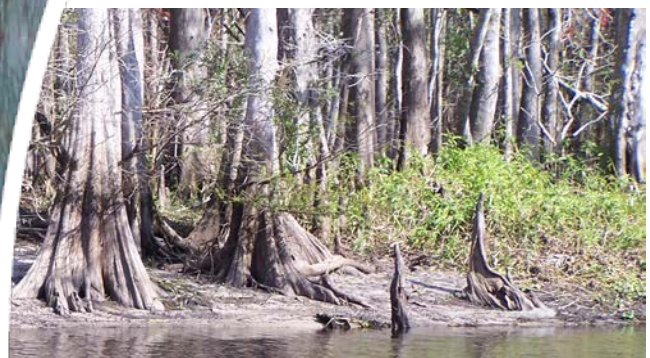
LAKE OKEECHOBEE WATERSHED RESTORATION

INTEGRATED PROJECT IMPLEMENTATION REPORT & ENVIRONMENTAL IMPACT STATEMENT

Initial Array of Alternatives Overview

October 25, 2016



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LOWP Timeline

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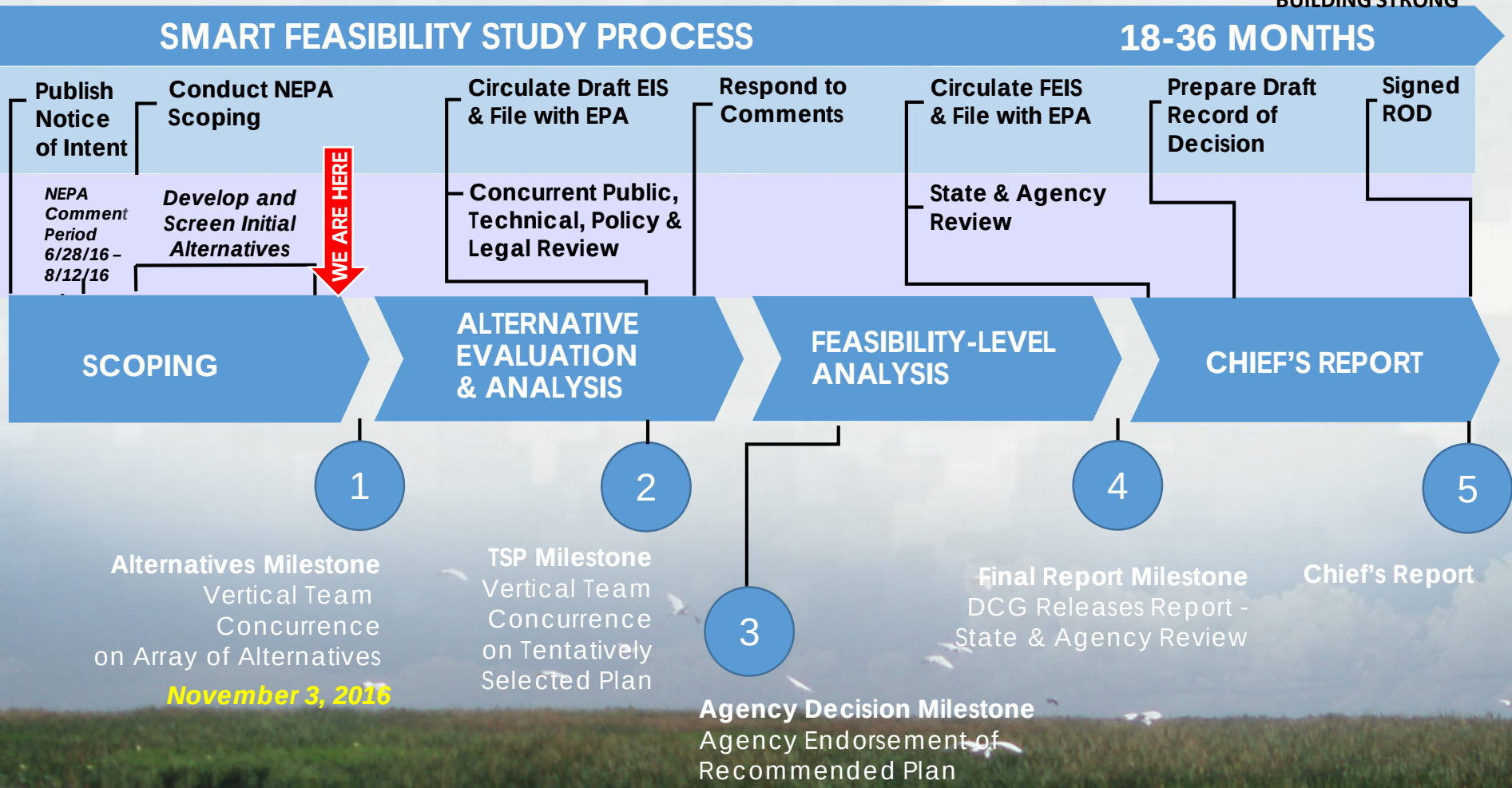
SMART FEASIBILITY STUDY PROCESS — 18-36 MONTHS



Alternatives Milestone
Vertical Team Concurrence on Array of Alternatives
November 3, 2016

TSP Milestone
Vertical Team Concurrence on Tentatively Selected Plan

Agency Decision Milestone
Agency Endorsement of Recommended Plan

Final Report Milestone
DCG Releases Report - State & Agency Review

Chief's Report

LAKE OKEECHOBEE WATERSHED PROJECT
FEASIBILITY STUDY SCHEDULE (90 Day Look Ahead)

