A G E N D A

Caloosahatchee River Watershed Protection Plan
Working Team Meeting
Wednesday, April 16, 2008
1:30 – 4:45 p.m.

SFWMD Lower West Coast Service Center
2301 McGregor Boulevard
Fort Myers, FL
First Floor Conference Room

Cisco MeetingPlace 6700 || Local 561-682-6700 || Toll Free 866-433-6299 || Meeting ID 9554

1:30	Introduction and Opening Remarks	Janet Starnes
1:40	Schedule	Janet Starnes
1:45	Management Measures Status	Janet Starnes
2:00	Hydrologic Modeling Initial Model Run Assumptions Performance Measures Performance Indicators Model Runs: LO Current Base CRWPP Base Run	Lehar Brion/Clyde Dabbs
3:00	Water Quality Status Summary Tables (TN, TP) Alternative 1 (Example using the best available data)	Tim Liebermann
4:00	Public Comment	All
4:30	Closing Remarks/Next Meeting Next Meeting is May 21st	Janet Starnes

Meeting Summary
Caloosahatchee River Watershed Protection Plan
Working Team Meeting
April 16, 2008

The Working Team for the Caloosahatchee River Watershed Protection Plan met on April 16, 2008 at 1:30 at the South Florida Water Management District's Lower West Coast Service Center in Ft. Myers, Florida. A copy of the sign-in sheet is attached.

Attendee	Organization	Attendee	Organization
Janet Starnes	SFWMD	Tim Liebermann	SFWMD
Pinar Balci	SFWMD	Patrick Martin	SFWMD
Jim Beever	SWFRPC	Sally McPherson	SFWMD
Karen Bickford	Lee County	John Mitnik	SFWMD
Lehar Brion	SFWMD	Tony Pellicer	Lee County
Wayne Daltry	Lee County	Jennifer Nelson	FDEP
John Cassani		Darren Rumbold	FGCU
Liz Donley	SWFRPC	Mike Voich	SFWMD
Clyde Dabbs	SFWMD	Rae Ann Wessel	SCCF
Bob Chamberlain	SFWMD	Rhonda Peets	FDEP
James Evans	City of Sanibel	Steve Sentes	SFWMD
Phil Flood	SFWMD	Noel Marton	FDACS
Katie Higgs	FDEP	Bud Goblish	JJG
Pat Fricano	FDEP	Beth Williams	SFWMD
Bob Pascale	PURRE	Linda Young	CWN of FL
Bob Howard	Agnoli, Barber & Brundage, Inc.	Scott Legg	SFWMD
Randy Ferguson	JJG	Judith Nothdurft	SFWMD
Christopher Wallen	Dynamic Solutions	Temperince Morgan	SFWMD
John Mitnik	SFWMD		

1. Introduction and Opening

Janet Starnes, Principal Project Manager, welcomed the Working Team and other attendees. She issued a reminder that the purpose of these meetings is for the designated Working Team members from the Coordinating Agencies to collaborate during plan development to address water quantity and quality problems in the Caloosahatchee River Basin. A time is specifically set aside for Public Comment, so that the team can hear and learn vital opinions and information from local individuals and stakeholders. Janet led introductions around the conference room, and those conferencing in via telephone introduced themselves.

2. Schedule

Janet advised that some minor project schedule details are being worked out, particularly as regards modeling efforts. Since Caloosahatchee River Watershed plan formulation is on a parallel path with planning for the St. Lucie River Watershed, Mike Voich provided the following major schedule milestones, which apply for both planning efforts:

- Formulation and evaluation of Alternatives – Now through June 30, 2008
- Report writing, internal Draft Plan – July through August
- Draft Plan for public review – September / October

- Plan submitted for District Governing Board Approval – December 11
- Plan submitted to Legislature in Tallahassee – January 1, 2009

Janet said that she expects to have Draft Alternative 2 results to the team by April 25, and Draft Alternative 1 results to the team by April 30. The spreadsheet and hydrologic results also will be sent for the team's review.

Alternative 1, the base or common elements alternative, will be a part of every subsequent alternative. It includes all of the Management Measures currently highlighted in yellow (these will be designated differently in future spreadsheets), such as BMPs, critical Management Measures, projects very close to construction and the Caloosahatchee River West reservoir (which in the plan will be treated as if it were constructed).

3. Management Measures

Reference Handout: "Where's My Management Measure?"

Janet introduced the handout, "Where's My Management Measure?" She explained that all Management Measures that are developed are held in a queue, so if they don't make the cut this time, or if they are subsequently combined with other Management Measures, the originators and stakeholders know the outcome or status of their submittals.

If a Management Measure is highlighted in yellow, then it is included in Alternative 1 and thus in all other Alternatives.

4. Hydrologic Modeling

Reference Handout: "8.1.1.1 LOSA & EAA Water Supply"

Each alternative for the Caloosahatchee River Watershed Protection Plan will be modeled in combination with the St. Lucie River plan alternatives. The modeling output will presented in terms of performance measures and indicators, and will look similar to the reports in the handout.

Lake Okeechobee Current Base

Reference Handout: "Overview of Hydrologic "

Lehar Brion presented an overview of the Northern Everglades Regional Simulation Model, which will produce modeling results in support of the Caloosahatchee River Watershed Protection Plan. He explained that his modeling team will be using the model's link-node version to evaluate alternatives for the plan in parallel with the St. Lucie River Watershed Protection Plan. The model will represent conditions in the watershed circa 2005, over a 36-year period of record.

Questions:

Q. What is the assumption for the Current Base?
A. The existing WSE Regulation Schedule.

Q. Regarding the Proposed Regulation Schedule – is that going to be adopted?
A. It is going to the USACE Commander this month (April 2008). The District wants consistency among the Lake and River plans, but is performing a screening-level analysis and will present it to the Lake Okeechobee WRAC. The results can also be brought back to this team, if desired.

Q. Regarding the performance indicator, "Number of Times Caloosahatchee Estuary High Discharge Criteria Exceeded (mean monthly flows > 2800 & 4500 cfs from 1970 – 2005)" – why is the metric to have three mean monthly occurrences?
A. The objective is not to try to return to a natural system, but to manage the system to be a healthy one, given the engineered system that exists today. Flows exceeding 4500 cfs absolutely must be avoided. There has to be a hydrologic distribution, though, and that's driven by rainfall.

Q. So is it three? Or is it more than three?
A. It is no more than three.

Q. What does "Current Base" mean?
A. Current Base means without CERP – and without Acceler8 or the Lake Okeechobee Watershed Construction Project Phase II Technical Plan. Basically, the Current Base represents the current conditions in the Lake Okeechobee Watershed.

Q. Will you use the new Lake Okeechobee Schedule?
A. For consistency, analyses are moving forward using the current lake schedule. All outputs – potential impacts and benefits on lake stage, the duration curve – will be evaluated through a sensitivity analysis using the current schedule.

Q. But you'll be managing the lake levels at a lower level?
A. The proposed LORS08 schedule will operate the lake at lower levels. This can be more ecologically beneficial to the lake as it minimizes high lake stage impacts. The Lake Okeechobee Watershed Construction Project Phase II Technical Plan planning effort utilized storage north of the lake to reduce high lake stages and mitigate low lake stages. Storage north of the lake would provide this benefit regardless of the lake regulation schedule.

Action Item: For the next meeting, Lehar Brion will provide detail and analysis of the green bar in the "Number of Times High Discharge Criteria Exceeded" bar chart. The team is looking for an explanation of the "55" – more than half of 55 events were from local basin events and only 9 were attributable to Lake Okeechobee – and discussion of the relationship to Kissimmee.

5. Water Quality

Tim Lieberman reported that spreadsheet development is complete, but the actual numbers have not been entered. The handout he used contained test numbers for demonstration purposes until the current water quality conditions are plugged in. The parameters that are being considered are Total Nitrogen and Total Phosphorous (average annual numbers).

There are three data points for which there is known, useful data: S-77, S-78 and S-79. 2004/2005 land use data is being used. Wetland Solutions, Inc will provide unit source loading rates and BMP efficiencies for TN and TP for each of the land use categories. Following are some team questions, comments and responses:

Questions:

Q. How will you pull out the lands that don't contribute load?
A. It would be possible to set the source loading rates to zero for some land-use types, such as upland forests, wetlands, or open water. However, due to atmospheric deposition and natural processes, we shouldn't assume that natural lands don't contribute any nutrient loads to the stream system. After all, it is unlikely that the TN and TP concentrations in streams in the year 1492 were exactly zero. The question of whether wetland systems are a net source or sink for nutrients is subject to some debate, and the answer probably depends a lot on the nutrient concentration of the inflows to the wetland. For now, it probably is best to assign some small, but non-zero, value for loading rates from these natural areas while we are waiting for an expert opinion from Del Bottcher. After we get the report from SWET, which will be based on an extensive literature review and compilation of available data, we should have the basis for assigning some realistic loading rates.

Q. Perhaps we could do a weighted average for these natural habitats.
A. That may factor in to the consultant's representative numbers. We will look in to whether these numbers are reasonable.

Q. There seems to be an overlap between this plan and the Southwest Florida Feasibility Study.
A. We will be looking to the feasibility study for numbers and assumptions. Many of the study's numbers already have been plugged in to the management measures.

Q. Do you have owner-implemented BMPs? Cost-shared BMPs?
A. The report will document the different BMPs. We don't know yet what assumptions there will be for implementation. There are two components to the BMPs: removal efficiency and the percentage of implementation in the watershed. Source control is critical, and we want to see full implementation of BMPs.

Q. So there are technical implementation issues for BMPs?
A. The level of implementation is key to this effort. We need to see Del's report first. Then we need to determine what level of funding will be needed to make this happen.

For each management measure in each alternative, a table will detail the management measure changes in units for: flow in acre feet per year; TN in pounds per year; and TP in pounds per year. Management measures need to be vetted to assure:

- The best numbers possible
- Based on common assumptions
- Used common means to develop
- Based on best available information or best professional judgment

More team discussion ensued:

Q. Who is responsible for filling out the management measure if "your" management measure has been rolled into another?
A. In the end, it is the person named on the management measure sheet, but you should coordinate with them to make sure they have the best possible numbers.

Q. How are you indicating Alternative 2?
A. We don't have an Alternative 2 yet.

6. Public Comment

There was no public comment.

7. Next Steps and Next Meeting

The Working Team's next meeting is scheduled for May 21, 2008, at 1:30 p.m., following the TMDL meeting. Janet asked the team to please provide their best numbers for the management measure sheets by April 18 so that the complete package can be reviewed for consistency.

Name	Signature/Via Phone	Agency
Abtew, Wossenu		SFWMD
Bailey, Nathaniel		FDEP
Balci, Pinar		SFWMD
Bartolone, Frank		SFWMD
Bartoshuk, Craig		A Duda & Sons
Beever, Jim	JMB3	SWFRPC ~~FFWCC~~
Beever, Lisa		SWFRPC/Charlotte Harbor NEP
Bengtsson, Terrance		SFWMD
Bennett, Susan		SFWMD
Bickford, Karen		Lee County
Bokor, Matt		Youngquist Brothers, Inc.
Bologna, Lizabeth		SFWMD
Boyle, Michael		City of Labelle
Brion, Lehar		SFWMD
Budell, Richard		DACS
Calder, Fred		FDEP
Capece, John		Southern Datastream
Cassani, John		Lee Co Hyacinth CD
Chamberlain, Robert		SFWMD
Chang, Miao-Li		SFWMD
Conner, Jenny		The Nature Conservancy
Copp, Roger		ECWCD and Lehigh Acres
Cornell, Brad		Audubon
Cressman, Kim		City of Cape Coral
Dabbs, Clyde		SFWMD
Dabral, Sandeep		SFWMD
Daltry, Marti		Sierra Club & Riverwatch
Daltry, Wayne		Lee County
Dantzler, Rick		Frost, O'Toole & Saunders

[redacted]

Name	Signature	Agency
Dauray, Charles		SFWMD
Denger, Tim		SFWMD
Denham, Mick		City of Sanibel
Doering, Peter		SFWMD
Donley, Liz		SWFRPC
Elliott, Rebecca		SFWMD
Evans, James		City of Sanibel
Everham, Edwin		FGCU
Feken, Stacey		FDEP
Flood, Phil		SFWMD
Fricano, Pat		FDEP
Gerry, Lawrence		SFWMD
Gihring, Jennifer		FDEP
Hamel, Ron		Gulf Citrus Growers
Hammond, Bill		Gulf Citrus
Hanlon, Ed		UFL SWFREC IFAS
Harclerode, Kurt		Lee County
Hazell, Joy		Lee County
Heatherington, Ken		SWFRPC
Hecker, Jennifer		Conservancy of SW FL
Higgs, Katie		FDEP
Howard, Bob		Agnoli, Barber & Brundage, Inc.
Hughes, Eric		USEPA
Iricanin, Nenad		SFWMD
Irizarry-Oritz, Michelle		SFWMD
Jarvis, Connie		City of Cape Coral
Kelly, Alison		SFWMD
Kennedy, Sally		SFWMD
Kibbey, Keith		Lee County

Name	Signature	Agency
Lamb, Steve		MacVicar, Federico & Lamb
Laskis, Kristina		FDEP
Legg, Scott	Scott Legg	SFWMD
Lewis, Beth		SFWMD
Liebermann, Tim		SFWMD
Lindblad, Erick		SCCF
Lindsay, David		ECWCD
Loflin, Rob		City of Sanibel
Love, Jim		Lee County/Health Dept
Love, Kim		Tetra Tech
MacLaughlin, Doug		SFWMD
MacVicar, Tom		MacVicar Federico & Lamb
Marks, Ernie		FDEP
Marlowe, Beth		USACE
Martin, Patrick	Patrick Martin	SFWMD
Marton, Noel		SWFWMD
Mazourek, Joyce		FWS
McCarthy, Linda		Lykes Brothers, Inc.
McCullers, Ed		Youngquist Brothers, Inc.
McPherson, Peggy		Everglades Foundation
McPherson, Sally	S McPherson	SFWMD
Meiers, Damon		SFWMD
Mitnik, John		SFWMD
Morgan, John		SFWMD
Morgan, Temperince		SFWMD
Murphy, Jerry		Town of Fort Myers Beach
Nearhoof, Frank		FDEP
Neidrauer, Cal		SFWMD
Nelson, Jennifer	Jennifer Nelson	FDEP

