Modified Water Deliveries to Everglades National Park

Tamiami Trail Modifications

DRAFT Limited Reevaluation Report & Environmental Assessment

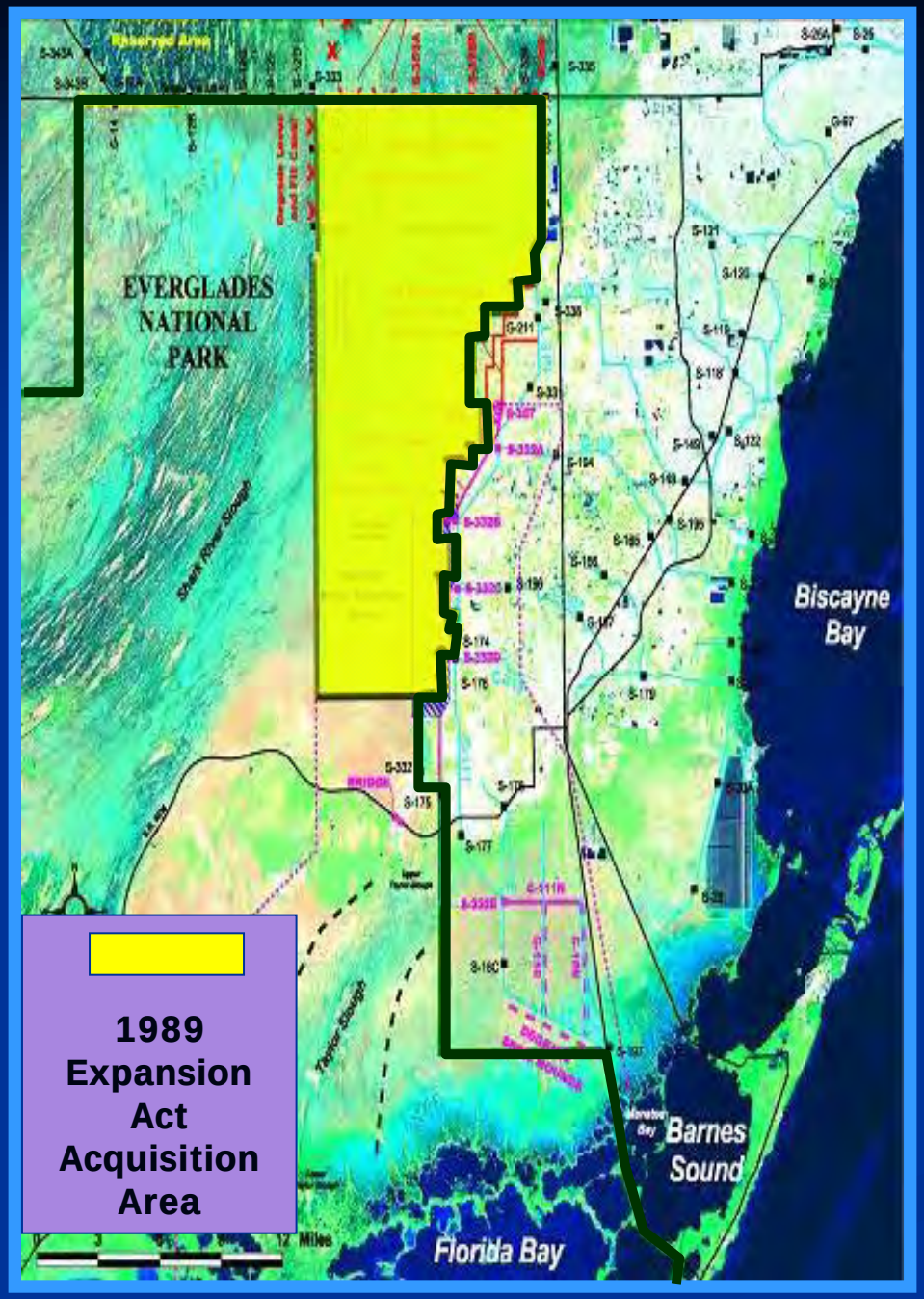
April 2008

Topics

- Background
- Limited Reevaluation Report
  - Alternatives
  - Screening Analysis
  - Evaluation of Remaining Plans
  - Tentatively Selected Plan
  - LRR Schedule

