

Modified Water Deliveries to Everglades National Park

**Incremental Approach to the
Integrated Operational Plan for the
MWD and C-111SD Projects**

July 16, 2014



Presentation Overview

- Purpose and Goals
- Summary of Effort
- S-356 Pump Test
- Increment 1: G-3273 Relaxation, S-356, S-357N
 - ▶ Operational Strategy
 - ▶ Monitoring Plan
 - ▶ Evaluation Methodologies
- Public Comment
- Next Steps/Closing Comments



Purpose and Goals

Purpose

- Layout the actions necessary to complete the MWD Project

Goals

- Understanding of scope, timeline, and dependencies of each Increment
- Technical discussion of proposed Increment 1



Background

- 1989 Congress passed the Everglades National Park Protection and Expansion Act.... 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.”
- Gage 3273 relaxation will allow for more water in NESRS; Pump Station 356 will mitigate for increased seepage
- S-356 is an authorized and constructed feature of MWD
- S-356 annual O&M costs run ~\$350K



Background

- All recent regional operational planning efforts for this part of the C&SF Project have recommended field testing S-356 to aid in determining real-time operational protocols, despite significant hydrologic modeling efforts conducted under each project:
 - ▶ Interim Operational Plan [IOP]: 1999-2002
 - ▶ Combined Structural/Operational Plan [CSOP]: 2003-2007
 - ▶ E RTP: 2009-2012



SUMMARY OF EFFORT



Summary of Effort

CURRENT OPERATIONS

- Everglades Restoration Transition Plan Environmental Impact Statement (EIS)
 - Implemented through the Water Control Plan (WCP) in October 2012
 - Preceded by Interim Operational Plan (IOP)
 - EIS and WCP do not have expiration dates
 - However, Biological Opinion expires January 2016
 - Formal consultation with USFWS must be completed by January 1, 2016 in order to continue under current operations



Summary of Effort

INCREMENTAL – PARALLEL APPROACH

- Increment 1
 - Field Test of S-356, S-357N with G-3273 constraint raised
 - L-29 Canal maximum operating stage remains at 7.5 ft NGVD
 - Dependent on completing 8.5 SMA seepage canal and S-357N (design in progress) within test period to maximize opportunity for data collection and analysis
- Outcome: Interim Operating Criteria



Summary of Effort

INCREMENTAL – PARALLEL APPROACH

- Increment 2
 - Field Test of S-356 with G-3273 constraint, and L-29 Canal maximum operating stage raised up to 8.5 ft NGVD
 - Continued operation of 8.5 SMA S-357N
 - Additional structures/components may be included
 - Dependent on acquisition of TTM RE Interests
- Outcome: Revisions to WCP (1st Increment); Interim Operating Criteria



Summary of Effort

INCREMENTAL – PARALLEL APPROACH

▪ INCREMENT 3

- Revise WCA/ENP/SDCS Water Control Plan (Vol. 4)
- Includes: MWD features, C-111 South Dade (Contracts 8 and 9), WCA-3A Rainfall Plan updates, additional 2.6 miles of bridges on Tamiami Trail and raising of TTM roadway, eliminated or constrained Column 2 operations, etc.
- Formulation efforts will be informed by information obtained from the Increment 1 and Increment 2 field tests.
- Outcome: Phased Implementation of operations