Name	Signature/Via Phone	Agency
Nothdurft, Judith		SFWMD
O'Donnell, Kevin		FDEP
Olson, Cathy		Lee County
Ottolini, Roland		Lee County
Parker, Shane		Hendry County
Pellicer, Tony		Lee County
Quasius, Peter		Audubon
Ramirez, Armando		SFWMD
Ramsey, Agnes		SFWMD
Romeis, Gordon		FDEP
Rumbold, Darren		FGCU
Rutledge, Dan		USDA
Sanchez, Judy		US Sugar
Sanders, Susan		SFWMD
Sculley, Séan		SFWMD
Sentes, Steven		SFWMD
Shukla, Sonjay		UFL SWFREC IFAS
Sievers, Pam		SFWMD
Smith, Geordie		Lee County/Health Dept
Spencer, Niki		SFWMD
Spratt, Jim		FL Nurserymen Growers
Starnes, Janet		SFWMD
Teasley, Debra		SFWMD
Teets, Tom		SFWMD
Thomas, Daryl		USFWS
Vanzee, Randy		SFWMD
Verrastro, Bob		SFWMD
Voich, Michael		SFWMD
Volety, Aswani		FGCU

Name	Signature/Via Phone	Agency
Wessel, Rae Ann	RAWessel	Sanibel-Captiva Conservation Foundation
Willams, Beth	Beth Williams	~~PURRE Water Coalition~~
Woodbury, Kirk		
RHONDA PEETS	Rhonda Peets	FDEP
BUD GUBLISCH	Bud Gublisch	JJG
BOB PASCALE	Bob Pascale	PURRE
Linda Young	Linda Young	CWN of FL
Renny Ferguson	[illegible]	JJG
Judy Notenkerft	Judy Notenkerft	SFWMD
Christopher Wallen	Christopher Wallen	Dynamic Solutions, LLC

Updated by: Scott Legg
On 04/11/2008

Caloosahatchee River Watershed Protection Plan Management Measures
aka "Where's My Management Measure"

Yellow = Alt 1 Common Elements

MM#	Project Feature/ Activity	Level	Notes
	Imported from LO Plan		
CRE-LO 01,02,49	Agricultural BMPs	1	
CRE-LO 03	Urban Turf Fertilizer Rule (LOER)	1	
CRE-LO 04	Land Application of Residuals	1	
CRE-LO 05	Florida Yards and Neighbors	1	
CRE-LO 08	NPDES Stormwater Program	1	
CRE-LO 09	Coastal & Estuarine Land Conservation Program	1	
CRE-LO 12g	Alternative Water Storage (LOER) - Barron Water Control District	1	
CRE-LO 15	Caloosahatchee River Watershed Works of the District Rule Regulatory Phosphorus Source Control Program	2	
CRE-LO 21	Lake Okeechobee and Estuary Watershed Basin Rule (LOER)	3	
CRE-LO 40	Lake Hicpochee	4	Combines CRE 03 & CRE 05
CRE-LO 41	C-43 Distributed Reservoirs	4	
CRE-LO 63	Wastewater & Stormwater Master Plans	4	
CRE-LO 64	Unified Statewide Stormwater Rule	4	
CRE-LO 68	Comprehensive Planning - Land Development Regulations (LDR)	3	
CRE-LO 87	Florida Ranchlands Environmental Services Project (FRESP) - 4 Existing Pilots	1	
CRE-LO 91	Farm and Ranchland Protection Program	4	
CRE-LO 92	Clewiston STA	4	
	CRE - MM		
CRE 01	Recyclable Water Containment Areas (RWCA) in the Freshwater Caloosahatchee Southeast sub-basin	4	Combine with CRE 93

CRE 02	Centralized Recycled Water Containment Area in the S-4 Basin	5	Include CRE 115
CRE 03	Lake Hicpochee	5	Combine with CRE-LO 40
CRE 04	Lake Hicpochee Restoration -STAs and Filter Marsh Concept	5	Combine CRE 06, 07, 08
CRE 05	West Lake Hicpochee Water Quality Treatment Area (C-19 canal)	3	Combine with CRE-LO 40
~~CRE 06~~	Lake Hicpochee Restoration - *SWFFS WQ – W50-52*	4	Combine in CRE 04
~~CRE 07~~	Hicpochee Restoration -STAs and Filter Marsh	4	Combine in CRE 04
~~CRE 08~~	Lake Hicpochee storage/flowway/ treatment feature	3	Combine in CRE 04
~~CRE 09~~	Recyclable Water Containment Areas (RWCA) in the Freshwater Caloosahatchee Southeast sub-basin	4	
CRE10	Water Quality Treatment Area - Constructed Wetland/STA (@Boma property) - *SWFFS WQ – W28*	3	
CRE11	Water Quality Treatment Area - Constructed Wetland/STA - Caloosahatchee Ecoscape - *SWFFS WQ – W38(1)*	4	
CRE 12	Christmas Canal Stormwater Treatment Area	3	
CRE 13	Water Quality Treatment Area - Constructed Wetland/STA @ C-43 West Basin Storage Reservoir - *SWFFS WQ – W38(2)*	4	Combine with CRE 14
CRE 14	Filter Marsh (STA) for C-43 Reservoir	5	
~~CRE 15~~	Filter Marsh (STA) for C-43 Reservoir	Duplicate	
CRE 16	Water Quality Treatment Area - @ Hunt Club - *SWFFS WQ - W38 (3)*	4	
~~CRE 17~~	East Lee County Aquifer Recharge Program (Proj 8515 - FY 1995-1996)	1	does not meet objective
CRE 18	Harns Marsh Improvements, Phase I Construction - ECWCD	1	
CRE 19	Harns Marsh Improvements, Phase II Final Design - ECWCD	2	
CRE 20	Yellowtail Structure Construction - ECWCD	2	Combine with CRE 39
CRE 21	Hendry County Storage	4	
CRE 22	Hendry Extension Canal Widening (Construction) - ECWCD	2	
~~CRE 23~~	Carlos Waterway Conveyance for WQ in C-43	4	Potential combination with CRE 13
~~CRE 24~~	Bedman Creek Corridor Restoration	4	Combine as part of CRE 34 -Generic BMP for creeks/outfalls.
~~CRE 25~~	Hickey Creek Cypress Swamp	4	

~~CRE 26~~	Hickey Creek Cypress Swamp	Duplicate	
~~CRE 27~~	Hickey Creek Headwater Restoration	4	Combine as part of CRE 34 -Generic BMP for creeks/outfalls.
~~CRE 28~~	Lehigh Acres Centralized Wastewater Treatment and Re-use (Hickey Creek Sub-basin Freshwater Caloosahatchee) SWFFS WQ -w44	3	Combine with CRE 35
CRE 29	" New" Hickey Creek - Lehigh Acres Stormwater Retrofits - SWFFS WQ -	3	Combine with CRE 35
CRE 30	Aquifer Benefit and Storage for Orange River Basin (ABSORB) - ECWCD	2	
~~CRE 31~~	Expansion of Harnes March - Orange River sub-basin - SWFFS WQ - W65	4	Combine with CRE 37
CRE 32	Orange River Algal Turf Scrubber	5	WQ feature - include CRE 117
~~CRE 33~~	Orange River Outfall (403134)	1	
CRE 34	Caloosahatchee Tidal Creeks - Mouth of Orange River	4	Use as base for generic Creeks/Outfall MM
CRE 35	Lehigh Acres Centralized Wastewater Treatment and Re-use (Orange River sub-basin Tidal Caloosahatchee) SWFFS WQ -w44	4	see Hickey Creek CRE 28
CRE 36	Dog Canal - Hendry Canal Connection (Final Design and Construction)	3	
~~CRE 37~~	West Marsh Property (Final Design and & Construction)	3	Combine with CRE 18
~~CRE 38~~	Jacks Branch Stream Restoration	4	Combine as part of CRE 34 -Generic BMP for creeks/outfalls. Tie into Bonita Bay project nearby.
~~CRE 39~~	Yellowtail Structure Retrofit Construction - ECWCD	2	Combine with CRE 20
~~CRE 40~~	Stroud Creek Improvements (Project #8530)	1	Combine as part of CRE 34 -Generic BMP for creeks/outfalls.
~~CRE 41~~	Stroud Creek Restoration (Project #8585)	1	Combine as part of CRE 34 -Generic BMP for creeks/outfalls.
~~CRE 42~~	Water Quality Treatment Are - Constructed Wetland/STA - "Four Corners" area SWFFS WQ - W62	4	Combine with CRE 44
~~CRE 43~~	Spanish Creek Restoration (Project #8538)	1	Combine with CRE 44

CRE 44	Spanish Creek Four Corners Environmental Restoration	3	Include CRE 42 & 43. Phase 1-3
CRE 45	Billy Creel Filter Marsh Phase I & II	2	Combine CRE 45, 46, 47
~~CRE 46~~	Billy Creek Filter Marsh, Phase 1	1	Combine with 45
~~CRE 47~~	Ford Filter Canal	2	Combine with 45
CRE 48	Manuel's Branch Silt Reduction Structure	2	
CRE 49	Manuel's Branch East and West Weirs	2	
~~CRE 50~~	Alameda Canal (Project #0761)	1	Combine as part of CRE 34 -Generic BMP for creeks/outfalls.
~~CRE 51~~	Poling Lane Drainage (Project #8556)	1	Combine as part of CRE 34 -Generic BMP for creeks/outfalls.
~~CRE 52~~	Daughtrey's Creek Improvements (Project # 8524)	1	Combine as part of CRE 34 -Generic BMP for creeks/outfalls.
CRE 53	Caloosahatchee Creeks Preserve Hydrological Restoration	2	
~~CRE 54~~	Bayshore Creek Improvements (Project #8520)	1	Combine as part of CRE 34 -Generic BMP for creeks/outfalls.
CRE 55	Powell Creek Filter Marsh (Project #8584)	1	
~~CRE 56~~	Powell Creek Clean & Snag Program (Project #3042)	1	LWCSC project need more details
CRE 57	Powell Creek Algal Turf Scrubber	3	
CRE 58	Kickapoo Creek Stormwater System Analysis	3	
CRE 59	N Ft Myers Surface Water Restoration Project	1	
~~CRE 60~~	Popash Creek Culvert Replacement (Project # 8508)	1	
~~CRE 61~~	Popash Creek Culvert Replacement (Project # 8508)	Duplicate	
CRE 62	Popash Creek Preserve (Project #8593)	1	Use as base for CRE 34 - Generic BMP for creeks/outfalls
~~CRE 63~~	Popash Creek Preserve (Project #8593)	Duplicate	
CRE 64	Yellow Fever Creek/Gator Slough Transfer Facility (#208509)	1	Combine with CRE 67
~~CRE 65~~	Yellow Fever Creek (E. Branch) Structure Replacements (Project #8510)	1	Combine as part of CRE 34 -Generic BMP for creeks/outfalls.
CRE 66	Gator Sough Phase 1 (Project #3060)	1	
~~CRE 67~~	Yellow Fever Creek and Gator Sough Interconnect - Lee County	1	Combined with CRE 64
~~CRE 68~~	Spreader Canal Restoration - Cape Coral	3	Combine with CRE 70
CRE 69	Cape Coral Stormwater Improvements	2	

CRE 70	Cape Coral Spreader Canals Restoration - SWFFS WQ - W100	3	include CRE 68 & CRE 76
~~CRE 71~~	Cohn Branch Channel Improvements (Project #8522)	1	combine as part of CRE 34 -Generic BMP for creeks/outfalls.
~~CRE 72~~	Chapel branch Improvements (Project #8521)	1	combine as part of CRE 34 -Generic BMP for creeks/outfalls.
~~CRE 73~~	March Point Improvements (Project #8526)	1	combine as part of CRE 34 -Generic BMP for creeks/outfalls.
~~CRE 74~~	Hancock Bridge parkway Flood Control (Project #8504)	1	combine as part of CRE 34 -Generic BMP for creeks/outfalls.
CRE 75	North Cape Coral - Water Control Treatment Area- - - SWFFS WQ W97	4	get more info and combine with other MM
~~CRE 76~~	Spreader Canal Restoration - Cape Coral	1	combined into CRE 70
CRE 77	Cape Coral - Canal Stormwater Recovery and Treatment by ASR	1	
CRE 78	Cape Coral Canal Weir System SWFFS WQ - W101	4	include CRE 79
~~CRE 79~~	Weirs Systems in Canals in Cape Coral	1	Combined with CRE 78
CRE 80	Cape Coral Utility Expansion program	1	
CRE 81	Florida Yards and Neighbors - Cape Coral	1	Rolled into Urban Benefits MM
CRE 82	Financial incentives to small governments to eliminate small wastewater treatment plants	3	See CRE 82A
~~CRE 83~~	Caloosahatchee Tributary Maintenance (project # 8581)	1	Combine as part of CRE 34 -Generic BMP for creeks/outfalls.
~~CRE 84~~	Caloosahatchee SII for TMDL compliance (Project #8588)	1	planning project - does not meet objectives
~~CRE 85~~	Surface Water Management Plan (project #200983)	1	planning project - does not meet objectives
~~CRE 86~~	Neighborhood Improvement Program (project #8514)	1	Combine as part of CRE 34 -Generic BMP for creeks/outfalls.
CRE 87	Marine Sanitation Initiative (Project #2904)	1	work with DEP and extend to Hendry and Glades County - See CRE 87A
CRE 88	Sewer System Infiltration/Inflow Improvements	2	