Background

Modified Water Deliveries to Everglades National Park

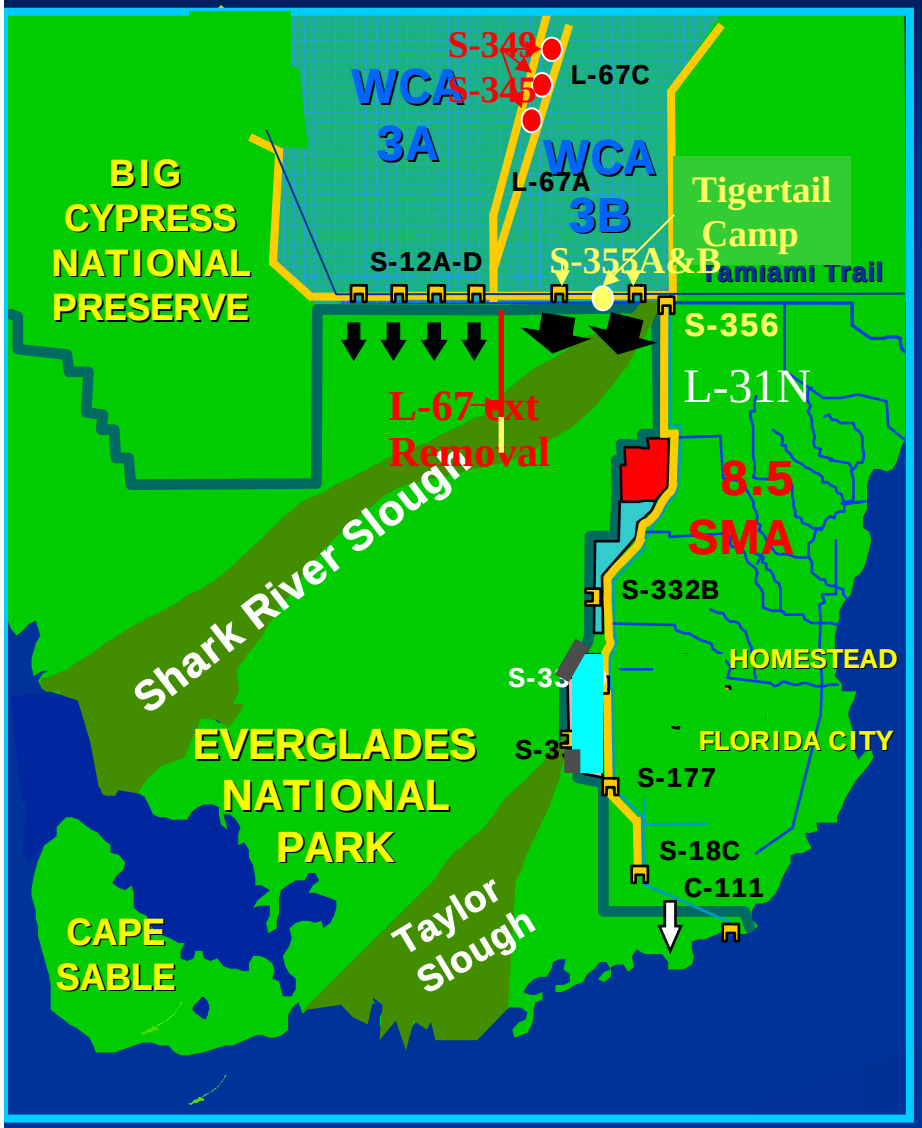


Modified Water Deliveries Authorization

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

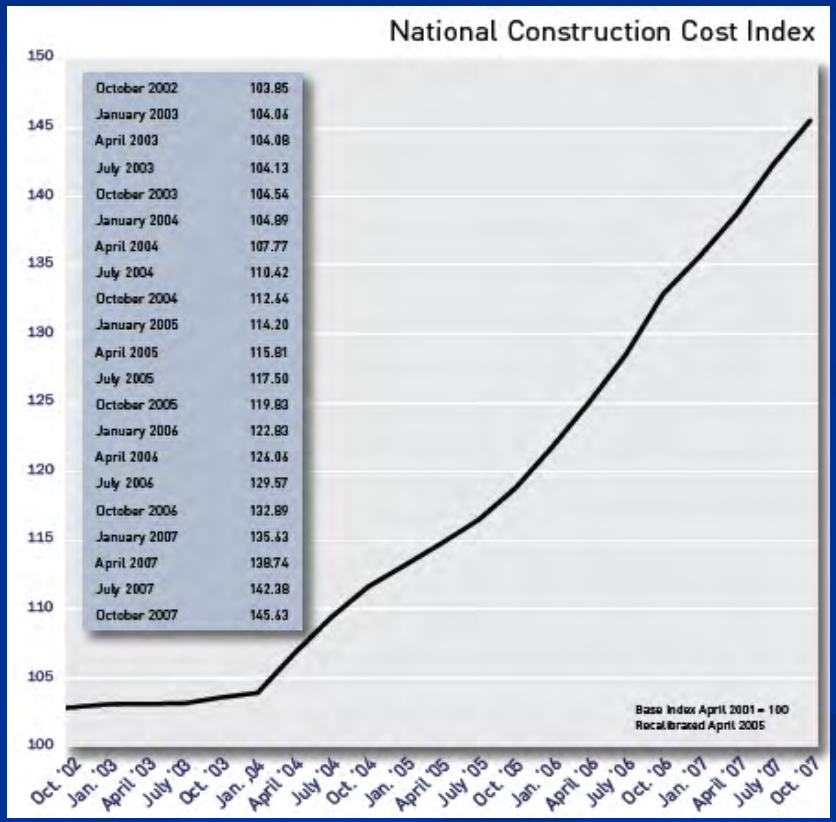
- **CSOP:** On Hold

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 & higher roadway elevations
- 2005 Nov - RGRR & SEIS for Tamiami Trail
  - Final Plan: 2-mile and 1-mile bridges & higher roadway elevations
- 2007 – Significant cost increases since RGRR plan

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 water moving 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

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 modifications

LRR Formulation of Alternatives

- Capitalized on data collected and work completed to date on the 2005 recommended plan including:

  Geotechnical survey data of Tamiami Trail & 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

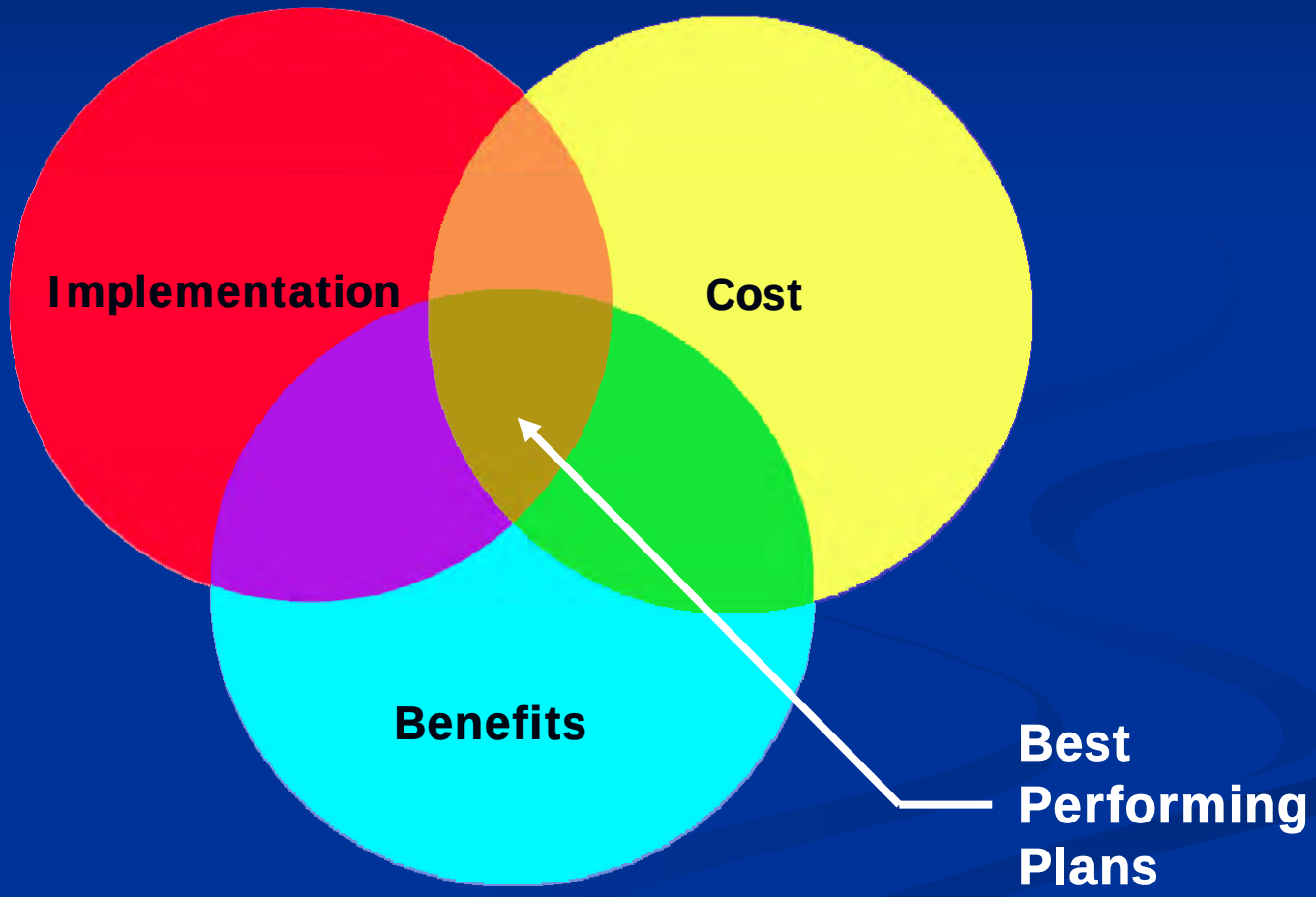
Alternatives in the Reevaluation

- 27 alternatives (including no-action) considered
- Organized into 5 groups:

1. Constrain L-29 Canal stage to 7.5 feet
   (no roadway reinforcement, no stage increase)
2. Raise stage constraint to 8.0 feet
   (minimum roadway reinforcement)
3. Raise stage constraint to 8.5 feet
   (moderate roadway reinforcement)
4. Raise stage constraint to 9.7 feet
   (major roadway reinforcement)
5. Other structural alternatives and roadway realignments

Each group included: road reinforcement, culvert addition, eastern bridge, western bridge, and two bridge alternatives

Evaluation of Alternatives



Tamiami Trail Plan Formulation Matrix

ALTERNATIVE			BENEFIT SUMMARY					COST INFORMATION				
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)	CONSTRUCTION	
											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	●