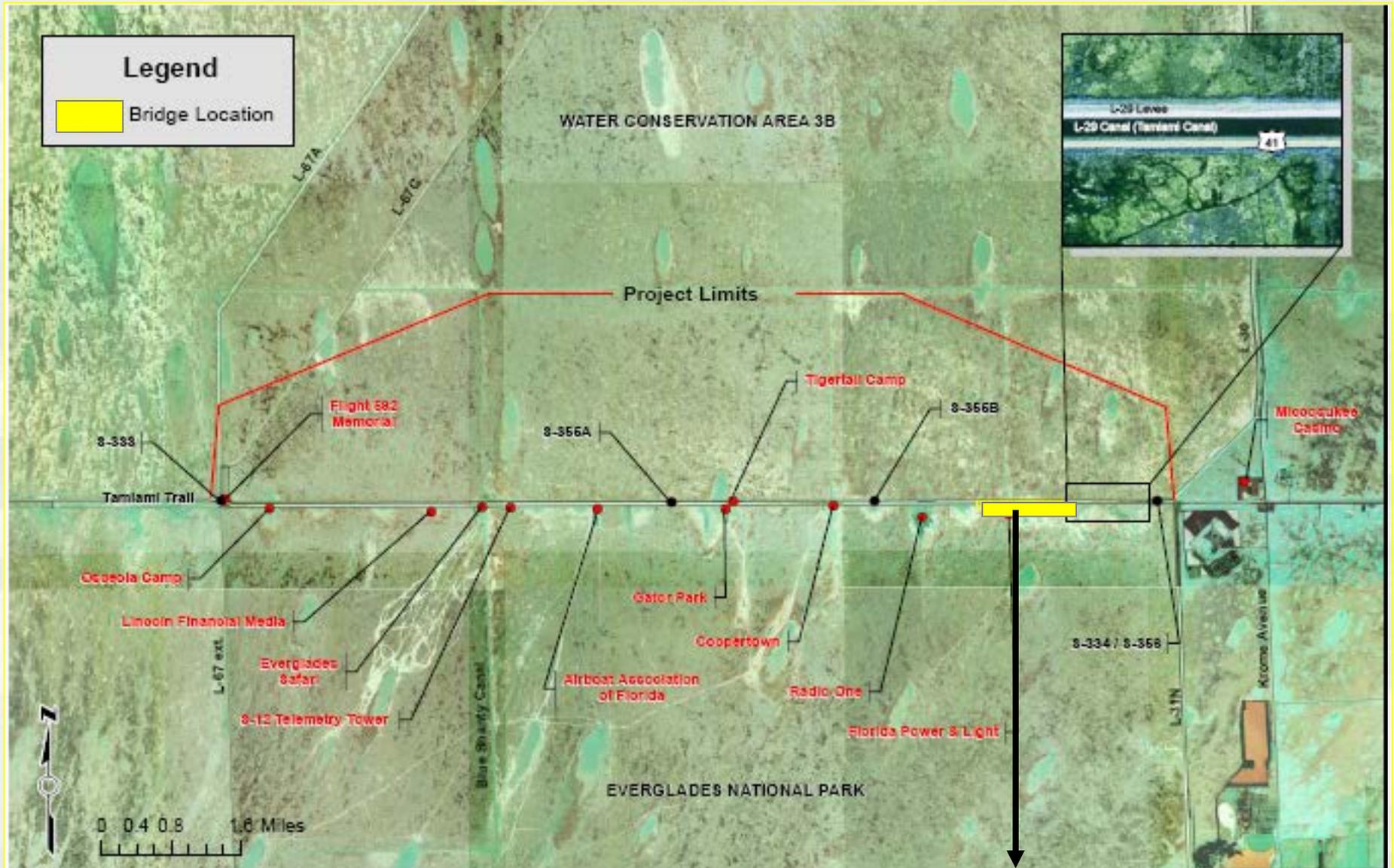
Summary of Effort

Key Dependencies

- Construction Dependent Milestones
 - Tamiami Trail 1 mile bridge (Dec 2013)
 - Transfer (end FY14)
 - Close Out (Dec 2014 – no issues)
 - 8.5 SMA Seepage Canal and S-357N Structure (Sep 2015)
 - C-111 South Dade Project - Contracts 8 and 9 (2016)
- Critical Path Dependencies
 - DOI/USACE Acquisition of real estate interests (Jan 2016)
 - Identification of water quality compliance criteria
 - Cultural resources
 - Endangered species



Real Estate - Locations



Summary of Effort

Cultural Resources

- Test must comply with legal requirements for cultural resources.
- Necessary to fulfill NEPA requirements

Technical Sub Teams

- H&H/Operations
- Water Quality
- Monitoring (Eco – Lead with H&H/Operations, Water Quality)



Summary of Effort

TIMELINE

Increment 1: Raise Current (ERTP) Operating Criteria for G-3273; Test S-356 and S-357N

- Planning Starts – 4th qtr 2014 (July)
- Testing commences – 2nd qtr 2015 (February)
- Complete – Minimum of 1 year or start of testing Increment 2

Increment 2: Raising of L-29 Stage

- Planning Starts – 3rd qtr 2015
- Testing commences – 2nd qtr 2016 (RE acquisition complete)
- Estimated Completion – 2nd qtr 2017

Increment 3: Revision of WCA/ENP/SDCS WCP (Vol. 4)

- Scoping and Model Development Starts – 1st qtr 2015
- Estimated Completion – 3rd qtr 2018



Timeline: Draft Schedule to Revised Water Control Plan

Task	FY 2014				FY 2015				FY 2016				FY 2017				FY 2018				
	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	
8.5 SMA	8.5 SMA CONSTRUCTION MODIFICATIONS COMPLETE																				
Tamiami Trail	TTM Construction Complete	TTM Transfer Complete		TTM Close Out - No Issues																	
ERTP BO	ERTP BO - Expires January 1, 2016								Solution for expiring BO to be determined												
MWD Real Estate	Acquisition of Real Estate Interest of AAoF (USACE) and Salem Communications, FPL, Cooper Town, Everglades Safari, Gator Park, and Financial Radio Tower and complete NPS NEPA document (DOI)																				
S-366 Pump Test			Develop Pump Test Criteria and 14-Day Test																		
Increment 1: G-3273 and S-356, S-357N Operational Field Test	Coordinate Initiation of Test with Agencies and Tribe RE Analysis		G-3273, S356, S357N Test Development; associated NEPA (~6 mo).		* Perform 1st Increment - 1 year min. Data Analysis and periodic operational adjustments.				TEST EVAL REPORT	Interim Ops Criteria, Struct Trans, FDEP Permit											
Increment 2: L-29 with G-3273 and S-356, S357N Operational Field Test								Develop GOC, Operating Strategy, Monitoring Plan for 2nd Increment; associated NEPA.		** Perform 2nd Increment - 1 year min. Data Analysis and periodic adjustments. RE Acquisitions must be complete.				TEST EVAL REPORT	Interim Ops Criteria, Modified FDEP Permit						
Increment 3: Revision of WCA/ENP/SDCS WCP (Vol. 4)	Coordinate Initiation of Operating Plan		Operating Plan Scope and Modeling Tool Development				***Operating Plan Development - incorporate 1st Increment test results and 2nd Increment development information.				Duration dependent on Scope				14 months	ROD, Revised WCP Vol 4					