CRE 89	Bayous Collection System Evaluation	3	
CRE 90	Sanibel Centralized Sanitary Sewer Expansion	1	
~~CRE 91~~	Sewer System Expansion, Phase IV	1	does not meet objective
~~CRE 92~~	Ft Myers Beach Stormwater Management Study	2	does not meet objectives
CRE 93	RWCA's Agricultural Suite (SWFFS WQ-W30,33,36,42,54,57,60,63, new freshwater Okeechobee,82,86,91,108)	4	Fold into CRE 01 & CRE 02
CRE 94	HWCA's (Harvestable Water Containment area) Ag Suite	4	
CRE 95	Modified Water Retention Ag Suite	4	
CRE 95A	Tailwater Recovery	4	assign new number - CRE 127
~~CRE 96~~	Billy Creek Restoration	5	Combine with CRE 45
~~CRE 97~~	Caloosahatchee Creeks Preserve Hydrological Restoration	5	Combine with CRE 53
~~CRE 98~~	Caloosahatchee Oxbows	5	does not meet objectives
~~CRE 99~~	City Golf Course Filter Marsh	5	combine with CRE 48 & 49
~~CRE 100~~	Ding Darling Impoundments	5	does not meet objective
~~CRE 101~~	Hancock Creek Riverine Corridor	5	Combine as part of CRE 34 -Generic BMP for creeks/outfalls.
~~CRE 102~~	Manatee island Complex	5	does not meet objective
~~CRE 103~~	Manuel's Branch	5	Combine with CRE 48 & 49
~~CRE 104~~	Matlacha Buffer	5	Combine as part of CRE 34 -Generic BMP for creeks/outfalls.
~~CRE 105~~	Orange River	5	Combie with CRE 33
~~CRE 106~~	Pine Island Buffer	5	does not meet objective
~~CRE 107~~	Prairie Pine Preserves/ Caloosahatchee Headwaters	5	does not meet objective
~~CRE 108~~	Punta Russa	5	does not meet objective
~~CRE 109~~	Sanibel Wetland Complex	5	does not meet objective
~~CRE 110~~	Sound Island Network	5	does not meet objective
~~CRE 111~~	Tidal Caloosahatchee Buffer	5	Combine as part of CRE 34 -Generic BMP for creeks/outfalls.
~~CRE 112~~	Yellow Fever Creek Headwaters	5	Combine with CRE 67
~~CRE 113~~	Yucca Pens	5	Combine as part of CRE 34 -Generic BMP for creeks/outfalls.
CRE 114	Urban Suite (SWFFS WQ - W66,71,77,85,90,98	4	Same as CRE-LO 13

~~CRE 115~~	Recyclable Water Containment Areas (RWCA) in the S-4 subbasin (Freshwater Caloosahatchee Okeechobee)		Combine with CRE 02
~~CRE 116~~	Riparian Buffers (SWFFS WQ - 31,64,37,40,45,49,55,58,61,64,67,75,78,83,88,93,96,99	4	Combine as part of CRE 34 -Generic BMP for creeks/outfalls.
~~CRE 117~~	Water Quality Treatment Area - Algal Turf Scrubber Facility - Orange River sub-basin (Bob's Triangle Marsh)	4	Include in CRE 32
CRE 118	North Fort Myers Surface Water Restoration Powell Creek - #8533	2	see CRE 57
~~CRE 119~~	Kickapoo Creek Stormwater System Improvements	1	see CRE 58
~~CRE 120~~	Public Education Program for Fertilizer & Landscape BMP	3	Include in CRE-LO 02
CRE 121	City of LaBelle Stormwater Quality Improvements	3	
CRE 122	Rehydrate Lee County Well Fields	3	
CRE 123	North Ten Mile Canal Stormwater Treatment System	2	
CRE 124	Carrell Canal (FMCC) Water Quality Improvements	2	
CRE 125	Shoemaker-Zapato Canal Stormwater Treatment	2	
CRE 126	Fort Myers-Cape Coral Reclaimed Water Interconnect	5	
CRE 127	Tailwater Recovery	4	was numbered CRE 95A

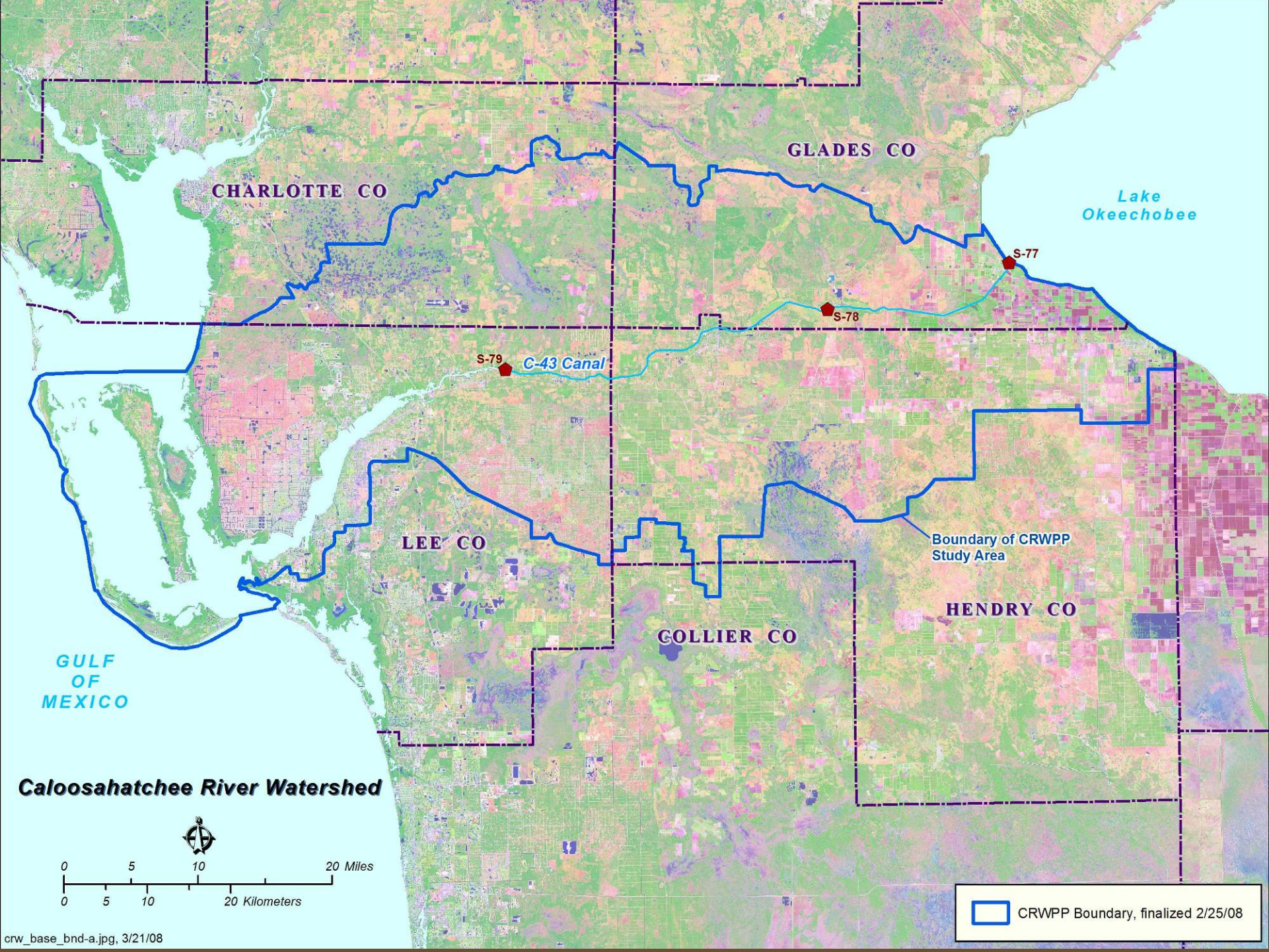
Northern Everglades & Estuaries Protection Program

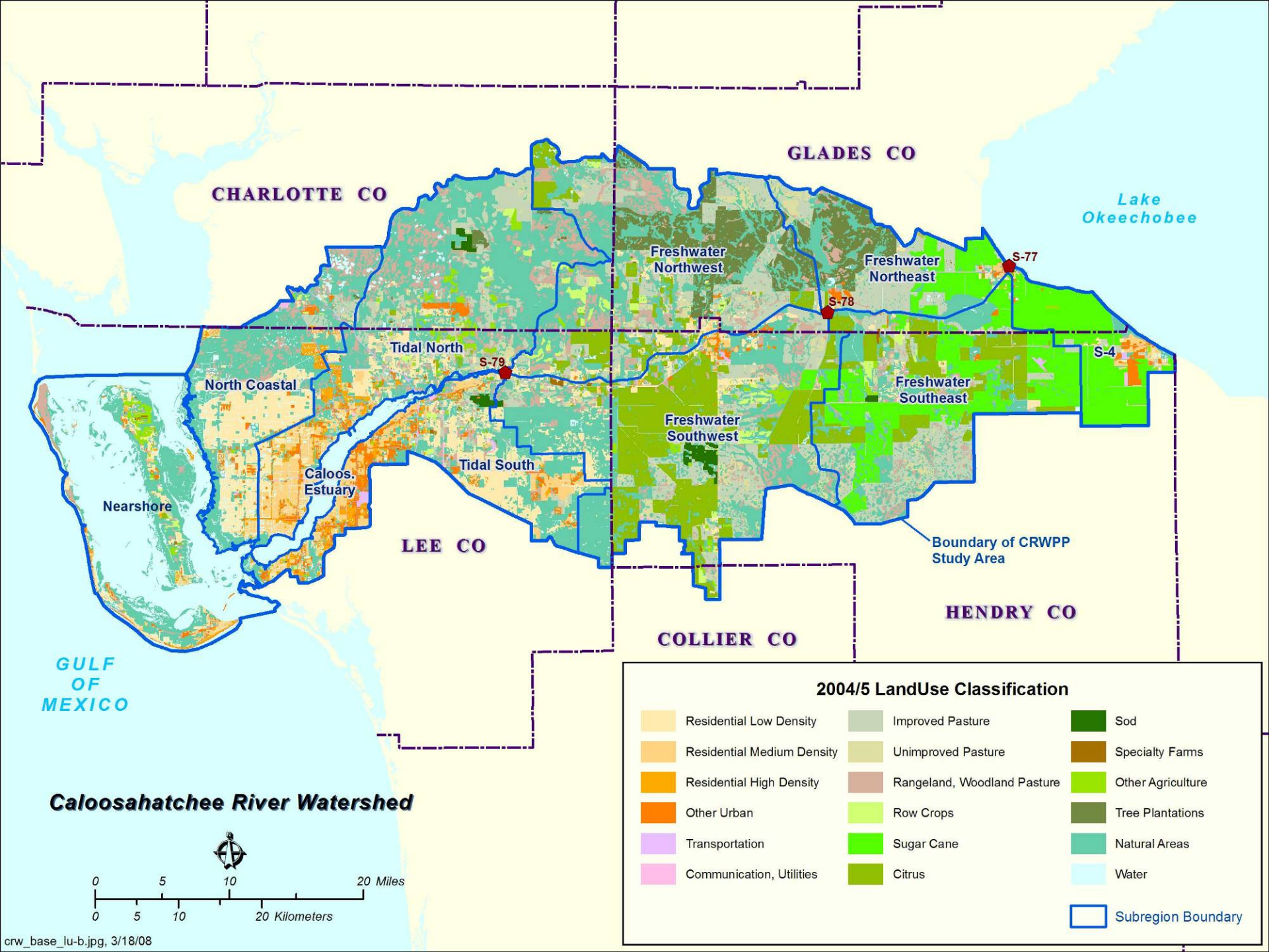
Caloosahatchee River Watershed Protection Plan

Water-Quality Spreadsheet:

Status of Alternative 1 Compilation

April 16, 2008


GLADES CO
CHARLOTTE CO
Lake Okeechobee
S-77
S-78
S-79
C-43 Canal
LEE CO
Boundary of CRWPP Study Area
HENDRY CO
COLLIER CO
GULF OF MEXICO
Caloosahatchee River Watershed
0 5 10 20 Miles
0 5 10 20 Kilometers
CRWPP Boundary, finalized 2/25/08
crw_base_bnd-a.jpg, 3/21/08



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Caloosahatchee River Watershed

-- EXAMPLE --
Numbers on this table are for purposes of illustration only.

	Total Nitrogen			Total Phosphorus		
	Loading Rates and BMP Efficiencies			Loading Rates and BMP Efficiencies		
Landuse Category	Unit Source Load (lb/ac/yr)	Owner-Implemented BMPs	Cost-Share BMPs	Unit Source Load (lb/ac/yr)	Owner-Implemented BMPs	Cost-Share BMPs
Residential Low Density	6.0	30%	0%	0.66	20%	0%
Residential Medium Density	16.0	40%	0%	0.90	30%	0%
Residential High Density	12.0	25%	0%	1.20	10%	0%
Other Urban	8.0	0%	0%	1.00	0%	0%
Improved Pasture	8.0	5%	10%	0.72	5%	10%
Unimproved Pasture	4.0	0%	5%	0.49	0%	5%
Rangeland, Woodland Pasture	3.0	0%	0%	0.27	0%	0%
Row Crops	20.0	20%	20%	6.30	20%	20%
Sugar Cane	8.0	10%	10%	0.63	10%	10%
Citrus	10.0	15%	20%	1.62	15%	20%
Sod	20.0	20%	30%	2.52	20%	20%
Ornamentals	15.0	20%	20%	4.10	20%	20%
Horse Farms	20.0	20%	30%	3.00	20%	40%
Dairies	20.0	20%	30%	3.38	20%	40%
Other Agriculture	10.0	5%	5%	0.70	5%	5%
Tree Plantations	8.0	5%	10%	0.28	5%	10%
Water	0.0	0%	0%	0.00	0%	0%
Natural Areas	2.0	0%	0%	0.20	0%	0%
Transportation	6.0	10%	0%	1.20	0%	0%
Communication, Utilities	6.0	0%	0%	1.00	0%	0%

Caloosahatchee River Watershed

Example of Alternative 1 Management Measures and the potential changes in Flow and Loads

-- EXAMPLE --
Numbers on this table are for purposes of illustration only.