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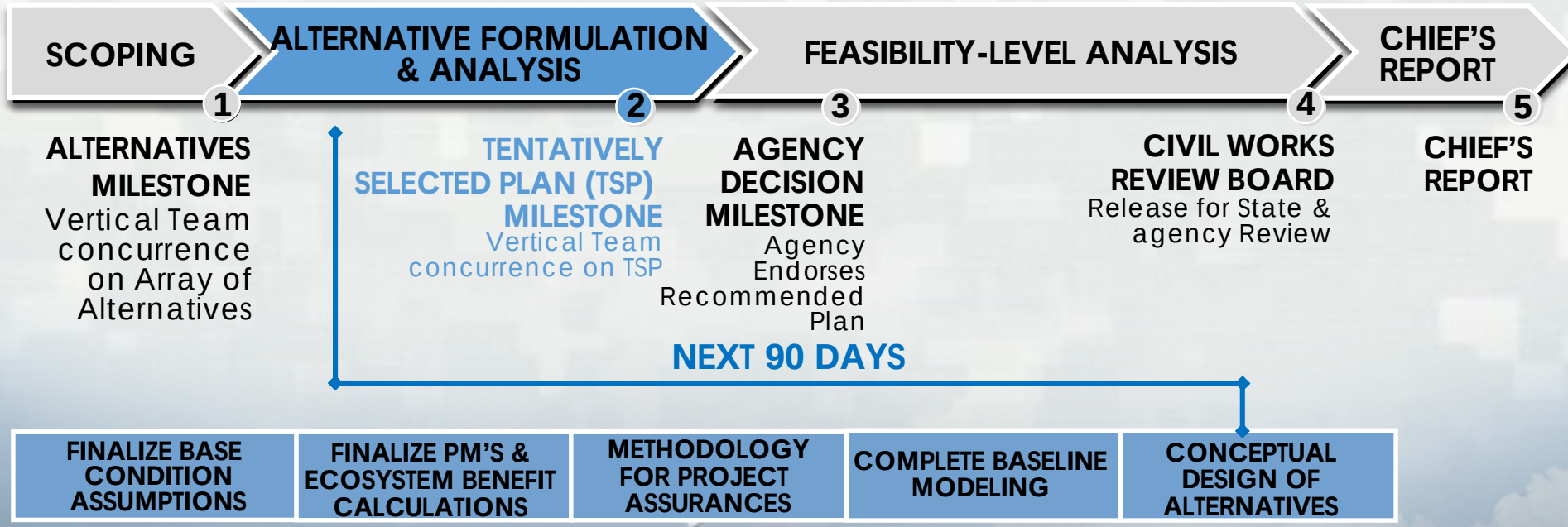

PDT/SCOPING INPUT

- Agricultural, Municipal & Industrial, Tribal Water Supply
  - Seminole Tribe of Florida water supply impacts (tribal entitlement currently being assessed)
  - Agricultural, municipal and industrial water and supply treated as a goal, not project objective
  - LORS 2008 (with CEPP modifications) as baseline condition rather than WSE (pre-LORS operating schedule)
- Incorporation of Large Reservoirs in Initial Array of Alternatives
  - Dam Safety Concerns
  - Minimize agricultural land taken out of production
  - Impacts to wetlands and T&E species-causing potential migration to Brighton Reservation
- Potential for cultural resources in project area
- Expedited SMART planning schedule

LOWP Goals

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CERP Goal	LOW Project Goals*
Enhance Ecological Values	Improve habitat in the watershed and Lake Okeechobee
	Improve Lake Okeechobee stage levels
	Improve discharges to the northern estuaries
Enhance Economic Values and Social Well Being	Increase availability of fresh water (environmental, agricultural, and municipal & industrial)
	Maintain agricultural and urban flood protection
	Protect and manage significant cultural, historical, and archeological resources
	Minimize adverse socioeconomic impacts on the local and regional economies

*General desired outcome of the project

Objectives*

1. Improve quantity, timing and distribution of flows into Lake Okeechobee to maintain ecologically desired lake stage ranges

2. Improve estuary discharges from Lake Okeechobee to improve the salinity regime and the quality of oyster, SAV, and other estuarine community habitats in the northern estuaries

3. Increase spatial extent and functionality of aquatic and wildlife habitat within Lake Okeechobee and surrounding watershed

* How LOWP intends to solve problems and achieve project goals

PLAN FORMULATION
2 Phase Planning Approach

Phase 1
Measures and alternatives that improve Lake Okeechobee stage conditions and discharges to the Northern Estuaries (Objectives 1 and 2)

Reservoirs, ASR Wells, Deep Injection Wells

Phase 2
Measures and alternatives that increase the spatial extent and functionality of aquatic and wildlife habitat within Lake Okeechobee and the surrounding watershed (Objective 3)

Watershed wetland restoration, littoral zone creation

PLAN FORMULATION

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Phase 1: Formulation for Improvement of Lake Okeechobee Stage and Discharges to Estuaries

Reservoir Formulation

Step 1. Identify Range of Storage Options

- Reservoir Sizing and Operations Screening (RESOPS) model was used to quickly predict water deliveries, timing of flow, Lake Okeechobee stages, and reduction in discharge to the Northern Estuaries
- Initial array of storage between 150,000 and 350,000 acre-feet until more detailed regional models could be used

NORTHERN ESTUARIES PERFORMANCE MEASURE: SALINITY ENVELOPE

The restoration goal is to re-establish salinity regimes suitable for the maintenance of healthy, naturally-diverse, and well-balanced estuarine ecosystems.

LAKE OKEECHOBEE PERFORMANCE MEASURE: LAKE STAGE

Measures optimal stage conditions for Lake Okeechobee.