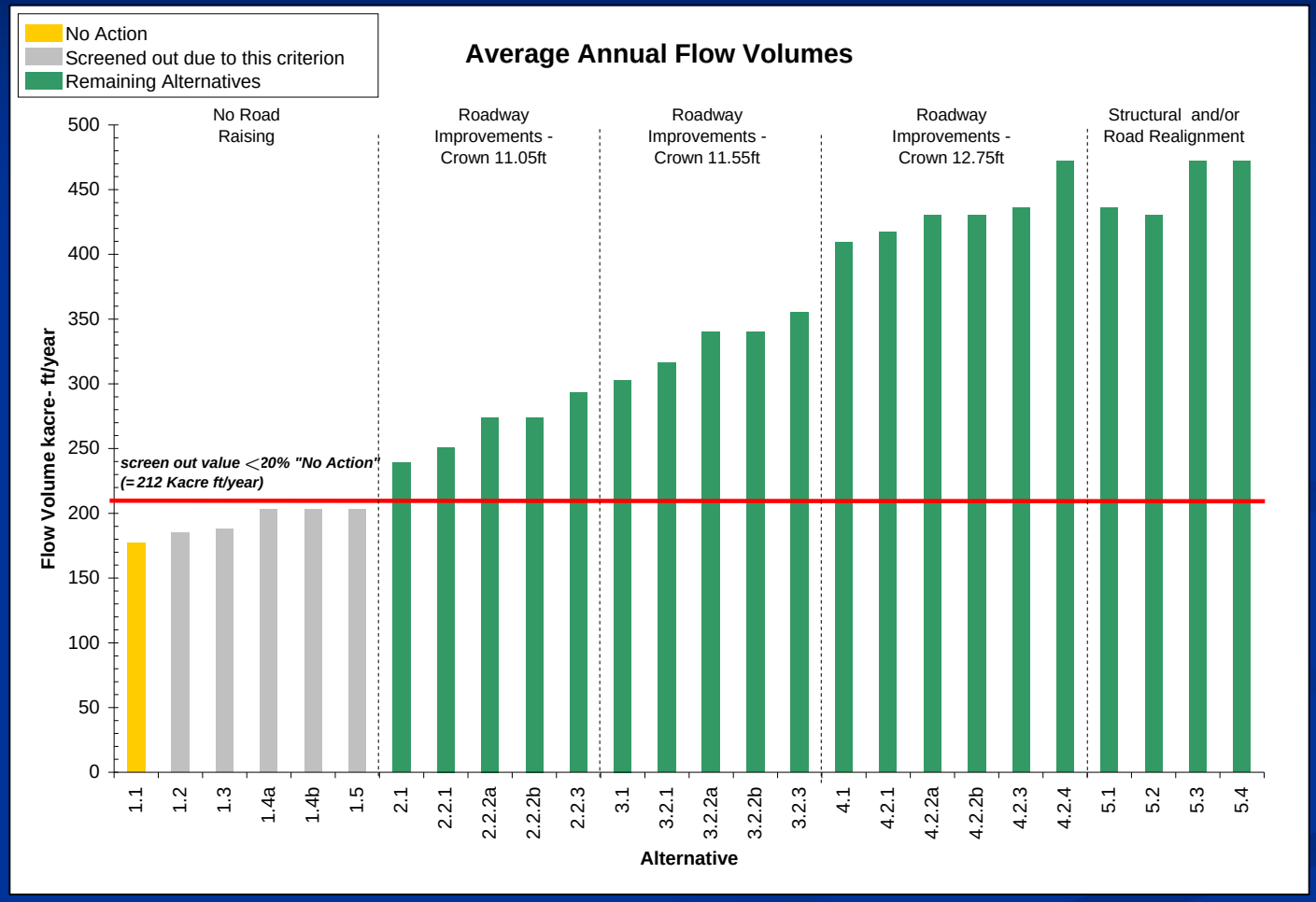
Notes: 2 Existing road has 19 culvert sets resulting in an average culvert set spacing of ~3000 feet.
3 Reduces the average culvert set spacing to approximately 1500 feet.
4 All road improvements require 3.05 feet between road crest and L-29 design elevation.