MM Number	Management Measure Name	MM Change, in Units			SubRegion
		Flow, in ac-ft/yr	TN, in lb/yr	TP, in lb/yr	
CRE 10	WQTA at Boma Property	-10,000	90,000	10,000	Freshwater Southeast
CRE 121	City of LaBelle Stormwater Master Plan	0	6,650	1,000	Freshwater Southwest
CRE 126	Ft. Myers/Cape Coral Reclaimed Water Interconnect	-10,000	135,000	13,500	Tidal South
CRE 21	Hendry County Storage	-500	6,000	1,000	Freshwater Southwest
CRE 30	Orange River Basin Aquifer Benefit and Storage (ABSORB)	-20,000	70,000	5,000	Tidal South
CRE 44	Spanish Creek Four Corners Environmental Restoration	-3,200	32,000	5,000	Freshwater Northwest
CRE 45	Billy Creek Filter Marsh	0	400	580	Tidal South
CRE 47	Ford Filter Canal	0	800	220	Tidal South
CRE 48	Manuel's Branch Silt Reduction Structure	0	300	240	Tidal South
CRE 49	Manuel's Branch East and West Weirs	0	900	240	Tidal South
CRE 53	Caloosahatchee Creeks Preserve Hydrologic Restoration	0	12,000	1,000	Tidal North
CRE 57	Powell Creek Algal Turf Scrubber	-50	11,000	1,000	Tidal North
CRE 59	N. Ft. Myers Surface Water Restoration Project	0	1,528	247	Tidal North
CRE 64	Yellow Fever Creek/Gator Slough Preserve Transfer Facility	-10,000	28,000	4,000	North Coastal
CRE 64	Yellow Fever Creek/Gator Slough Preserve Transfer Facility	10,000	-28,000	-4,000	Tidal North

Caloosahatchee River Watershed

Long-term averages for primary locations along the Caloosahatchee River

Period of Record -- 1995 to 2005	S-77	S-78	S-79
Streamflow, in ac-ft/yr	975,042	1,207,915	1,854,004
Total Nitrogen			
Load, in Metric Tons/yr	1,950.9	2,141.8	3,263.7
Flow-weighted Concentration, in mg/L	1.622	1.438	1.427
Total Phosphorus			
Load, in Metric Tons/yr	104.5	153.7	272.0
Flow-weighted Concentration, in mg/L	0.087	0.103	0.119

Caloosahatchee River Watershed

-- EXAMPLE -- Numbers on this table are for purposes of illustration only.			Initial Loadings			
	Area	Discharge	Total Nitrogen		Total Phosphorus	
Subregion	acres	af-ft/yr	Mton/yr	mg/L	Mton/yr	mg/L
Caloosahatchee Estuary	16,285	16,285	1.4	0.072	0.2	0.008
Freshwater Northeast	63,724	61,928	47.3	0.619	9.4	0.123
Freshwater Northwest	162,141	297,454	492.4	1.342	45.1	0.123
Freshwater Southeast	134,575	127,740	105.2	0.668	31.6	0.201
Freshwater Southwest	187,593	348,634	629.5	1.464	73.1	0.170
Nearshore	137,653	137,653	81.7	0.481	8.5	0.050
North Coastal	89,583	150,302	214.6	1.157	29.6	0.160
S-4	42,504	43,206	38.4	0.721	8.2	0.154
Tidal North	163,505	282,621	521.8	1.497	65.7	0.188
Tidal South	82,234	162,874	357.3	1.779	45.0	0.224
Lake Okeechobee Input		975,042	1,950.9	1.622	104.5	0.087
Total for CRWPP study area	1,079,796	1,628,697	2,489.6	1.239	316.5	0.158
Between S-79 and S-77	590,537	878,962	1,312.8	1.211	167.5	0.155
Above S-79		1,854,004	3,263.7	1.427	272.0	0.119
Between Shell Point and S-77	852,560	1,340,742	2,193.4	1.326	278.4	0.168
Above Shell Point		2,315,784	4,144.3	1.451	382.9	0.134

Caloosahatchee River Watershed

-- EXAMPLE -- Numbers on this table are for purposes of illustration only.	Summary for Total Nitrogen					
	Alternative 1 Net Changes			After Alternative 1		
	Owner-Implemented BMPs	Cost-Share BMPs	Baseline Changes plus Alternative 1	Load	Flow-weighted	Total Reduction in Load
Subregion	**Mton/yr**	**Mton/yr**	**Mton/yr**	**Mton/yr**	**mg/L**	**percent**
Caloosahatchee Estuary	0.0	0.0	0.0	1.4	0.072	0.0%
Freshwater Northeast	0.0	0.0	0.0	47.3	0.619	0.0%
Freshwater Northwest	39.6	44.9	14.5	393.4	1.084	20.1%
Freshwater Southeast	0.0	0.0	8.2	97.0	0.668	7.8%
Freshwater Southwest	76.2	72.9	5.7	474.7	1.122	24.6%
Nearshore	0.0	0.0	0.0	81.7	0.481	0.0%
North Coastal	37.9	1.7	12.7	162.2	0.938	24.4%
S-4	0.0	0.0	19.2	19.2	0.721	50.0%
Tidal North	83.5	17.1	-1.6	422.8	1.171	19.0%
Tidal South	86.3	5.6	95.3	170.1	1.070	52.4%
Lake Okeechobee Input	0.0	0.0	0.0	1,950.9	1.622	0.0%
Total for CRWPP study area	323.5	142.1	154.2	1,869.8	0.975	24.9%
Between S-79 and S-77	115.7	117.8	47.7	1,031.6	0.997	21.4%
Above S-79	115.7	117.8	47.7	2,982.5	1.333	8.6%
Between Shell Point and S-77	285.6	140.4	141.5	1,625.9	1.033	25.9%
Above Shell Point	285.6	140.4	141.5	3,576.8	1.288	13.7%

Caloosahatchee River Watershed

What's Next ?

- Consolidate all background information
  - ✓ Landuse loadings and BMP efficiencies
  - ✓ Other BMPs, if any
  - ✓ Other existing data for flows and loads
- Finalize "natural background" concentration
- Finalize data for baseline projects
- Review and finalize load reductions for the Alternative 1 management measures
- Evaluate WQ spreadsheet results for Alternative 1
- Proceed with Alternatives 2 and 3

Questions ?

CRWPP Performance Indicators (from the Lake Okeechobee Watershed Construction Project, Phase II Technical Plan, February 2008)

8.1.1.1 LOSA and EAA Water Supply

A P2TP project constraint is to achieve Lake Okeechobee water quality and water management benefits while meeting the other water related needs of the region including water supply. By using 7 years in the period of record with the most severe Lake Okeechobee Service Area (LOSA) water supply cutbacks, the water supply impact of each alternative plan can be compared. **Figure 8-10** shows the percentages and volumes of water supply cutbacks that would occur for each alternative during the seven most severe water shortage years. In each of the seven years, the water supply cutback volumes were reduced by each of the alternatives relative to the future base condition. The additional storage capacity of Alternative 2 resulted in the greatest reductions in cutbacks. However, in all but two of the seven years, the performance of Alternative 4 was comparable to Alternative 2.

Figure 8-11 shows the sources of water supply and the mean annual percentage of water supply demands not met for the EAA and LOSA. The additional storage capacity provided by Alternative 2 results in the largest increase in demands met in both, the EAA and LOSA. Overall, all four alternative plans appear to reduce demands not met as compared to the future base condition.

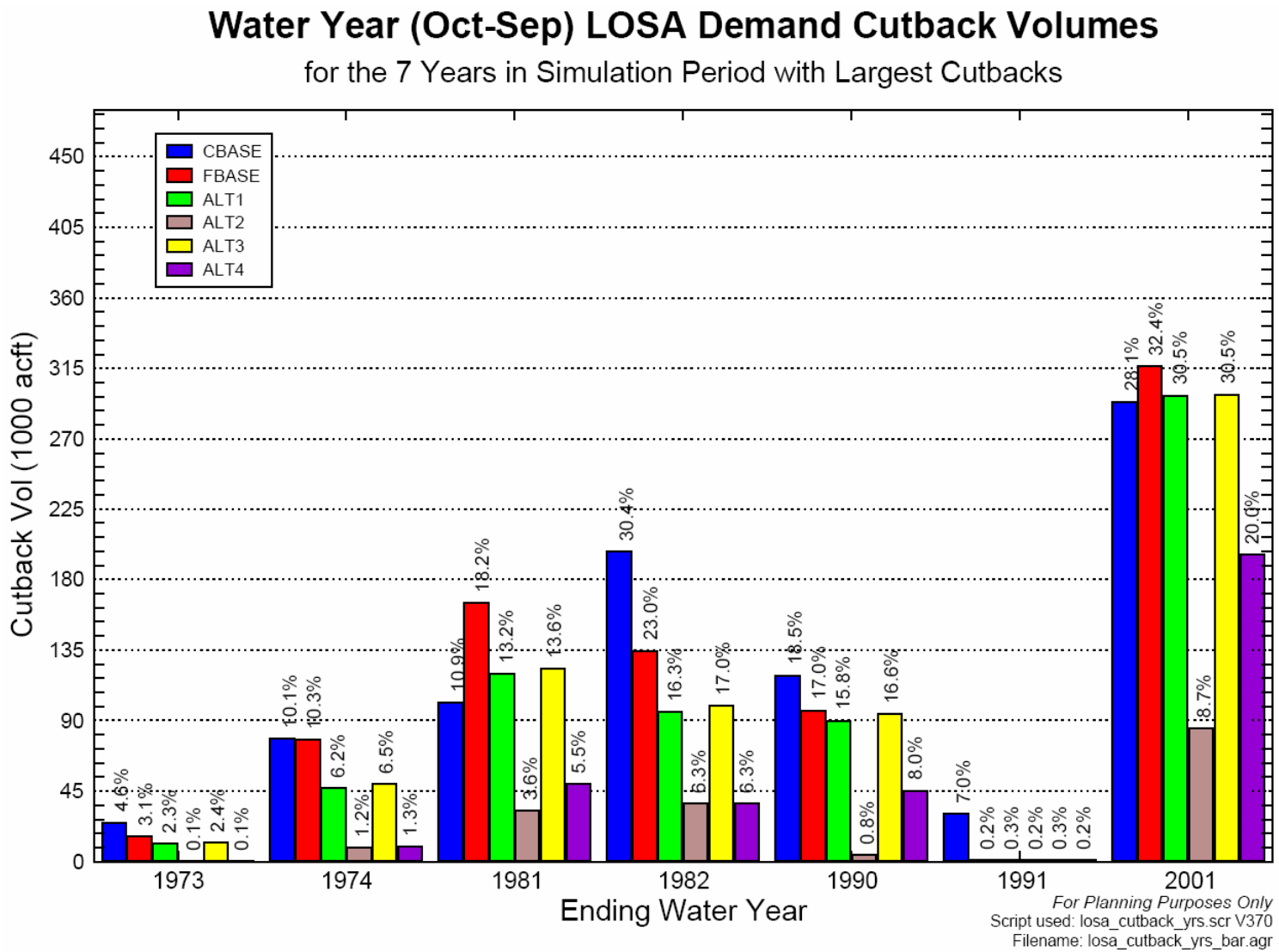


Figure 8-10. Simulated performance of Alternative Plans and Future Base – Water Year LOSA Demand Cutback Volumes.

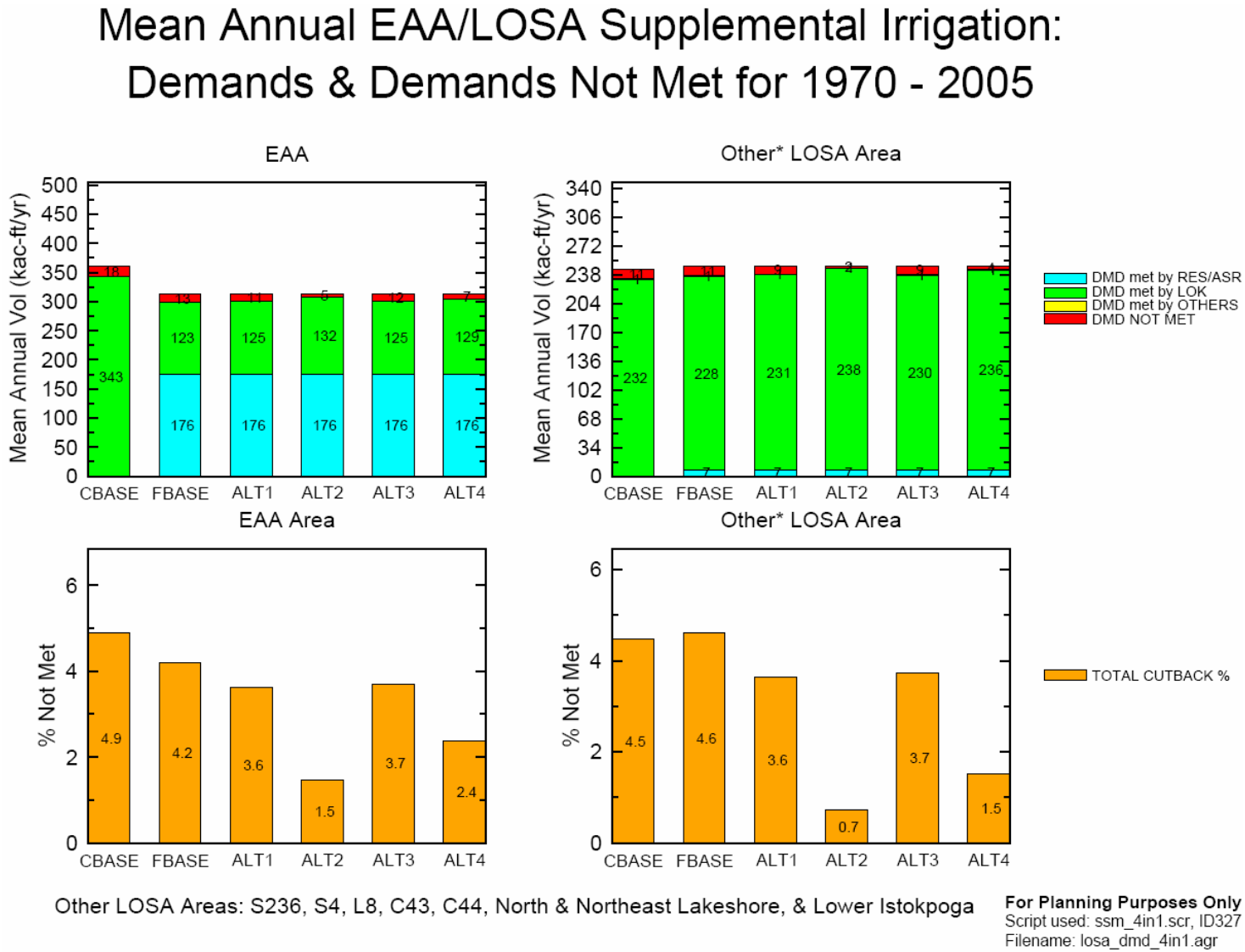


Figure 8-11. Simulated performance of Alternative Plans and Future Base – Mean Annual LOSA/EEA Supplemental Demands & Demands Not Met.