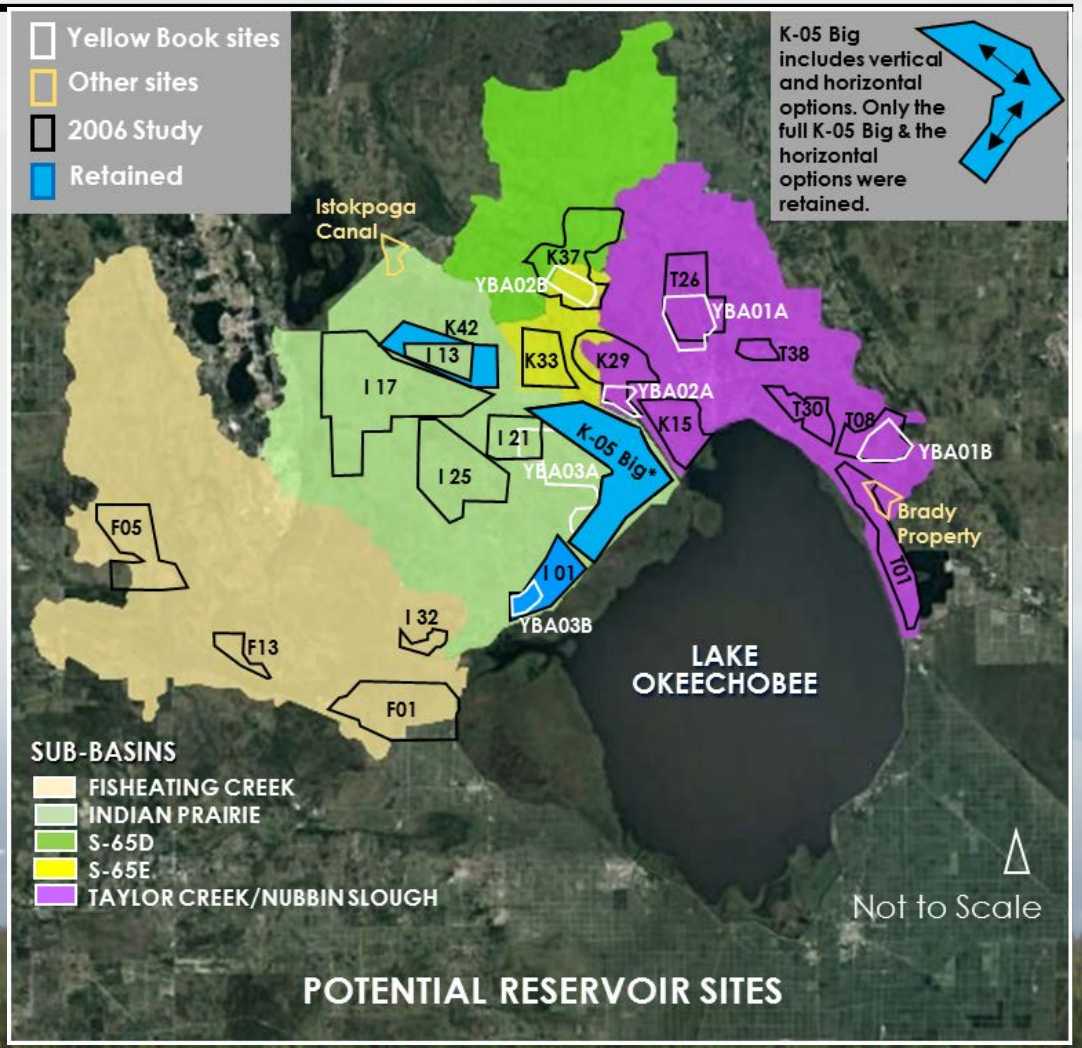
PLAN FORMULATION

Phase 1: Formulation for Improvement of Lake Okeechobee Stage and Discharges to Estuaries

Reservoir Formulation

Step 2. Reservoir Placement and Sizing Considerations

- Land Suitability Model to identify 'constraint free' sites
- Analysis of spatial relationships between reservoir placement sites



Phase 1: Formulation for Improvement of Lake Okeechobee Stage and Discharges to Estuaries

Reservoir Formulation

Step 3: Screening Reservoir Features

- Reservoir water storage capacity
- Consistency and availability of water inflows
- Percentage of SFWMD land ownership within the reservoir footprint
- Co-location opportunities with other project features
- Cost effectiveness in dollars per acre-foot of storage
- The following reservoirs were carried forward: K-42, T-26, K05 Horizontal, K05 Big (similar to YBA-03A), Brady Property, and I-01

PLAN FORMULATION

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Phase 1: Formulation for Improvement of Lake Okeechobee Stage and Discharges to Estuaries

Step 4: Run Institute of Water Resources Plan (IWR Plan)

- The IWR Plan was run to determine cost-effective and best buy reservoir combinations that would provide storage options within the selected storage range.

RESERVOIR (S)	STORAGE CAPACITY (ACRE-FEET)	SCREENING-LEVEL COST (USD)*
K05 Horizontal (14')	154,554	$ 896,000,000
K05 Big (10')	189,214	$ 986,000,000
K05 Horizontal (14') and I-01 (12')	248,822	$ 1,506,000,000
K05 Big (14')	263,584	$ 1,427,000,000
K-42 (16') & K05 Horizontal (14')	315,817	$ 1,902,000,000
K05 Big (12') and I-01 (12')	320,761	$ 1,802,000,000

PLAN FORMULATION

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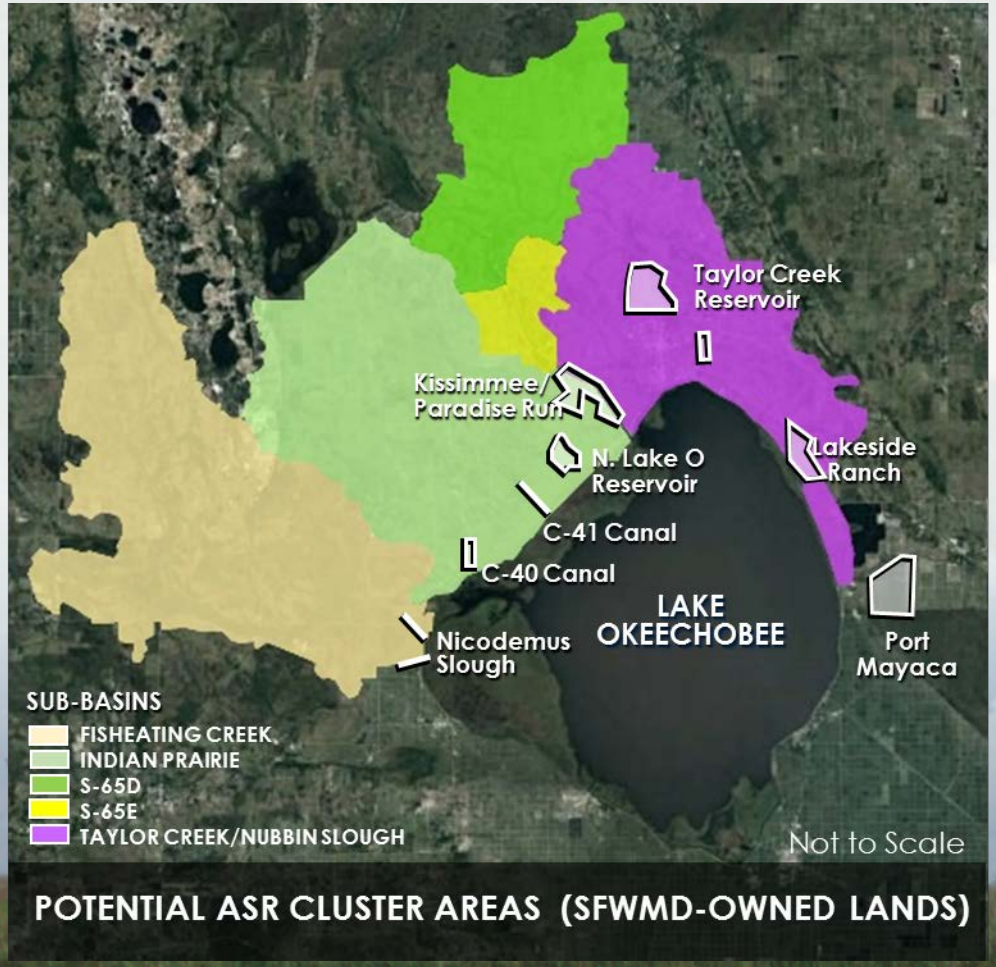
Phase 1: Formulation for Improvement of Lake Okeechobee Stage and Discharges to Estuaries

