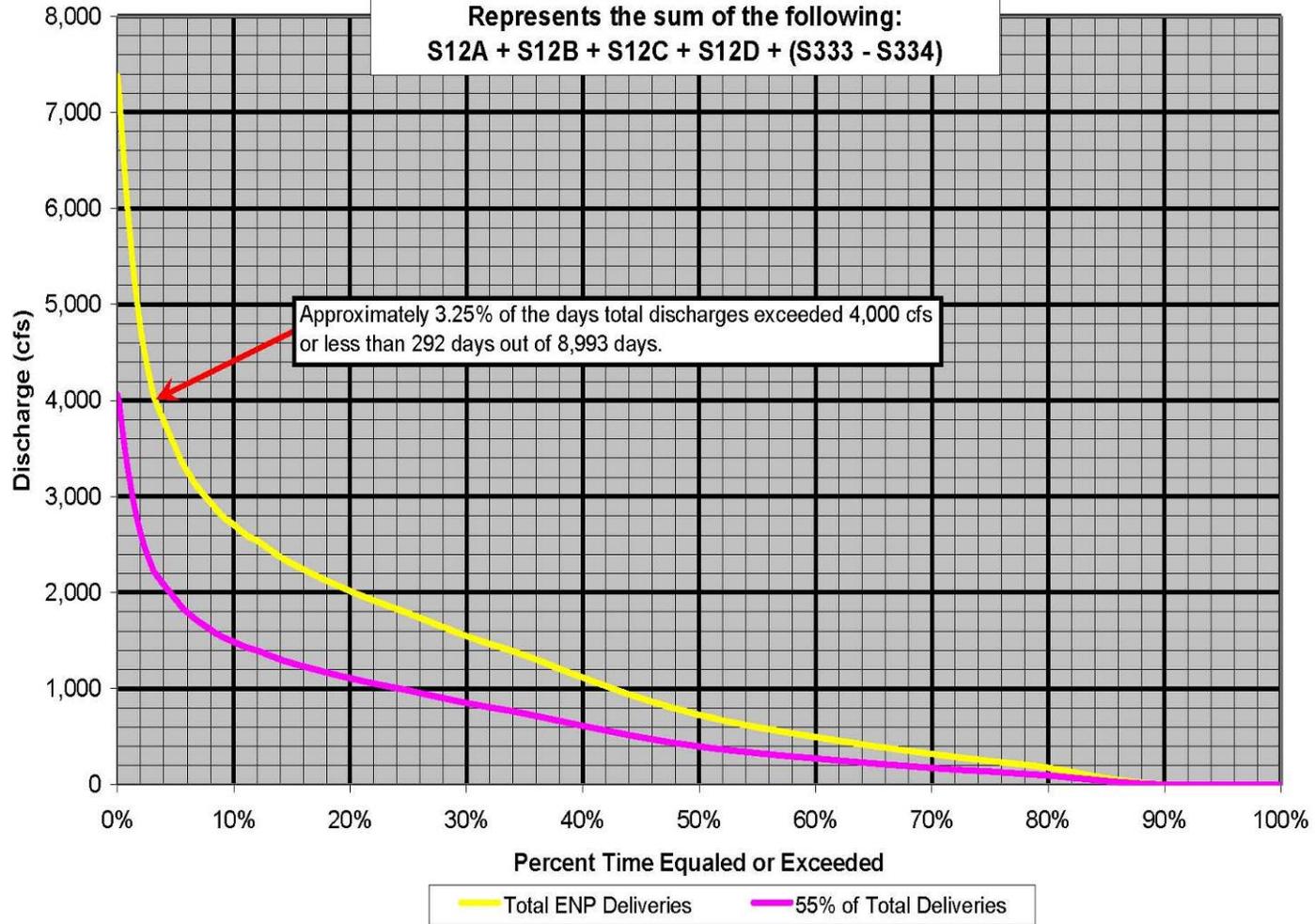
Conference Report Language

- 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

Why 4000 cfs?

- 4000 cfs is based on structure maximum capacities from the 1992 GDM on the following structures discharging into L-29
 - S-333 @ 1350 cfs
 - S-355A@ 1000 cfs
 - S-355B@ 1000 cfs
 - S-356 @ 950 cfs
- Assumption: As all structures begin to reach their peak discharge capacity, S-333 would see tailwater impacts and reduce its capacity to 1050 cfs hence providing only 4000 cfs capacity

Daily Flow Duration Curve
Total Inflow into ENP (Historical)
(1 Jan 1983 - 15 Aug 2007, approximately 8,993 days)
Represents the sum of the following:
S12A + S12B + S12C + S12D + (S333 - S334)



FY 2008 Appropriations Act Report Language

- Appropriations Committees Concerns:
 - open-ended scope of MWD
 - increasing costs for Corps participation
- Corps directed to use this funding to improve flows through the culverts under the Tamiami Trail. Any other use will require:
 - Reprogramming request; and
 - House & Senate Appropriations Committee approval
- Within 90 days of enactment, Corps is to submit to the House and Senate Committees on Appropriations its plan for completion of its role in the MWD plan – final project scope and funding requirements of Corps, DOI, and the State of Florida

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.

Road Reinforcement Plan per FDOT Pavement Design Manual

- For roadway with crown > 11.91 feet NGVD, mill road 3" and replace with 3" asphalt
- For roadway with crown elevation between 10.91 and 11.91 feet NGVD, mill road 3" and replace with 5" asphalt
- For roadway crown elevation < 10.91 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