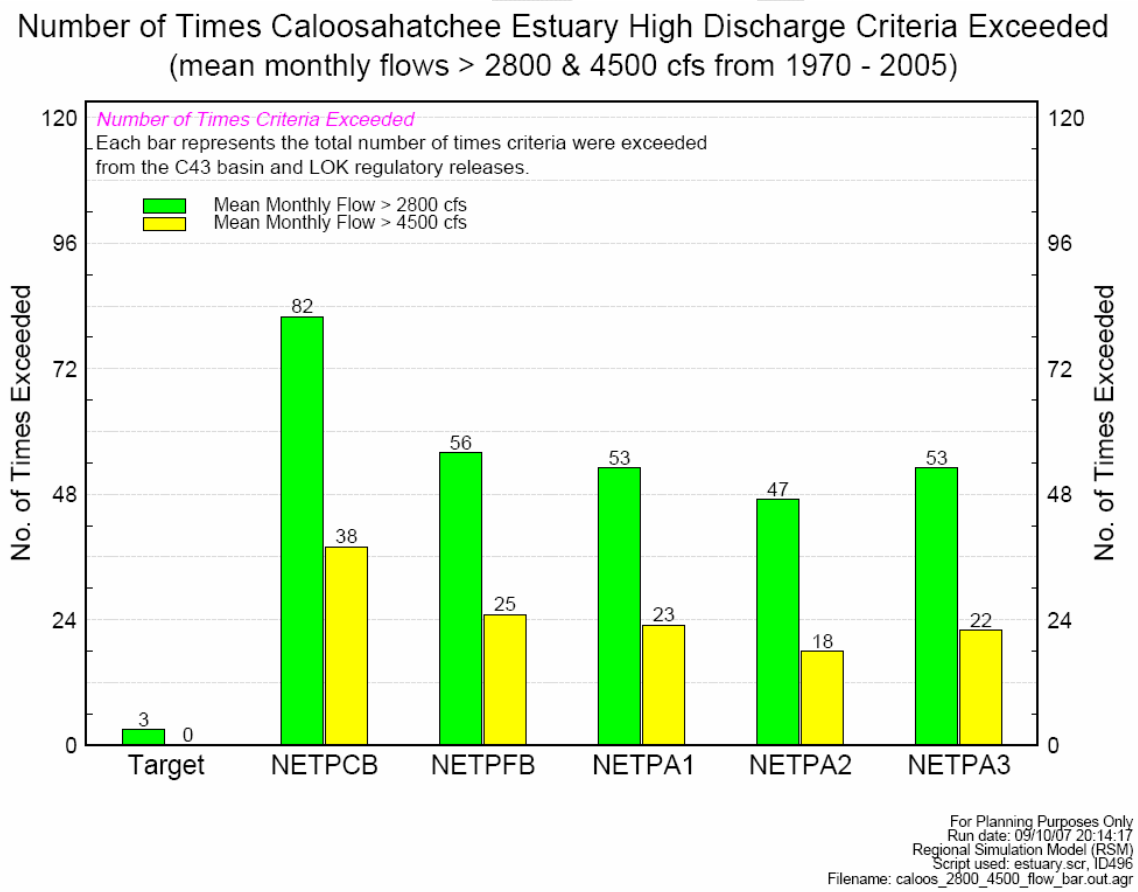
DRAFT - CRWPP Hydrologic Performance Measures

Performance Measure: Number of Times Caloosahatchee Estuary High DischargeCriteria Exceeded – Mean Monthly Flows >2,800 cfs and Mean Monthly Flows > 4,500 cfs

Description – The Lake Okeechobee WSE Regulation Schedule is applied to regulate(flood control) discharges to the Caloosahatchee River, and subsequently to the Caloosahatchee Estuary, when lake stages are high. The Caloosahatchee River has primary capacity for local inflows and is only utilized for CRE discharges when there is secondary capacity available. The number of times that the Caloosahatchee Estuary high discharge criterion is exceeded must be limited to prevent destructive impacts on the estuary.

Target – No more than 3 events with mean monthly flows at S-79 greater than 2,800 cfs and no events with mean monthly flows greater than 4,500 cfs.

Evaluation Method - The Northern Everglades Regional Simulation Model (NERSM) will be employed for all evaluations. The evaluation will be based on the period of record from 1970 through 2005. The number of average monthly S-79 flows between 2,800 cfs and 4,500 cfs will be tallied for each alternative.



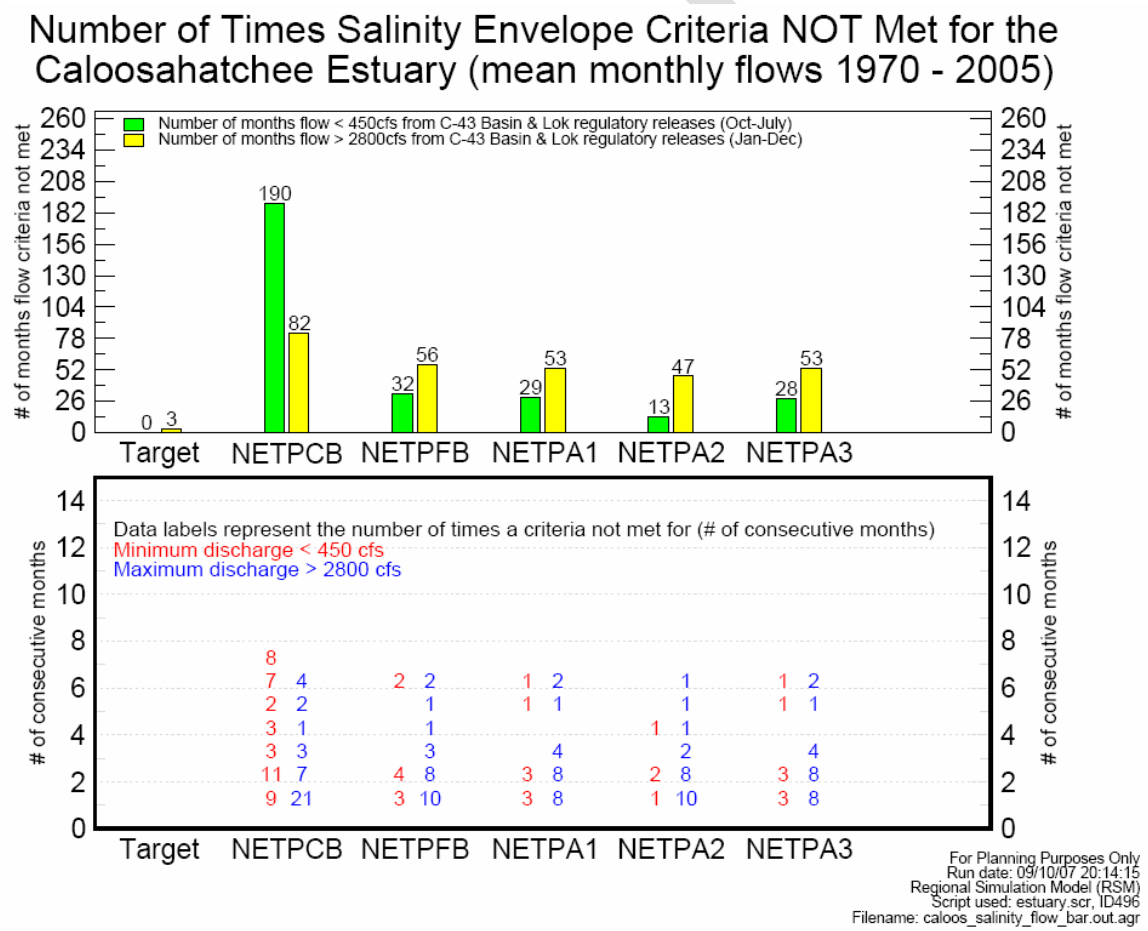
DRAFT - CRWPP Hydrologic Performance Measures

Performance Measure: Number of Times Salinity Criteria Not Met for the Caloosahatchee Estuary – Mean Monthly Flows < 450 cfs and Mean Monthly Flows > 2,800 cfs

Description – A healthy, naturally-diverse and well-balanced estuarine ecosystem canexist only if the salinity regimes are controlled within the desirable range. LakeOkeechobee discharges have a significant impact on how well desirable salinity regimesare maintained in the Caloosahatchee Estuary.

Target – Maintain mean monthly flows at S-79 between 450 cfs and 2,800 cfs with nomore than 3 events with mean mothly flows greater than 2,800 cfs.

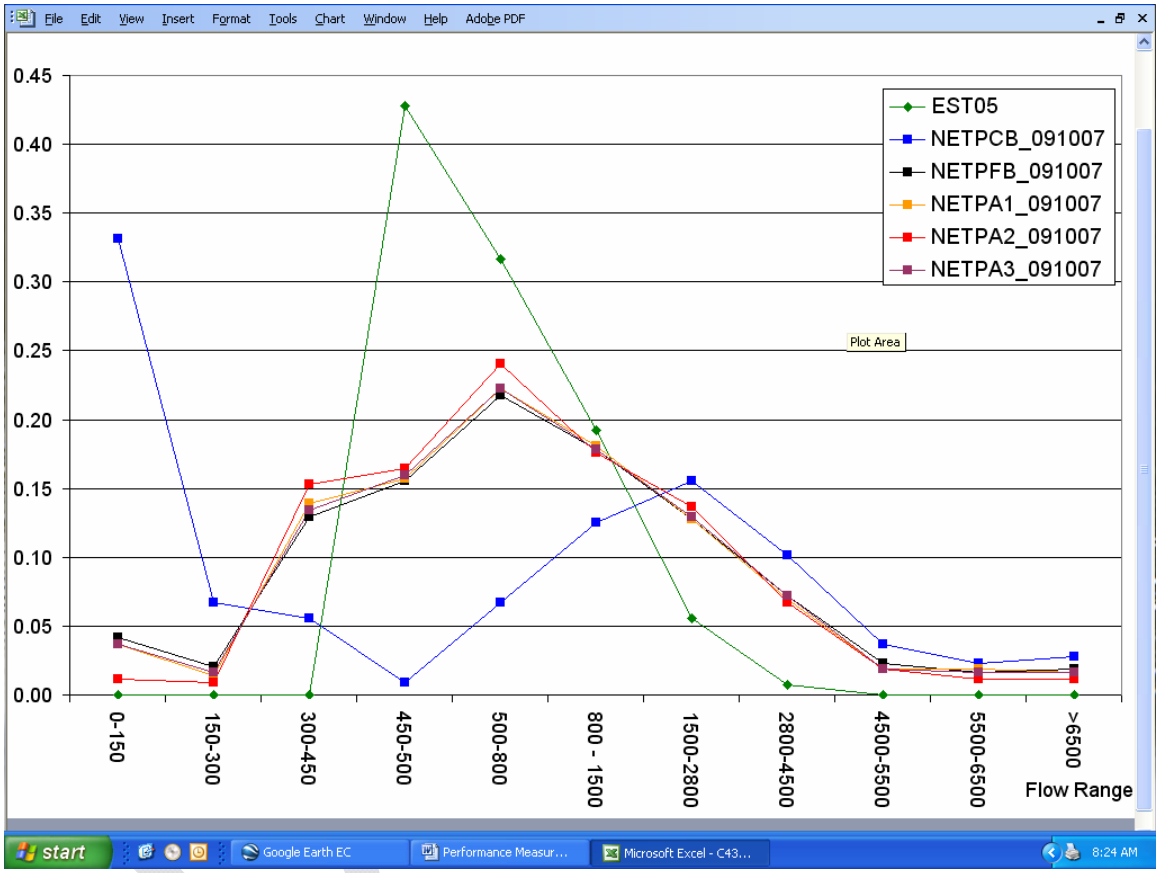
Evaluation Method - The Northern Everglades Regional Simulation Model (NERSM) will be employed for allevaluations. The evaluation will be based on the period of record from 1970 through 2005.
The number of mean monthly flows outside of the desirable range from 450 cfs to 2,800 cfs will be tallied for each alternative.



Performance Measure: Total Flow Index

Description – Compares Alternative flow distribution to desired flow distribution

Evaluation Method – The Northern Everglades Regional Simulation Model (NERSM) will be employed for all evaluations. The evaluation will be based on the period of record from 1970 through 2005.



For Planning purposes only.

Caloosahatchee River Watershed Protection Plan
Regional Simulation Model (RSM)
Summary of Assumptions for Initial Model Runs
DRAFT – 04/10/08

The Regional Simulation Model will be used to evaluate project alternatives in terms of performance measures. Base conditions will be established to provide a starting point by which relative comparisons will be made between the project alternatives. The following is a summary of the various model runs that will be used to determine system-wide impacts likely to be associated with implementation of each alternative:

• **Current Base** – This scenario represents conditions as they exist in the Northern Everglades Watershed in 2005. This condition assumes that no projects contained in the Comprehensive Everglades Restoration Plan (CERP) have been implemented. Measured data for the 36-year Period of Record (1970-2005) will be used for this simulation. Regulatory (flood control) releases from Lake Okeechobee to the estuaries and to the Water Conservation Areas will be simulated based on the existing Water Supply and Environmental (WSE) Regulation Schedule.