ASR Formulation: Add increments of either 60 or 80 ASR wells to optimal reservoir configurations



POTENTIAL ASR CLUSTER AREAS (SFWMD-OWNED LANDS)

PLAN FORMULATION

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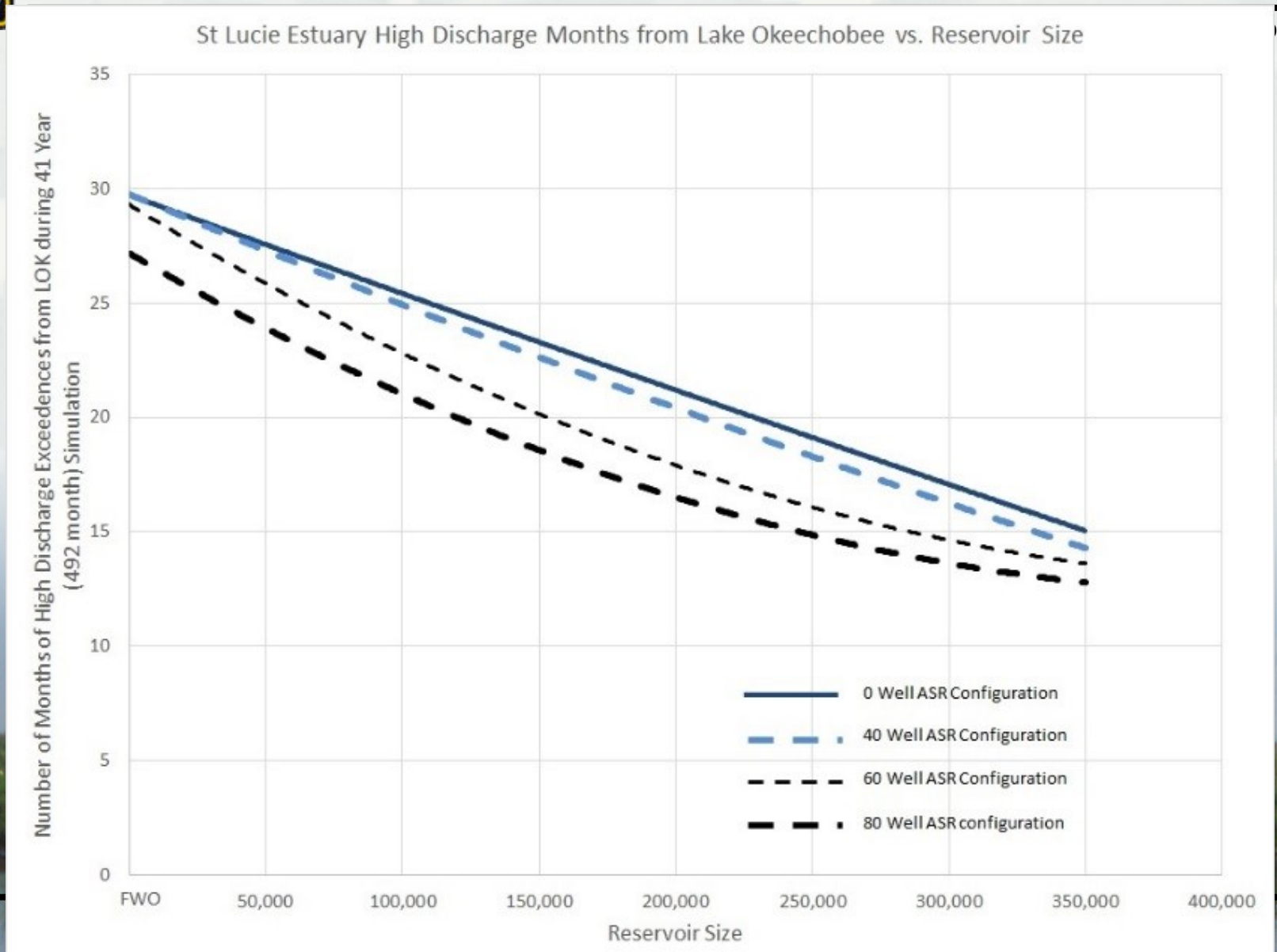
Phase 1: Formulation for Improvement of Lake Okeechobee Stage and Discharges to Estuaries

MONTHS OF HIGH DISCHARGE EXCEEDANCES OUT OF 492 MONTHS					
St. Lucie Estuary			Caloosahatchee Estuary		
FWO Conditions (months of exceedance)	150,000 ac-ft of reservoir + 80 ASR wells (months of exceedance)	350,000 ac-ft of reservoir + 80 ASR wells (months of exceedance)	FWO Conditions (months of exceedance)	150,000 ac-ft of reservoir + 80 ASR wells (months of exceedance)	350,000 ac-ft of reservoir + 80 ASR wells (months of exceedance)
30	18	13	32 Months	20	15
	40% reduction	57% reduction		37.5% reduction	53% reduction

REDUCTION IN MONTHS MINIMUM ESTUARY DISCHARGES NOT MET OUT OF 492 MONTHS					
St. Lucie Estuary			Caloosahatchee Estuary		
FWO Conditions (months minimum flows not met)	150,000 ac-ft of reservoir + 80 ASR wells (months minimum flows not met)	350,000 ac-ft of reservoir + 80 ASR wells (months minimum flows not met)	FWO Conditions (months minimum flows not met)	150,000 ac-ft of reservoir + 80 ASR wells (months minimum flows not met)	350,000 ac-ft of reservoir + 80 ASR wells (months minimum flows not met)
90	76	64	41	24	20
	16% reduction	29% reduction		41.5% reduction	51% reduction