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

Screening of Alternatives

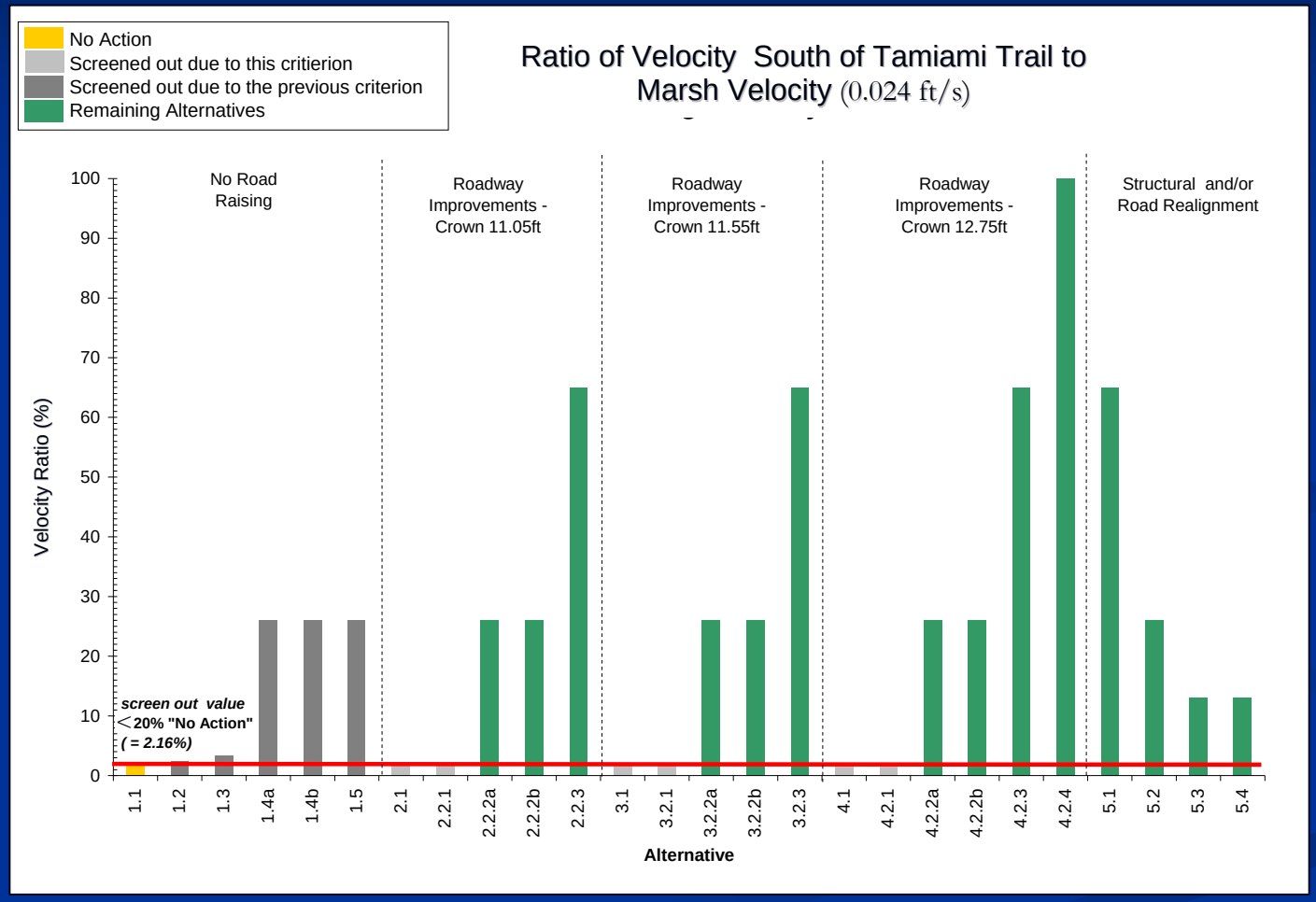
- Worked to narrow the alternatives considered
- Used scoping comments to develop screening criteria
- Screening criteria focused on combined benefits, then costs
  - Hydrologic performance (1 and 2)
  - Marsh connectivity (3)
  - Downstream ecological response (4)
  - Cost considerations (5)

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



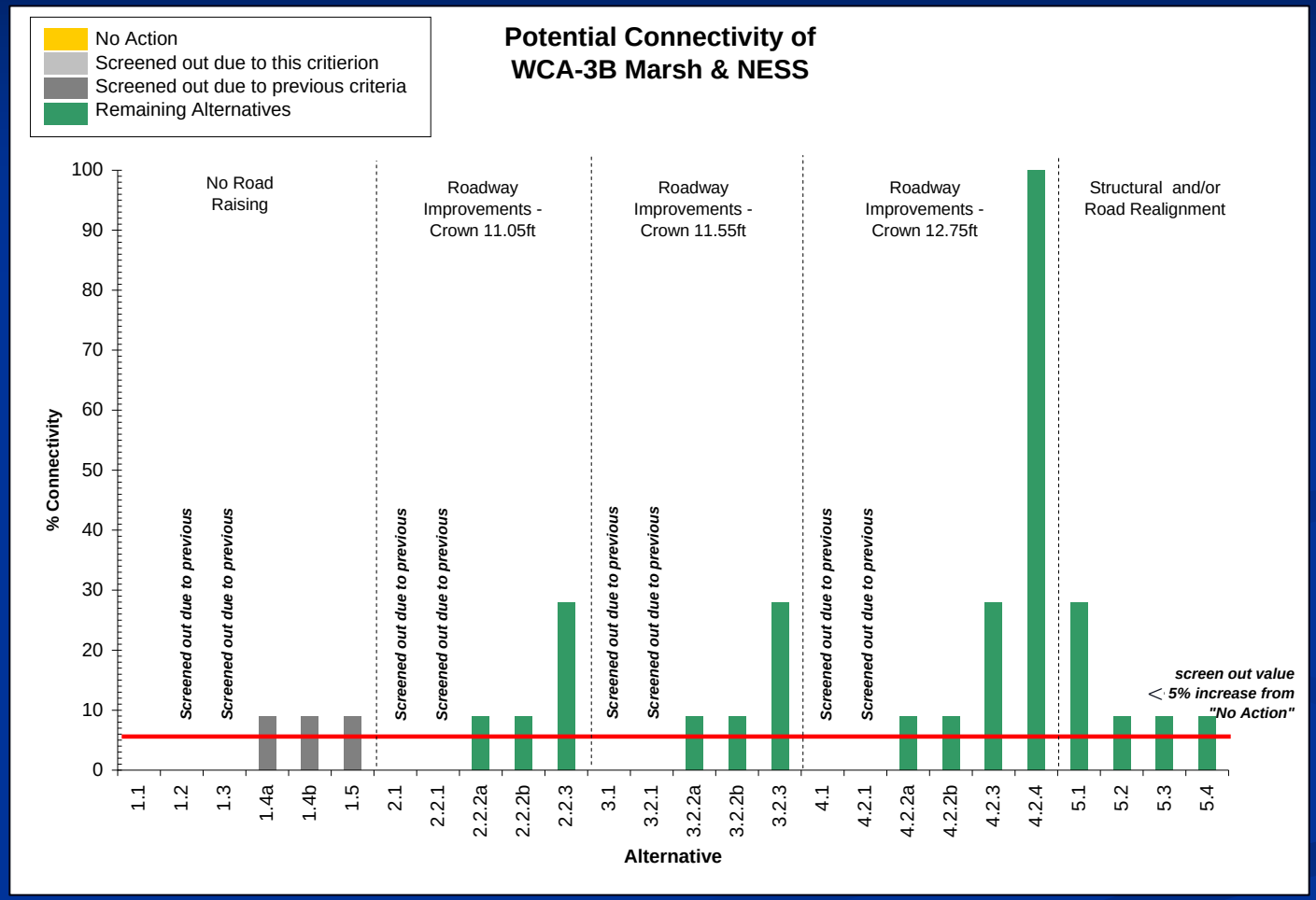
- < 20% increase over 'No Action' removed
- Removed alternatives with the existing stage constraint