• **Future Base** – This scenario is intended to represent conditions likely to exist in the Northern Everglades Watershed after the implementation of all Acceler8 (A8) and Lower and Upper Kissimmee Sub-watershed water resources projects, including :

- **A8 projects**: C-43 Reservoir, C-44 Reservoir and Stormwater Treatment Area, Broward Water Preserve Areas, Site 1 Reservoir, Modified Water Deliveries to Everglades National Park, limited version of Everglades rainfall deliveries, and Everglades Agricultural Area Phase A-1 Reservoir.
- **Kissimmee Projects**: Kissimmee River Restoration Project and the Kissimmee River Headwaters Revitalization Project including the headwaters revitalization stage regulation schedule.

• **CRWPP Base Run -** This scenario, which builds upon the Future Base run described above, is intended to represent the conditions likely to exist with the implementation of the projects described in the Lake Okeechobee Watershed Construction Project Phase II Technical Plan. This is the base run from which all alternatives will be run.

• **Alternative Plans** –Alternatives will be developed by combining management measures to achieve both water quantity and quality goals.

The Lake Okeechobee Aquifer Storage & Recovery (ASR) project is not included in the future runs, however, it is anticipated that ASR will play an important role in meeting the storage goal identified in the ultimate plan. The results from Lake Okeechobee ASR pilots and the ASR Regional Study will be used to help determine the mix of surface and sub-surface storage needed to better manage Lake Okeechobee water levels.

An objective of the Caloosahatchee River Watershed Protection Plan (CRWPP) is to reduce frequency and duration of harmful freshwater releases into the Caloosahatchee Estuary at the S-79 structure. Large volumes of freshwater releases into the estuary lower salinity concentrations and adversely impact abundance and diversity of estuarine flora and fauna. Conversely, long periods of zero or extremely low flows can cause undesirable increases in salinity concentrations.

Mean monthly discharges to the estuary in excess of 2,800 cfs cause stress to the ecosystem while mean monthly discharges greater than 4,500 cfs are known to result in severe damage. The goal is to reduce the occurrence of such discharges to a frequency that approximates natural conditions. **Figure 1** shows the number of mean monthly discharge events at S-79 in excess of 2,800 cfs and 4,500 cfs for each of the four alternative plans and the future base condition. Alternatives with greater storage capacity are able to capture and store excess water until conditions allow for non-damaging releases. Therefore, Alternative 2, with the largest storage capacity, produces the most significant reductions in damaging discharges. Discharges to the Caloosahatchee Estuary at S-79 consist of contributions from Lake Okeechobee plus local inflows from the C-43 drainage basin. **Table 1** compares the number of high flow events associated with Lake Okeechobee discharges and local inflows at S-79.

Table 1. Comparison of Lake Okeechobee and local discharges at S-79.
(Number of months discharge > 2,800 cfs (432 total months of simulation))

	Current Base	**Future Base**	**ALT1**	**ALT2**	**ALT3**	**ALT4**
Number of months Lake Okeechobee (LOK) regulatory discharges > 2,800 cfs	21	13	13	9	13	9
Number of months Caloosahatchee (C-43) Basin > 2,800 cfs	48	28	27	26	27	26
Number of months combined (not individually) LOK and C-43 Basin runoff discharges > 2,800 cfs	11	14	15	8	14	16
Total number of months S-79 > 2,800 cfs	80	55	55	43	54	51

Notes:

1. Number of months Lake Okeechobee regulatory discharges>2,800 cfs – This is the number of additional months that Lake Okeechobee discharges only is greater than 2,800 cfs.
2. Number of months Caloosahatchee (C-43) Basin>2,800 cfs – This is the number of months that runoff originating from within Caloosahatchee Basin is greater than 2,800 cfs.
3. Number of months combined (not individually) Lake Okeechobee and C-43 Basin runoff discharges > 2,800 cfs – This is the number of months that a combination of runoff from within the Caloosahatchee Basin and Lake Okeechobee regulatory discharges are greater than 2,800 cfs.
4. Number of months S-79 > 2,800 cfs – Total number of months discharge across S-79 is greater than 2,800 cfs. - These flows that are greater than 2,800 cfs could be caused by runoff from within the Caloosahatchee Basin, Lake Okeechobee regulatory discharges, or a combination of runoff from within the Caloosahatchee Basin and Lake Okeechobee regulatory discharges.

The data in **Table 1** indicate that while regulatory releases from Lake Okeechobee do contribute to the problems in the Caloosahatchee Estuary, local discharges from the C-43 basin also play an important role. The Caloosahatchee River Watershed Protection Plan, which will be prepared separately and implemented, will address problems associated with local discharges into the estuary and recommend solutions to address this issue. This highlights the fact that to achieve holistic restoration of the Northern Everglades ecosystem, many different initiatives have to converge and complement each other in space and time.

Maintenance of Caloosahatchee Estuary salinity concentrations at levels that are conducive to its ecologic health requires maintaining flows at S-79 within a desirable salinity envelope. The goal is to avoid mean monthly flows less than 450 cfs (particularly from October through July) and mean monthly flows greater than 2,800 cfs. The capture and storage of excess water during wet conditions helps reduce the need for high discharges at S-79. The storage of excess water can also contribute toward maintaining minimum flows during dry conditions. Consequently, alternatives with large storage capacities (Alternatives 2 and 4) exhibit better performance as shown in **Figure 2**.

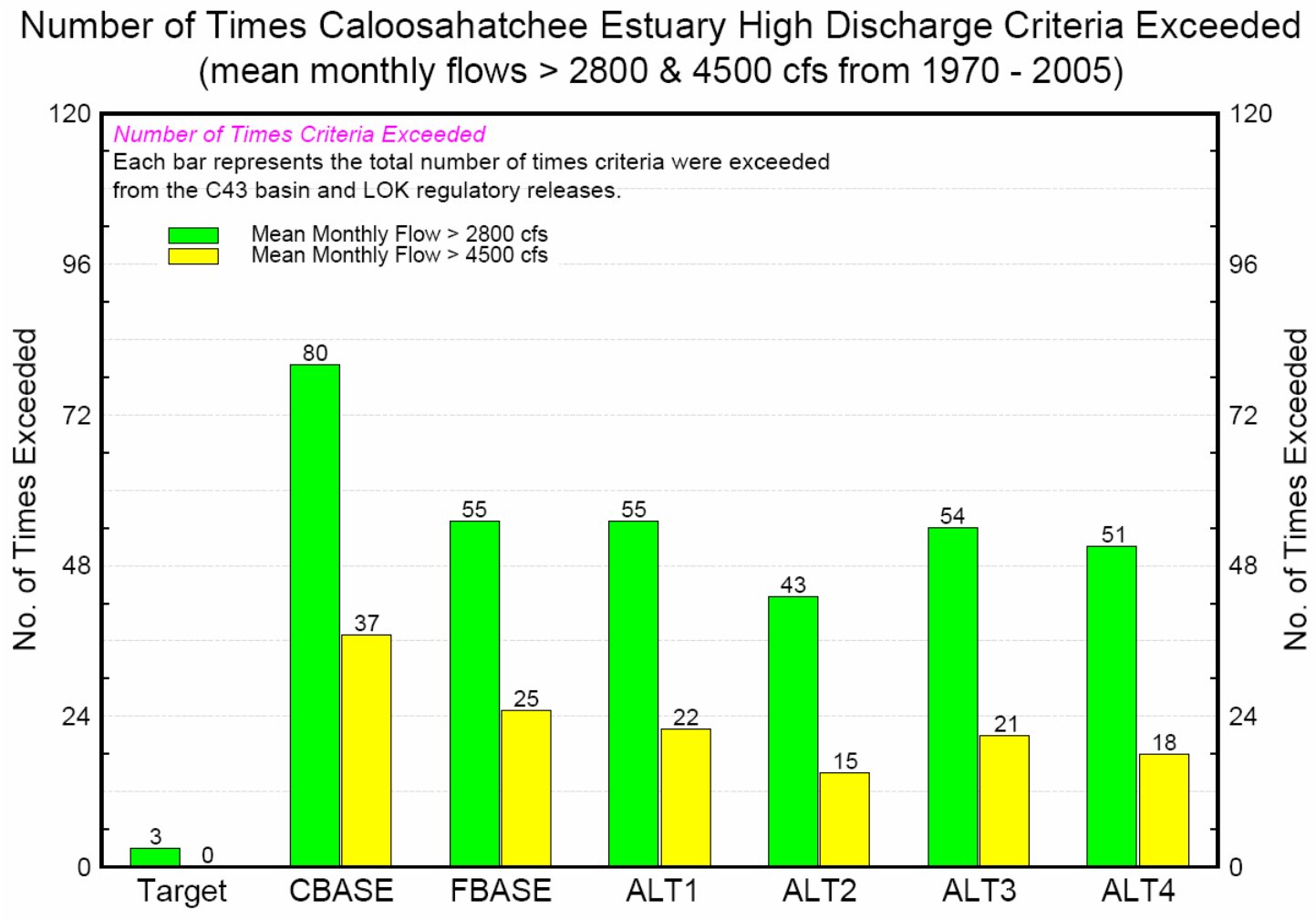


Figure 1. Simulated performance of Alternative Plans and Base Scenarios –Number of Times Caloosahatchee Estuary High Discharge Criteria Exceeded.

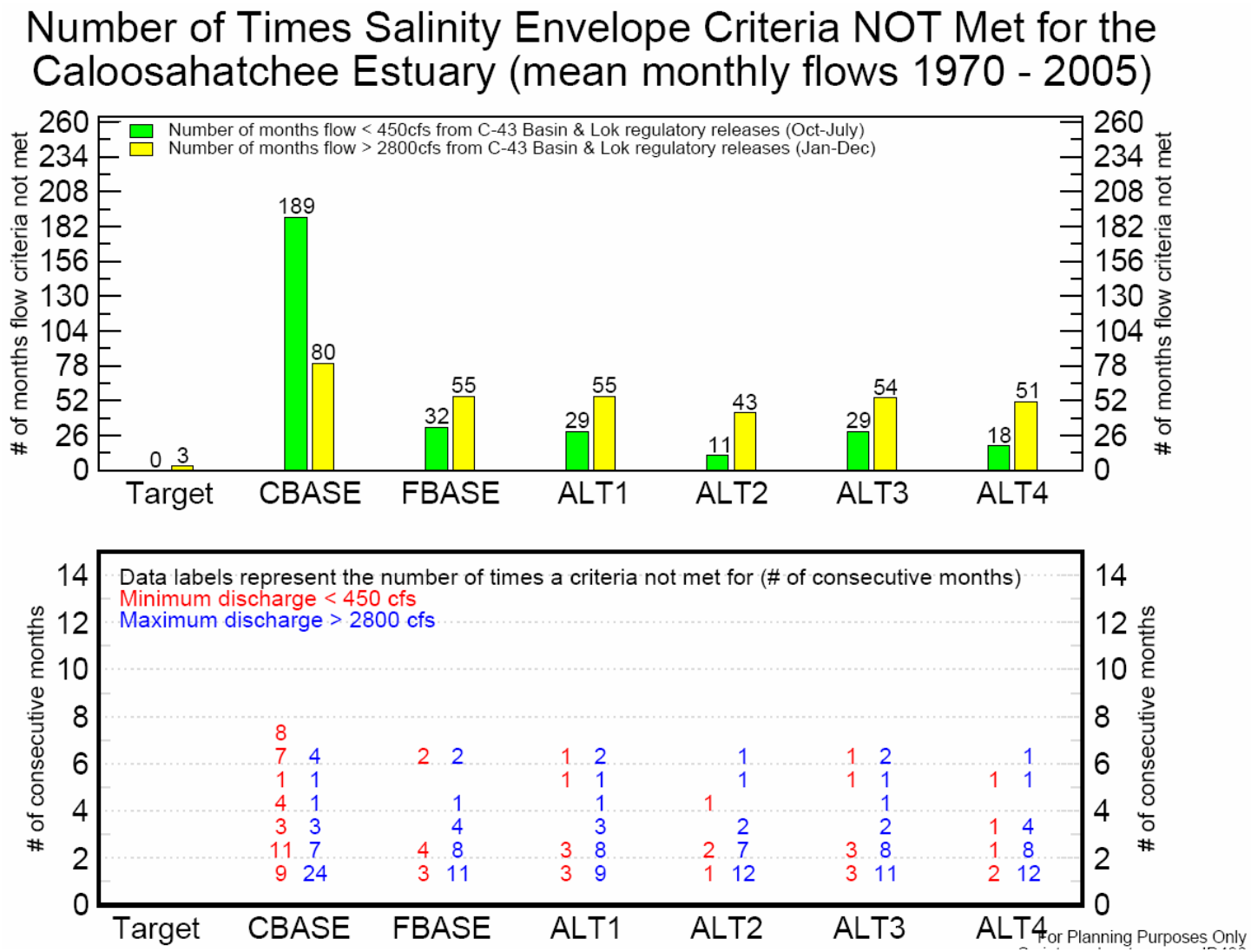


Figure 2. Simulated performance of Alternative Plans and Base Scenarios – Number of Times Salinity Envelope Criteria for the Caloosahatchee Estuary NOT Met.

Caloosahatchee River Watershed Protection Plan

Performance Measures

Final Draft March 17, 2008

Problem	Objective	Performance Measure	Comments
Excess discharges resulting from local run-off and Lake Okeechobee regulatory discharge events	Manage discharges to meet desirable salinity ranges for estuary		Model results will represent the total number of times criteria were exceeded
Excess Nutrient Loads to river and estuary	Reduce current loads	Maximize load reduction	

SOUTH FLORIDA WATER MANAGEMENT DISTRICT

Overview of Hydrologic Modeling For Caloosahatchee River Watershed Protection Plan

(presented by Lehar Brion, HESM, SFWMD)

4/16/08

sfwmd.gov

Presentation Outline

- Initial Model Run Assumptions
- Performance Measures
- Performance Indicators
- Initial Modeling Results:
  - LOWCP P2TP Current Base
  - Draft CRWPP Base Run

Initial Model Run Assumptions

- The link-node version of the Regional Simulation Model (RSM) is the regional tool used to evaluate alternatives for Caloosahatchee River Watershed Protection Plan (CRWPP)
- NERSM = specific implementation of RSM covering the northern extent of the District down to Lake Okeechobee
- Current Base:
  - Represents conditions as they exist in the Northern Everglades Watershed in 2005.
  - Assumes no projects as defined by the Comprehensive Everglades Restoration Plan (CERP).
  - Period of record: 1970 to 2005.
  - Lake Okeechobee flood control releases to estuary and Water Conservation Areas are based on the existing WSE regulation schedule.
  - Same as LOWCP P2TP current base scenario.