PLAN FORMULATION



PLAN FORMULATION

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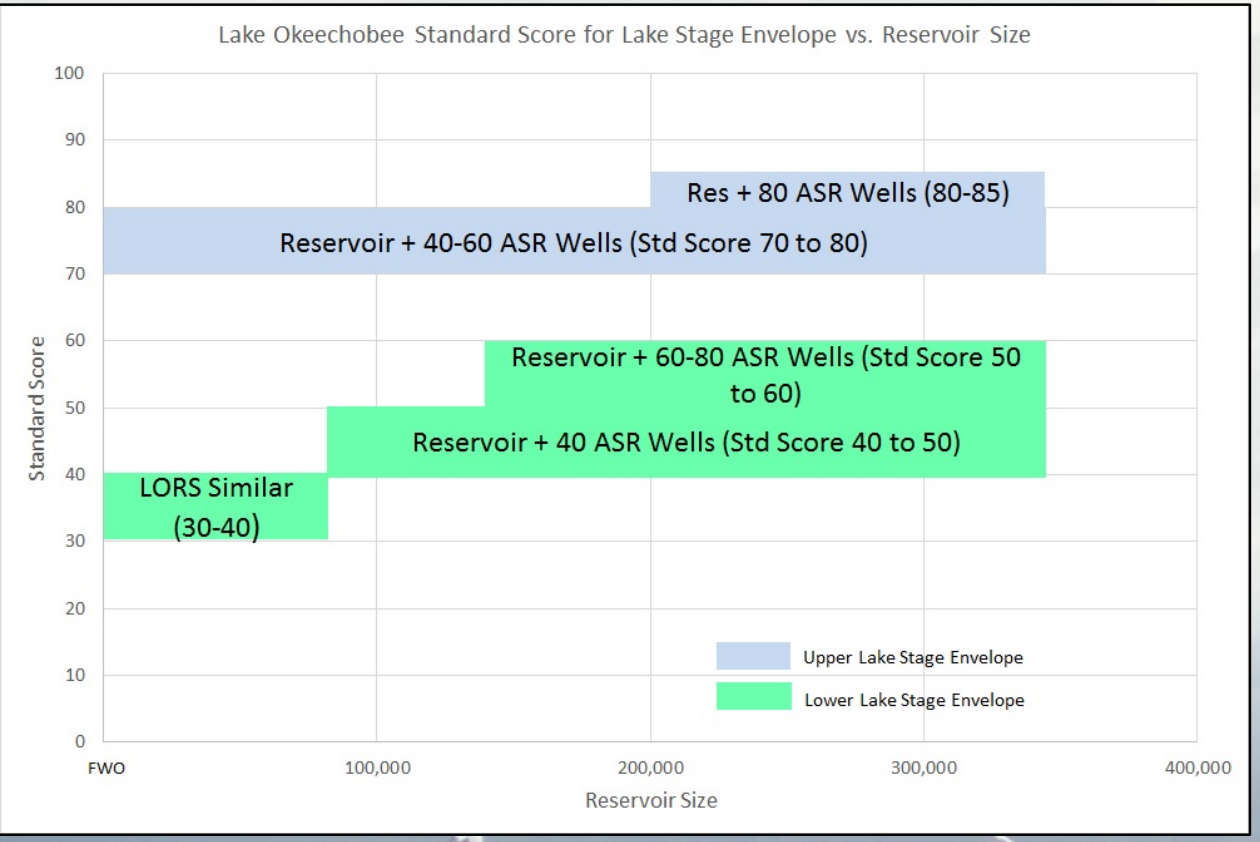


With addition of ASR wells:

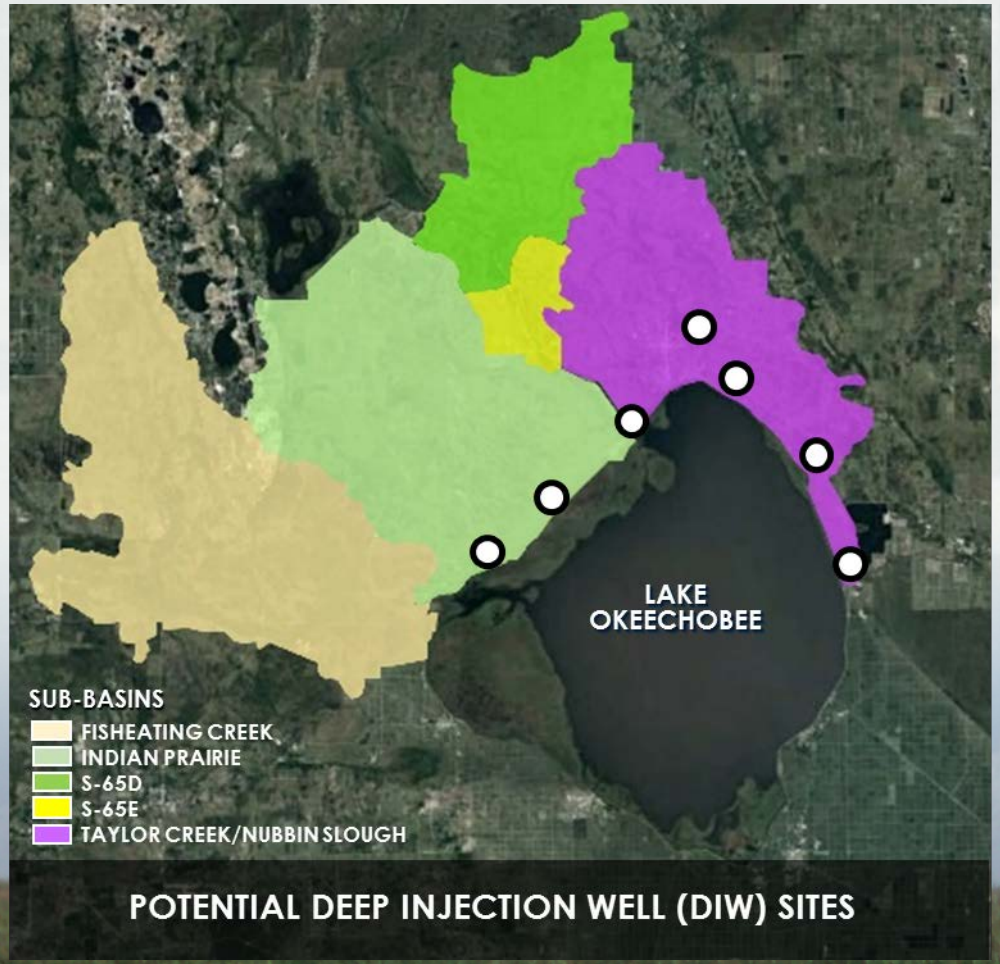
- Lower Lake Okeechobee stage envelope score showed improvements
- High stage envelope score was less sensitive due to the large volume of water associated with high stage events