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



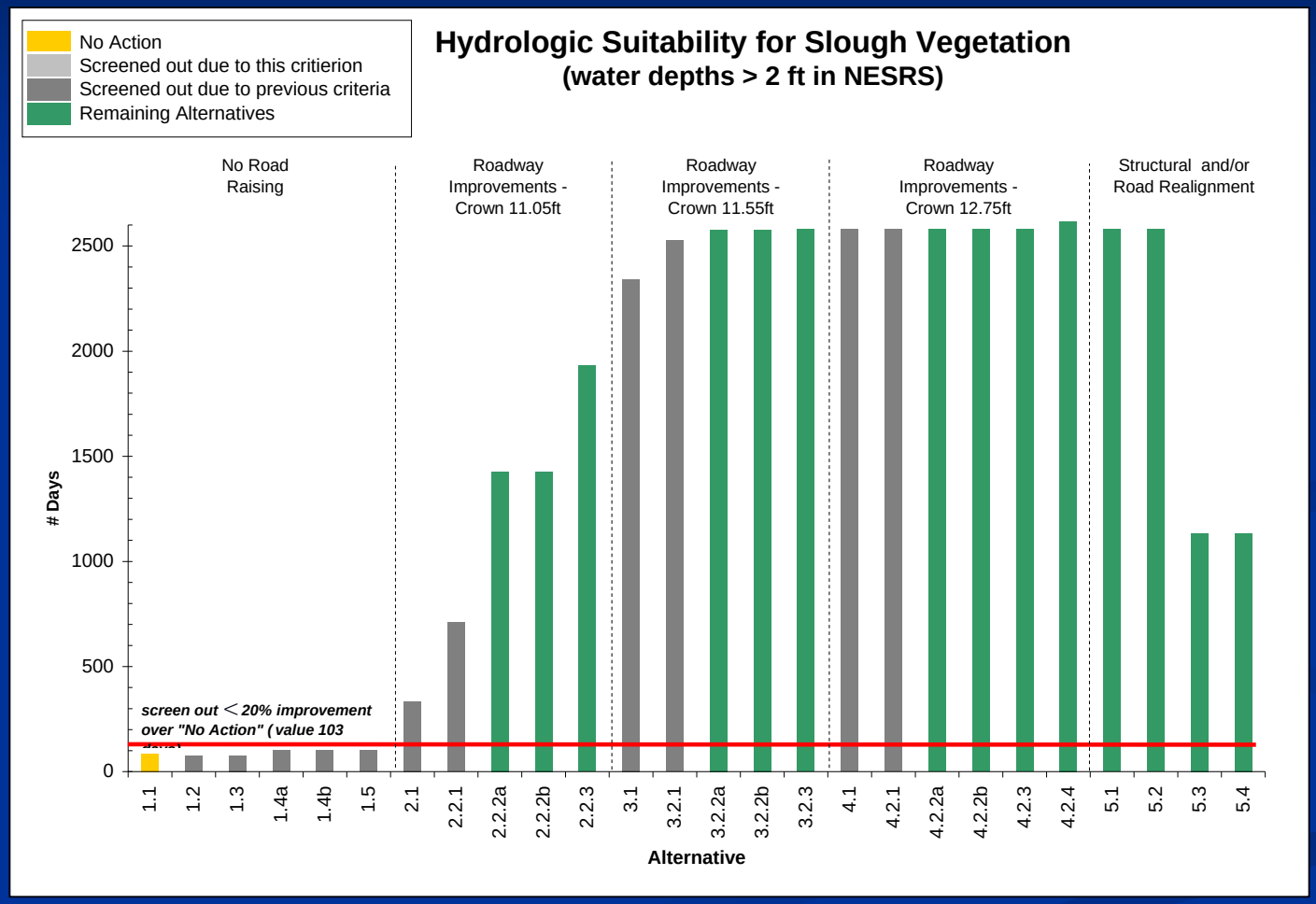
- Alternatives with similar velocity ratios as No Action were removed