Initial Model Run Assumptions

- **Future Base:**
  - **Represents conditions likely to exist in Northern Everglades Watershed after implementation of Acceler8, Lower & Upper Kissimmee water resources projects such as:**
    - **C-43 reservoir**
    - **C-44 reservoir and STA**
    - **EAA Phase A-1 Reservoir**
    - **Kissimmee River Restoration Project and the Kissimmee River Headwaters Revitalization Project**
    - **Other projects south of Lake Okeechobee such as authorized MODWATERs and C-111 projects**
  - **Also referred to as LOWCP P2TP future base.**

Initial Model Run Assumptions

- CRWPP Base Run:
  - Represents future base conditions plus implementation of projects described in the Lake Okeechobee Watershed Construction Project Phase II Technical Plan
    - C-43 reservoir operating with 178.6 kaf of storage operating between 20 to 42 ft NGVD; 9,380 acres; 1,500/1,200 cfs inflow/outflow capacity
    - C-43 reservoir used solely to meet EST05 targets in the Caloosahatchee estuary as in the C43 reservoir Phase I PIR
  - Based on the LOWCP P2TP ALT4 with refinements in the simulation of the Caloosahatchee watershed
    - Additional level of detail in conceptualizing the Caloosahatchee basin into Eastern and Western subbasins
    - Use of less boundary conditions to drive the model, e.g. backflows are now simulated relative to water level fluctuations in Lake Okeechobee
    - Additional performance indicator (Target Flow Index) to aid in the alternative evaluation process

Performance Measures

- An objective of the Caloosahatchee River Watershed Protection Plan is to reduce frequency and duration of harmful freshwater releases into the Caloosahatchee Estuary at the S-79 structure.
  - Number of Times Caloosahatchee Estuary High Discharge Criteria Exceeded (mean monthly flows > 2800 & 4500 cfs from 1970 – 2005)
    - Goal is to reduce the occurrence of high discharges to a frequency that approximate natural conditions.
    - Specific metric is to have three occurrences of mean monthly flows exceeding 2800 cfs (causes stress to the ecosystem); and avoid mean monthly flows in excess of 4500 cfs (causes severe damage).
  - Number of Times Salinity Envelope Criteria NOT met for the Caloosahatchee Estuary
    - Goal is to maintain salinity concentrations that are conducive to estuary ecology
    - Specific metric is to avoid mean monthly flows less than 450 cfs from October to July and three occurrences of mean monthly flows greater than 2,8000 cfs

Performance Measures (con't)

- The goal is to establish salinity range favorable to juvenile marine fish, shellfish, oysters and submerged aquatic vegetation;
  - A desired flow distribution (based on the EST05 flow time series) was established to achieve this goal.
  - A metric called target flow index (TFI) was formulated in order to measure deviation from the desired flow distribution. A value of zero signifies a perfect match to EST05. Progressively more negative index values are associated with flows deviating (either above or below) from the target.

Performance Indicators

- **Maintain other water-related needs for the other parts of the system; provides a way to evaluated water supply impacts of different alternatives.**
  - **Lake Okeechobee performance measures as used in LOWCP P2TP**
  - **Mean annual EAA/LOSA supplementation irrigation (4-in-1)**
  - **LOSA demand cutback volumes for 7 water years in the simulation period with the largest cutbacks**

- **Modeling Domain**

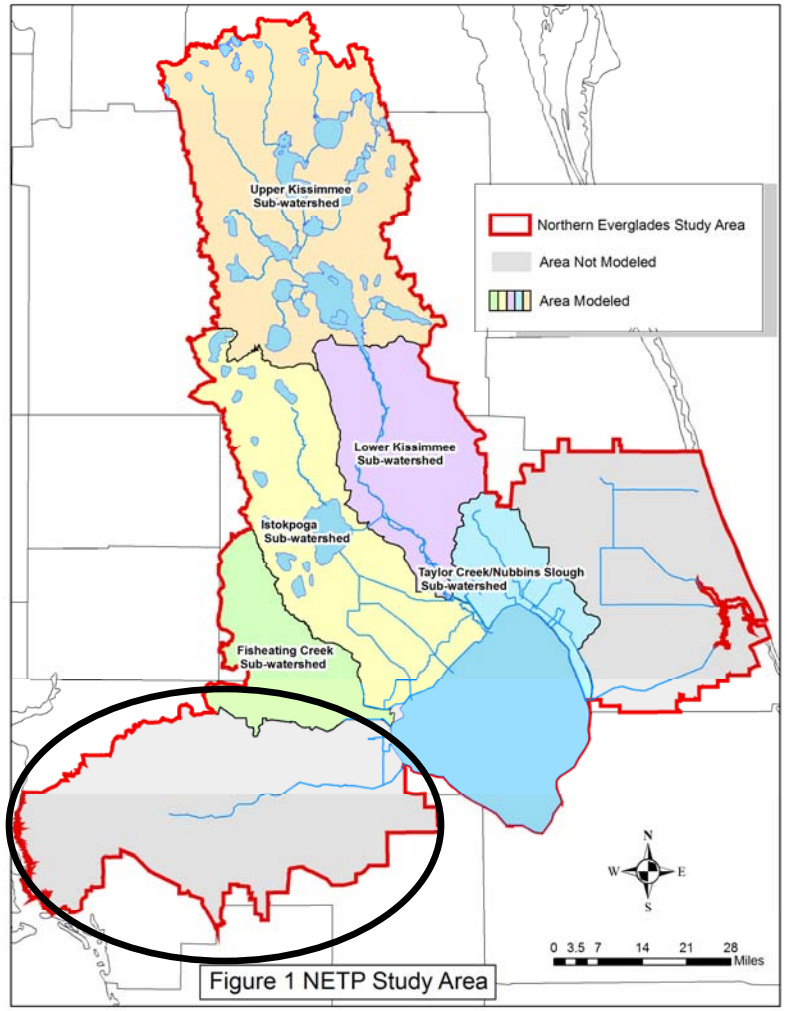


Figure 1 NETP Study Area

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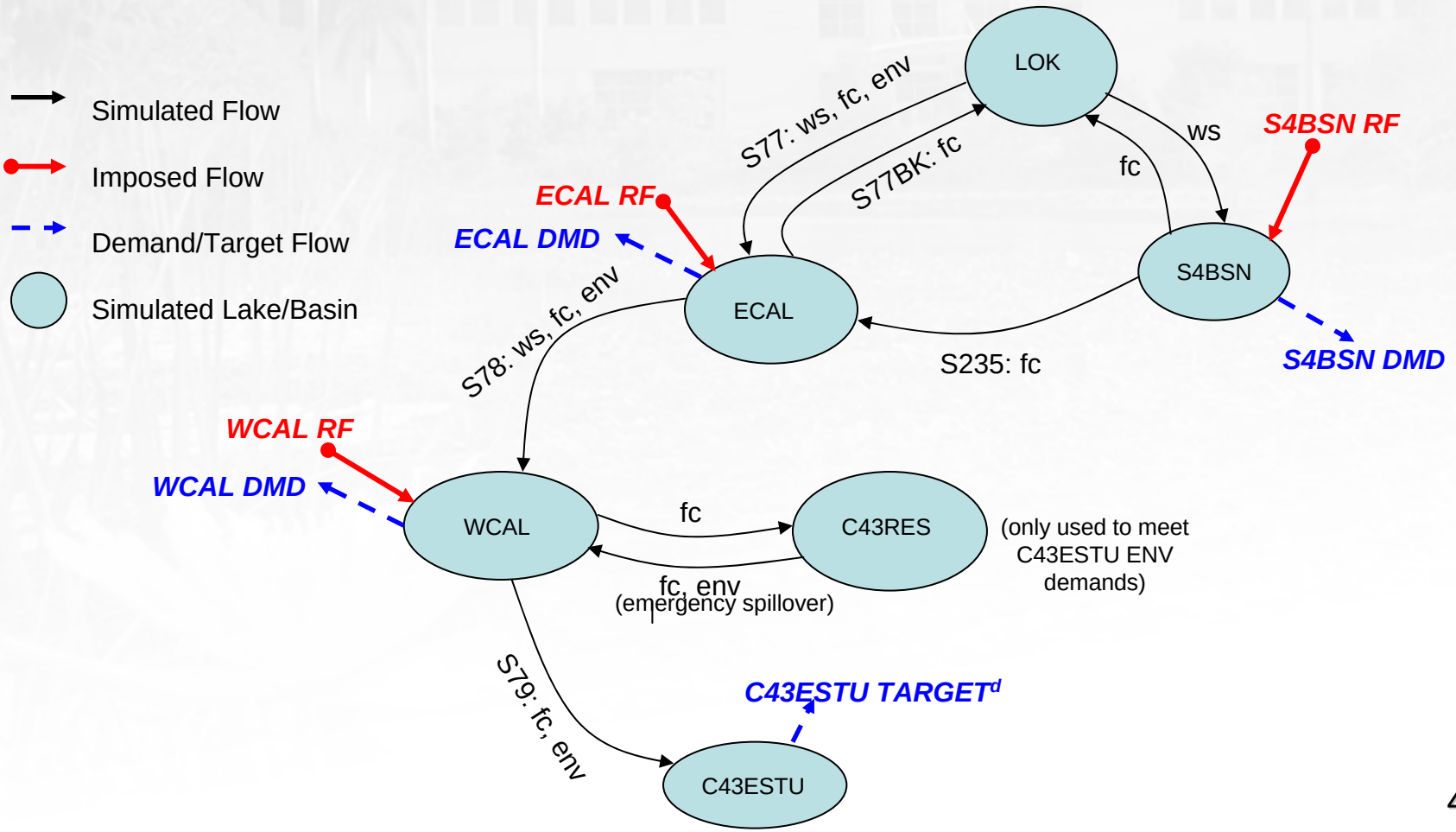
Node-Link Representation of the Caloosahatchee Sub-watershed in the NERSM for Draft CRWPP Base



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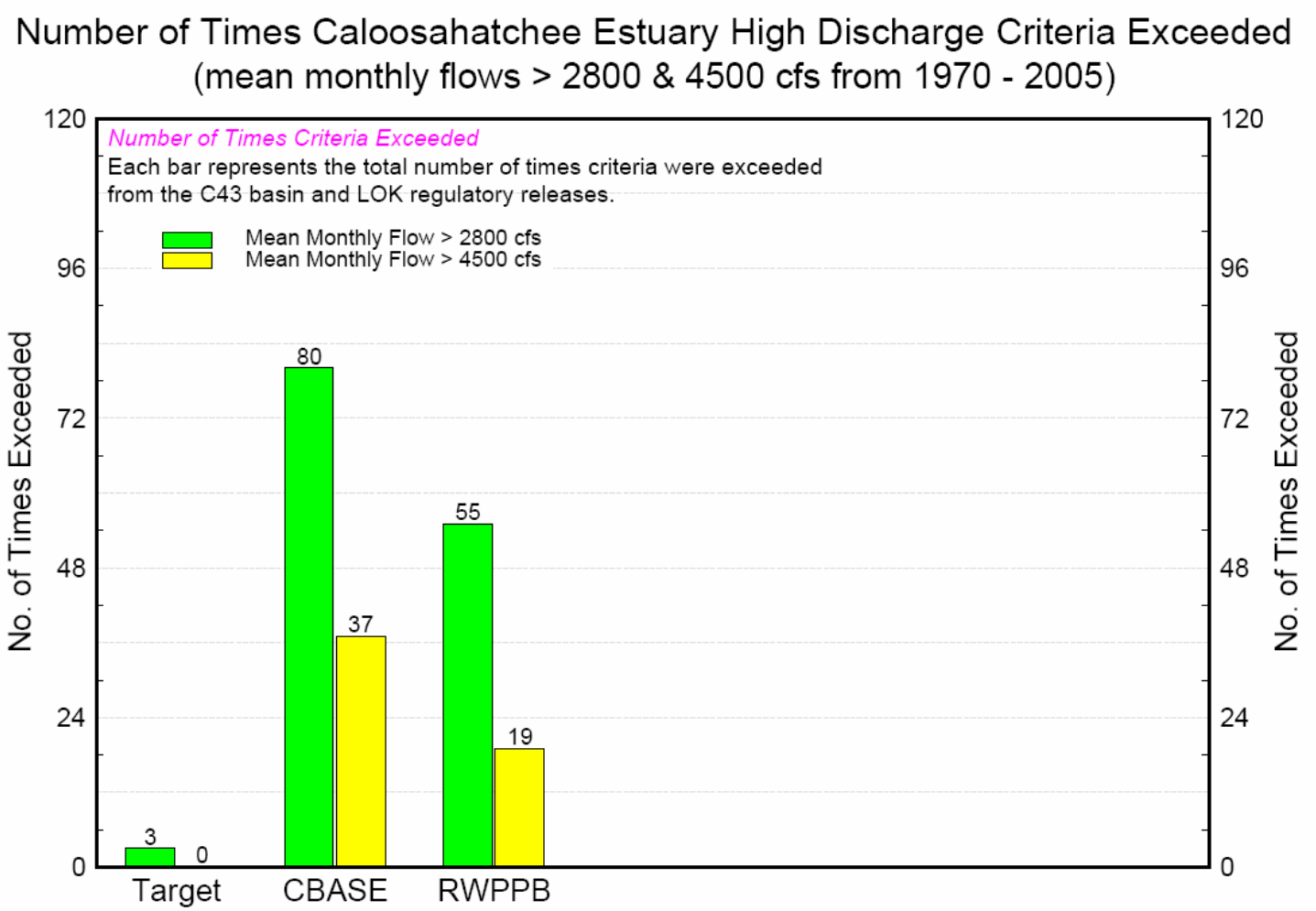
Initial Modeling Results