PLAN FORMULATION

Phase 1: Formulation for Improvement of Lake Okeechobee Stage and Discharges to Estuaries

Deep Injection Well (DIW)

- DIWs provide an additional outlet for excess Lake Okeechobee water to reduce damaging regulatory releases to the coastal estuaries
- Total DIW range is 450-1,300 million gallons per day (MGD) for preliminary planning



PLAN FORMULATION

BUILDING STRONG

MONTHS OF HIGH DISCHARGE EXCEEDENCES OUT OF 492 MONTHS							
St. Lucie Estuary				Caloosahatchee Estuary			
FWO Conditions (months of exceedance)	Total DIW Capacity	Stand-Alone DIWs (months of exceedance)	350,000 ac-ft of reservoir + 80 ASR wells + DIWs (months of exceedance)	FWO Conditions (months of exceedance)	Total DIW Capacity	Stand-Alone DIWs (months of exceedance)	350,000 ac-ft of reservoir + 80 ASR wells + DIWs (months of exceedance)
30	450 MGD	22	12	32	450 MGD	31	14
		27% reduction	60% reduction			3% reduction	56% reduction
	900 MGD	12	7		900 MGD	27	13
		60% reduction	77% reduction			16% reduction	59% reduction
	1,300 MGD*	9	6		1,300 MGD*	21	12
		70% reduction*	80% reduction*			30% reduction*	60% reduction*

*Additional hydrologeologic data needed to confirm capacity

PLAN FORMULATION

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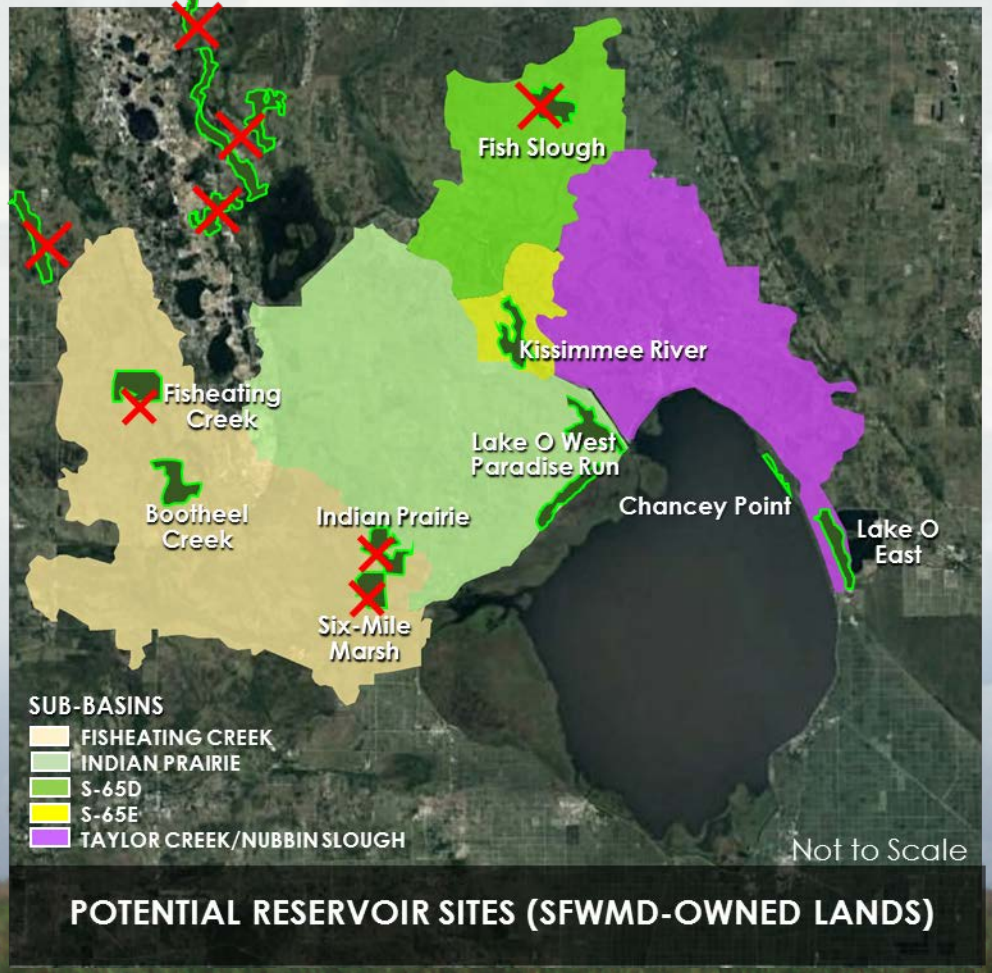
Phase 2: Formulation to Increase Spatial Extent and Functionality of Aquatic and Wildlife Habitat within Lake Okeechobee and Surrounding Watershed (Objective 3)

Watershed restoration and littoral zone creation management measures are considered separately due to distinct performance measures used to capture project benefits



PLAN FORMULATION STRATEGY
Watershed Wetland Restoration

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NORMALIZED SCORES								'TIEBREAKERS'			
SCORING FROM 0-4								SCORE 0 OR 1			
Potential Restoration Site	**Acres**	**Connectivity (% of perimeter)**	**Wading Bird Rookeries**	**Surface Water Connection (linear meters)**	**Percent Restorable**	**Public Access**	**Normalized Score**	**SFWMD Owned Land**	**Directly Adjacent to Kissimmee River and/or Lake O**	**Potential to co-Locate with Reservoirs or ASR wells**	**New Score**
Kissimmee River/Paradise Run	4215	3	4	3	4	4	**18**	1	1	1	**21**
Lake O West (K03)	2750	3	4	2	4	3	**16**	0	1	1	**18**
Lake O East (T27)	2693	3	1	1	4	3	**12**	0	0	1	**13**
IP-10	2,372	1	4	0	4	3	**12**	0	0	0	**12**
Bootheel Creek (F01, F08)	3393	3	2	1	3	2	**11**	0	0	0	**11**
Fish Slough (K23)	3341	2	2	1	2	2	**9**	0	0	0	**9**
Indian Prairie (IP09)	3627	1	3	0	3	1	**8**	0	1	0	**9**