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



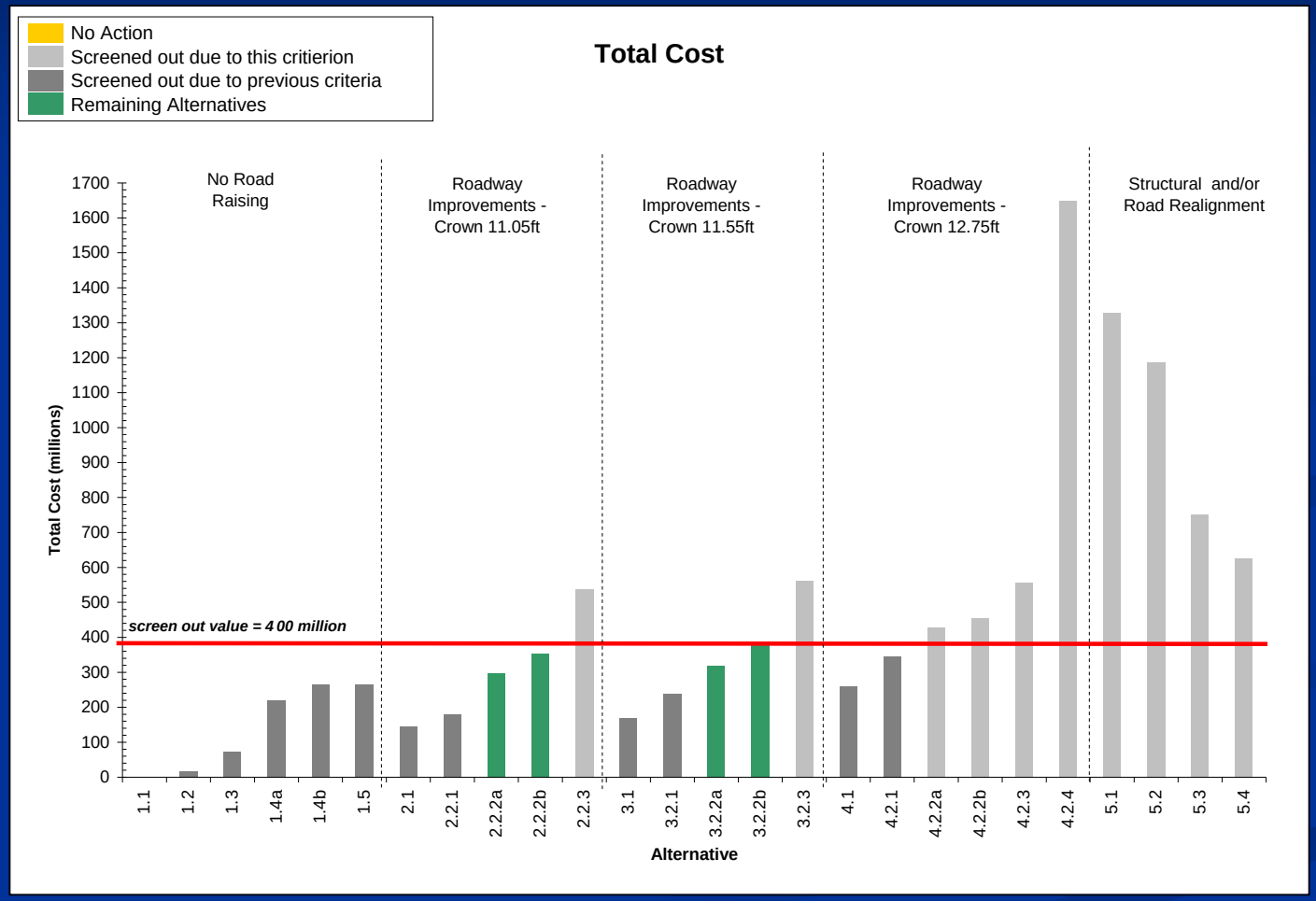
- Reduced wildlife mortality with improved connectivity
- Verified previously screened out alternatives

#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

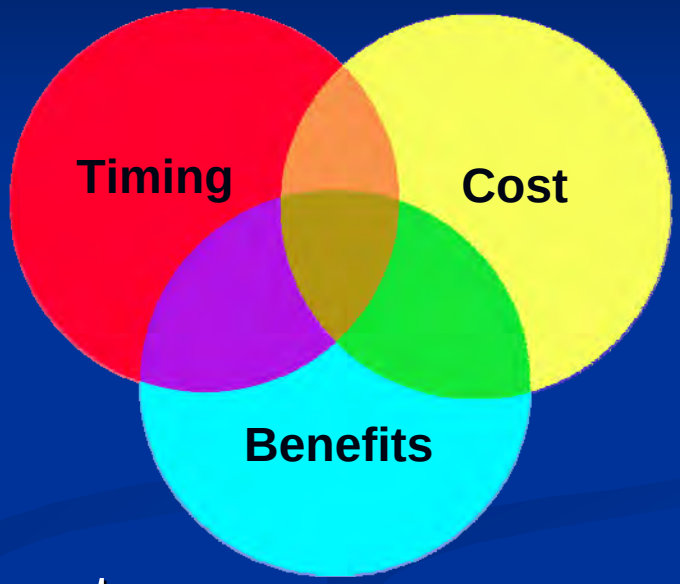
Alternative	Description
1.1	No Action
2.2.2a	Add 1-mile eastern opening (bridge), allow 8.0 ft stage, and mitigate the road for the 8.0 ft stage
2.2.2b	Add 1-mile western opening (bridge), allow 8.0 ft stage, and mitigate the road for the 8.0 ft stage
3.2.2a	Add 1-mile eastern opening (bridge), allow 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 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
- 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 were recommended over the 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 Construction 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 Project 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	145.1	185.3
3.2.2a (allow 8.5 ft stage)	115.6	148.1	177.0	225.1