- Comparison of LOWCP P2TP Current Base Scenario {CBASE} and Draft CRWPP Base Run {RWPPB} using performance measures and indicators
- Alternative scenarios will be compared against CBASE and RWPPB incrementally as they become available

- **Recap: Scenario Comparison Using Performance Measures and Indicators**
  - **goal is to re-establish salinity regimes suitable for the maintenance of healthy, naturally-diverse and well-balanced estuarine ecosystems while meeting the other water related needs of the region including water supply.**
    - **Number of times C-43 Estuary High Q Criteria Exceeded**
    - **Number of times salinity envelope criteria NOT met for C-43 estuary**
    - **Target Flow Index for Caloosahatchee estuary at S-79**
    - **Water year (Oct-Sep) LOSA demand cutback volumes (7-worst years)**
    - **Mean Annual EAA/LOSA supplemental Irrigation: demands and demands-not-met (4-in-1 WS indicator)**


Number of Times Caloosahatchee Estuary High Discharge Criteria Exceeded
(mean monthly flows > 2800 & 4500 cfs from 1970 - 2005)
Number of Times Criteria Exceeded
Each bar represents the total number of times criteria were exceeded
from the C43 basin and LOK regulatory releases.
Mean Monthly Flow > 2800 cfs
Mean Monthly Flow > 4500 cfs
No. of Times Exceeded
120
96
72
48
24
0
3
0
80
37
55
19
Target
CBASE
RWPPB

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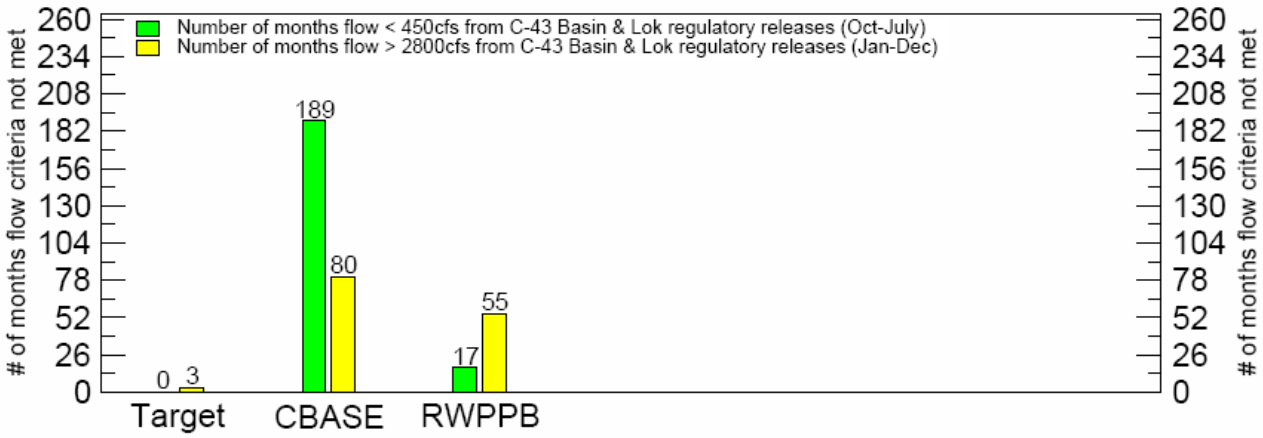
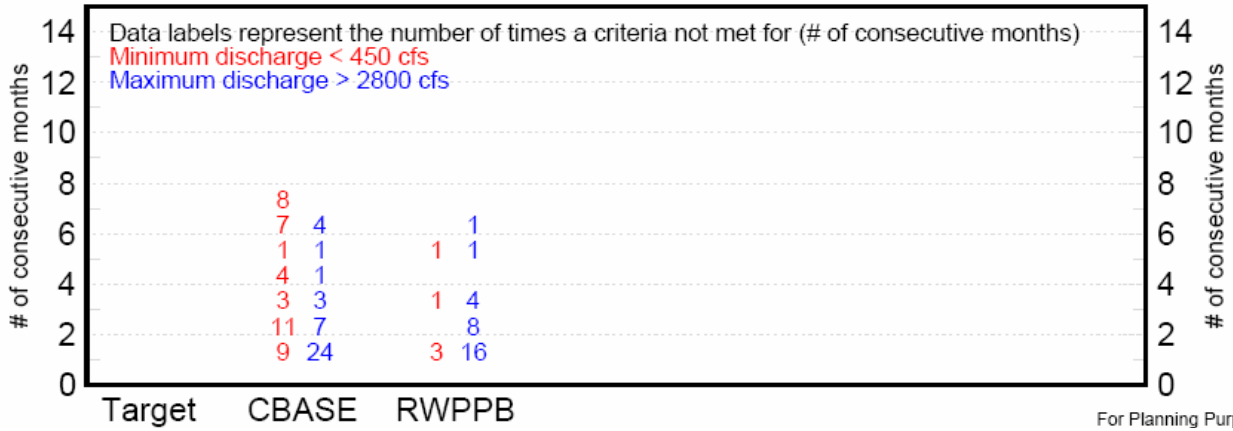
Number of Times Salinity Envelope Criteria NOT Met for the Caloosahatchee Estuary (mean monthly flows 1970 - 2005)





For Planning Purposes Only

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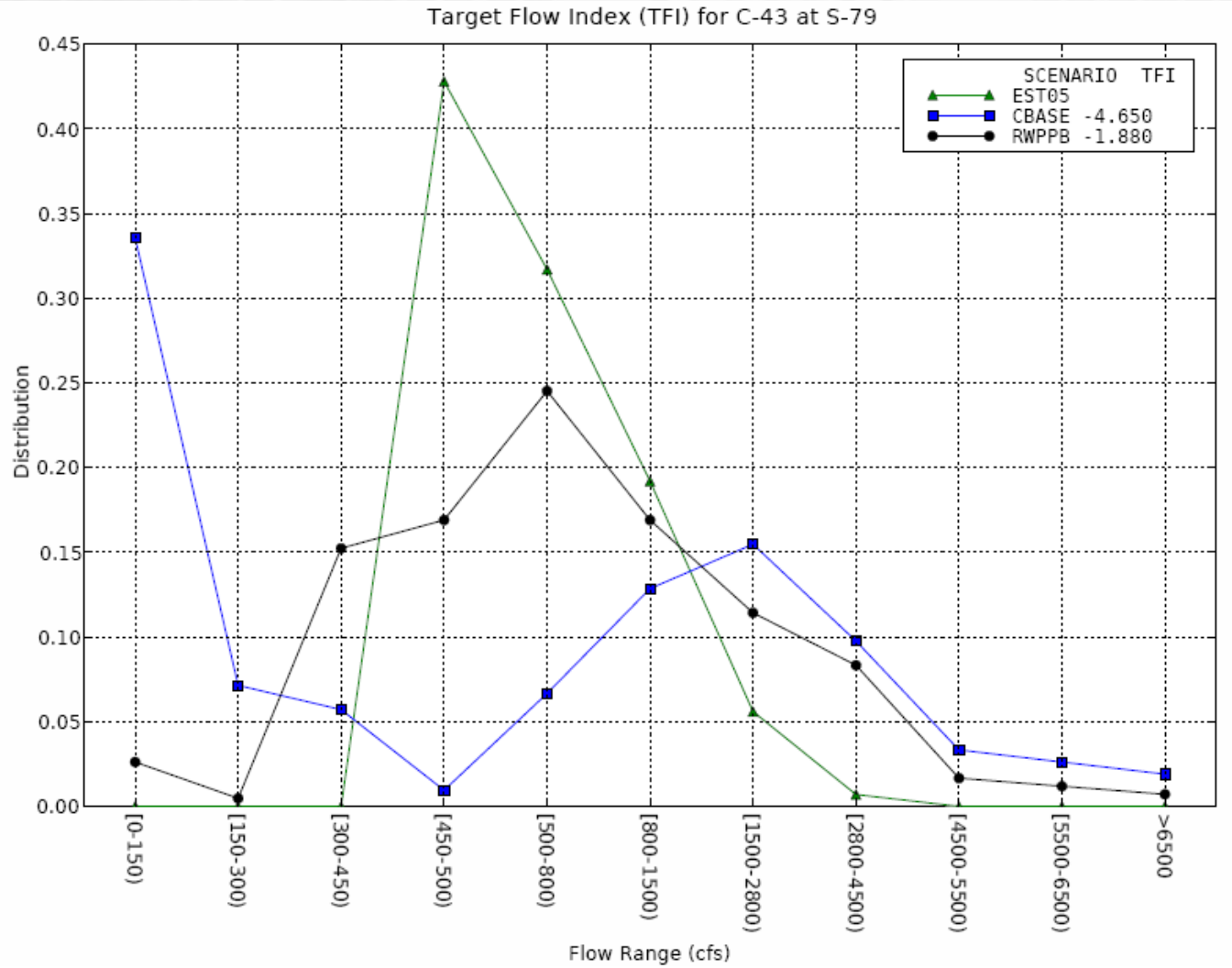
Target Flow Index (TFI) for C-43 at S-79
SCENARIO TFI
EST05
CBASE -4.650
RWPPB -1.880
Distribution
0.45
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
[0-150)
[150-300)
[300-450)
[450-500)
[500-800)
[800-1500)
[1500-2800)
[2800-4500)
[4500-5500)
[5500-6500)
>6500
Flow Range (cfs)

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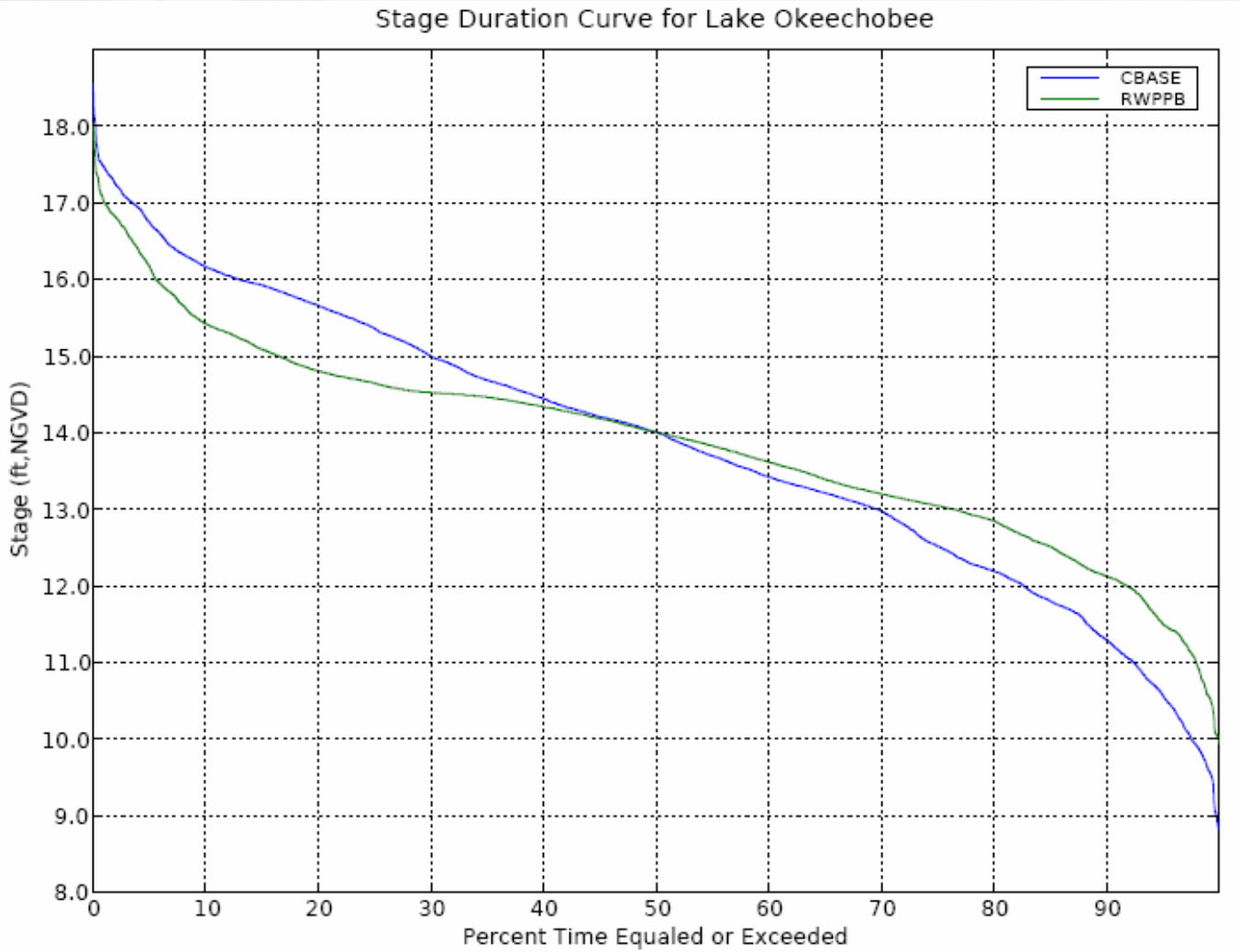
Stage Duration Curve for Lake Okeechobee
CBASE
RWPPB
Stage (ft,NGVD)
18.0
17.0
16.0
15.0
14.0
13.0
12.0
11.0
10.0
9.0
8.0
0
10
20
30
40
50
60
70
80
90
Percent Time Equaled or Exceeded

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Future Modeling Using NERSM

- Refinement of Draft CRWPP Base Run
- Integration with improvements in the St. Lucie River Watershed Protection Plan (SLRWPP) modeling efforts and use of Lake Okeechobee & SLRWPP-specific performance measures
- Alternative formulation, simulation and evaluation

- **Website: www.sfwmd.gov/northerneverglades**
- **Questions?**