PLAN FORMULATION STRATEGY
Watershed Wetland Restoration

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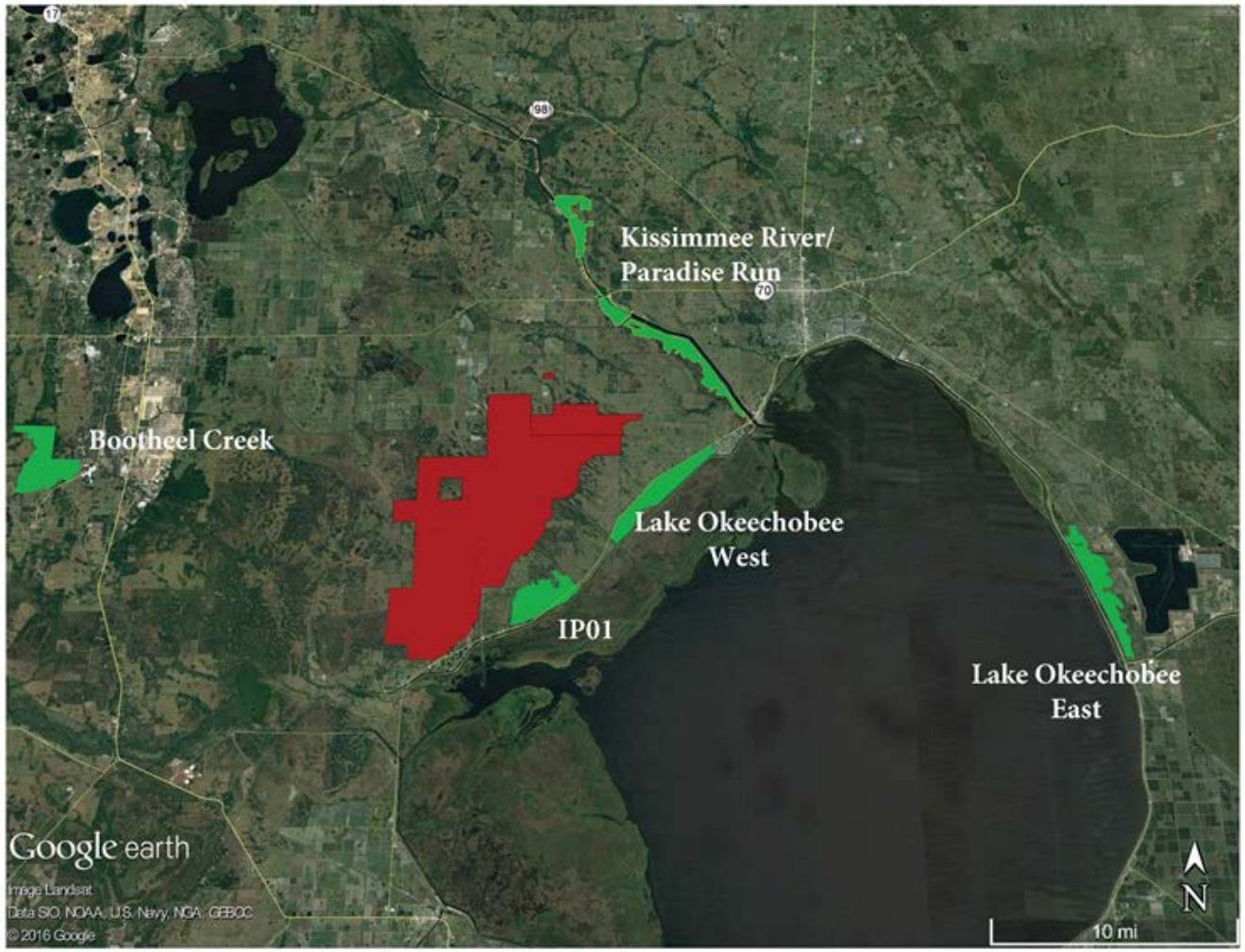

PLAN FORMULATION STRATEGY
In-Lake Littoral Zone

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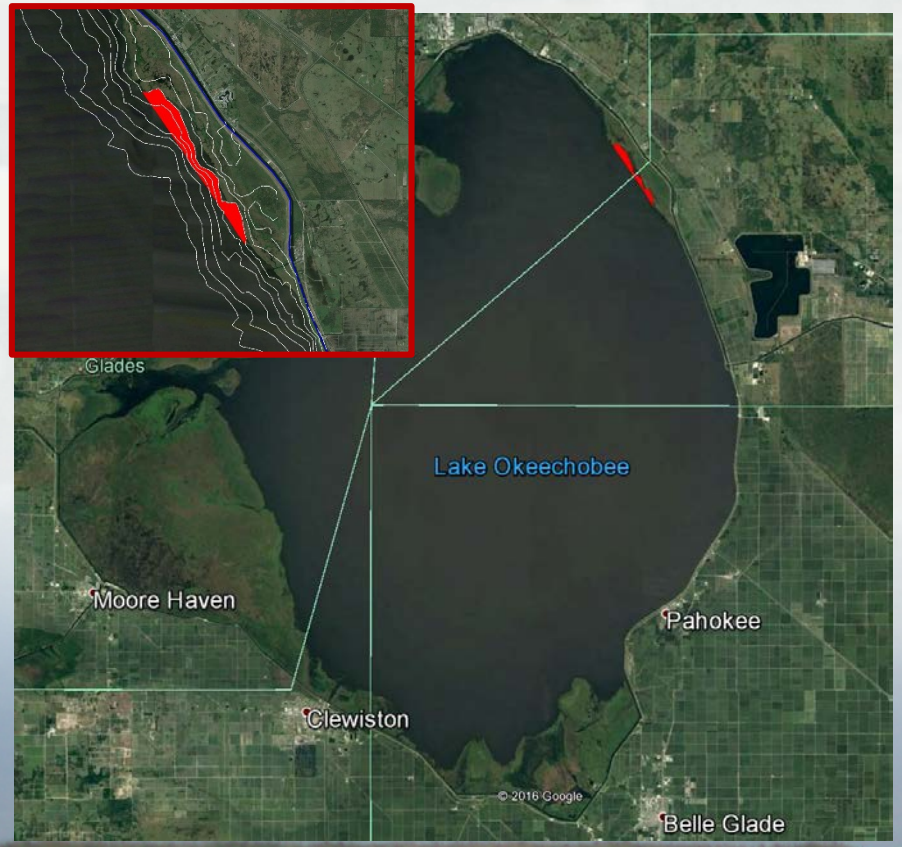