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

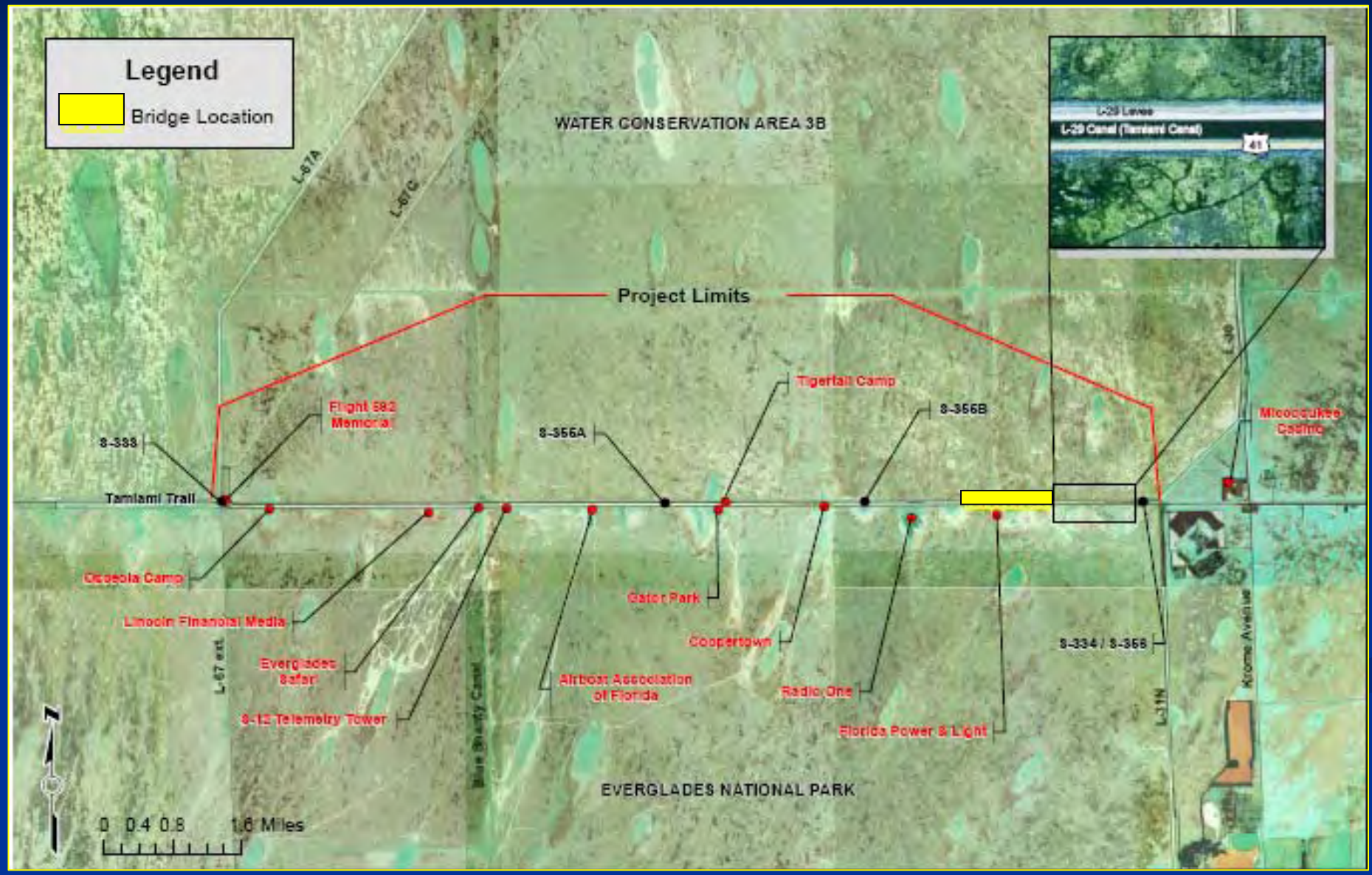
TSP Selection – 3.2.2a
(1-mile Eastern Bridge, Allow 8.5 Foot Stage, and Road Reinforcement for 8.5 Foot Stage)

- 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

- Draft LRR/EA Public Review — 9 Apr 08
- Public Comments Due — 9 May 08
- Incorporate Comments — May 08
- Sign Documents (LRR & FONSI) — Jun
- Transmit Report to Congress — 30 Jun 08

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