Chancey Point

- Add 500+ acres to the existing littoral zone using material located at the mouth of the Kissimmee River
- ~ $34million

PLAN FORMULATION

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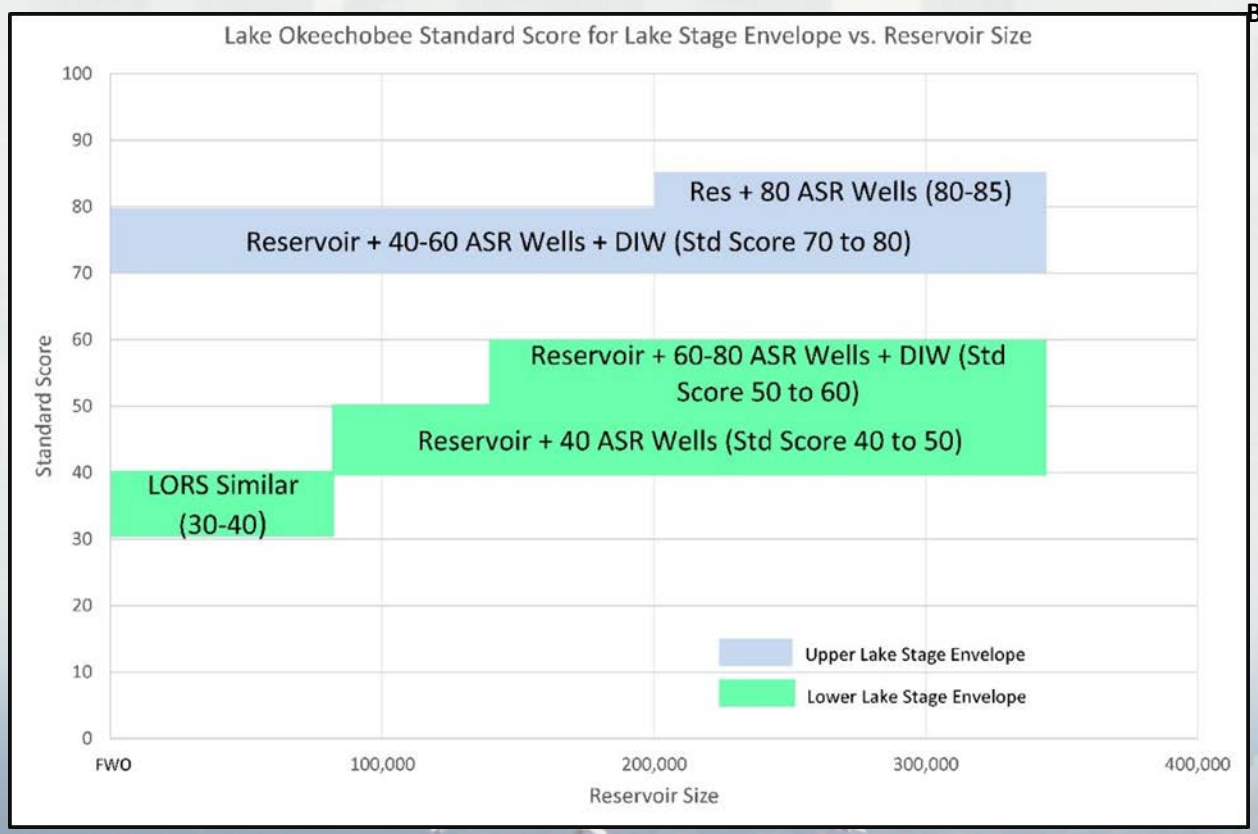

DIWs remove the peak off high Lake Okeechobee stages

INITIAL ARRAY OF ALTERNATIVES

Phase 1 Alternatives.

- Stand-alone reservoirs
- Reservoirs + ASR
- Reservoirs + ASR + DIW
- Stand-alone DIW

Phase 2 Alternatives

- Watershed wetland restoration site(s) stand-alone
- Watershed wetland restoration site(s) + littoral zone creation

INITIAL ARRAY OF ALTERNATIVES
Reservoirs and ASR Wells

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RESERVOIR MANAGEMENT MEASURE(S)	STORAGE CAPACITY (AC-FT)	SCREENING-LEVEL COST (USD)*
K05 Horizontal (14')	154,554	$896,000,000
K05 Big (10')	189,214	$986,000,000
K05 Horizontal (14') and I-01 (12')	248,822	$1,506,000,000
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K05 Big (12') and I-01 (12')	320,761	$1,802,000,000

ASR WELLS MANAGEMENT MEASURES	STORAGE (ACRE FEET/MONTH)	SCREENING-LEVEL COST ($)
60 ASR wells	28,081	$399,360,000
80 ASR wells	37,442	$532,480,000

* 40% contingency costs

Table 9. ASR Wells Storage and costs

INITIAL ARRAY OF ALTERNATIVES
Deep Injection Wells

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15 MGD CAPACITY DEEP INJECTION WELLS		
Well Quantity	Capacity (acre-feet/month)	Screening-Level Cost
30 DIW	42,122	$ 516,589,440
50 DIW	70,203	$ 860,982,400
70 DIW	98,285	$ 1,205,375,360
90 DIW	126,366	$ 1,549,768,320

30 MGD CAPACITY DEEP INJECTION WELLS		
Well Quantity	Capacity (acre-feet/month)	Screening-Level Cost
30 DIW	84,244	$ 759,360,000
50 DIW	140,407	$ 1,265,600,000
70 DIW	196,569	$ 1,771,840,000
90 DIW	252,732	$ 2,278,080,000

INITIAL ARRAY OF ALTERNATIVES
Wetland Restoration and Littoral Zone Creation

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Wetland Alternative	Potential Restoration Site	Acres	Total Cost
Wetland Alternative 1	Kissimmee River/Paradise Run	4215	$41,871,810
Wetland Alternative 2	Lake O West	2750	$27,318,500
Wetland Alternative 3	Lake O East	2693	$26,752,262
Wetland Alternative 4	Bootheel Creek	3393	$33,706,062
Wetland Alternative 5	IP-10	2372	$23,563,448
Wetland Alternative 6	Chancey Point	~500	$34,000,000