* 1st INCREMENT MAY CONTINUE UNTIL INITIATION OF 2nd INCREMENT

** ALL RE MUST BE ACQUIRED PRIOR TO BEGINNING 2nd INCREMENT/ 2nd INCREMENT MAY CONTINUE UNTIL INITIATION OF OPERATING PLAN

*** ONE YEAR OF 2nd INCREMENT TESTING NEEDED PRIOR TO INITIATION OF INCREMENT 3: REVISION OF WCA/ENP/SDCS WCP (Vol. 4)

G-3273/S-356 Field Test

Goals/Objectives

- Collect technical information needed to support development of an update to the Water Control Plan for the WCAs, ENP, and the ENP-SDCS (Increment 3) for the MWD and C-111SD Projects.
- Apply an adaptive management approach, with continuous monitoring and assessment to support periodic operational adjustments, as needed.
- Reduce risk and uncertainty for multiple project purposes
 - ▶ Ecological responses and water quality in ENP;
 - ▶ Changing water levels in WCA 3A and 3B;
 - ▶ Levels of service for water supply and flood protection in Miami-Dade County;
 - ▶ Flood mitigation performance for the 8.5 SMA



G-3273/S-356 Field Test

Goals/Objectives

- Improve hydrological conditions in NESRS and increase water deliveries from WCA-3A to NESRS, while maintaining other C&SF Project authorized purposes
- Use the S-356 pump station to mitigate for effects of the incremental increase in seepage from NESRS to the L-31N Canal resulting from raising the G-3273 stage (Increment 1) and L-29 Canal (Increment 2) stage criteria
- Improve hydrological conditions in NESRS and WCA-3A by maximizing the flexibility and efficiency of the existing infrastructure, including use of seepage management to complement inflows to NESRS from WCA-3A



G-3273/S-356 Field Test

Goals/Objectives

- Gather and analyze ecologic, hydrologic and water quality data from each increment sufficient to support the next, resulting in:
 - ▶ Transfer of MWD features to the SFWMD as the local sponsor;
 - ▶ Data gathering sufficient to support FDEP permitting requirements;
 - ▶ Operating criteria for the MWD and C-111SD projects; and
 - ▶ Updates to the 2012 USACE WCP for the WCAs, ENP, and the ENP-SDCS
- Fulfill National Environmental Policy Act, Endangered Species Act and National Historic Preservation Act requirements as they relate to each increment



PUMP TEST



2006 S-356 Pump Test

- Objective: To acquire hydrologic data on how the existing system responds to S-356 pumping.
- Due to the Pump Test's limited 8-day duration, no definitive conclusions could be reached
 - ▶ Pumping at S-356 while under a closed system allowed for drawdown of the L-31N canal.
 - ▶ This drawdown created only a slight increase in L-29 canal stages.
 - ▶ Neither L-29 nor L-31N levels were significantly affected by the single 125 cfs pump.
 - ▶ Noticeable change in L-31N stages was evident after starting two pumps totaling 250 cfs.
 - ▶ Stages in WCA-3B and NESRS were not significantly affected by pumping and continued to recede (Note: S-333 closed during test).
 - ▶ Conclusions cannot be drawn specifically to whether seepage was successfully being captured by S-356.
- It was recommended that further testing of a longer duration be conducted to gain more information



2014 S-356 Pump Test

- No change to current operations
 - ▶ ERTP G-3273 (6.8') and L-29 (7.5') constraints in place
- One continuous 14 day operational test
- Evaluate pumping limits, mechanical operation of structure
- Test compliance of new equipment with air quality standards
- Test sufficiency of existing monitoring wells to determine pump limits on operations
- Document with a Record of Environmental Compliance



OPERATIONAL STRATEGY



8.5 Square Mile Area – S-357N

S-357N

- Included in the 2012 Design Refinement 8.5 SMA Environmental Assessment which addressed 8.5 SMA southwest corner
- To be constructed by September 2015
- Connects newly constructed seepage collection canal (C-358) to C-357, is upstream of S-357
- S-357N interim water management operating criteria to be developed by H&H/Ops Sub-team



Increment 1

- Field Test of S-356, S-357N with G-3273 constraint raised
- L-29 Canal maximum operating stage remains at 7.5 ft NGVD
- Dependent on completing 8.5 SMA seepage canal and S-357N (design in progress) within test period to maximize opportunity for data collection and analysis

- Outcome: Interim Operating Criteria



**WCA-3B CLOSE S-335
CLOSE S-355A/B**

1: S-333

WCA-3A FLOW

2: S-355A/B

3: S-356

**CLOSE S-356
SEEPAGE**

**CLOSE G-211
& S-338**

G-3273/S-356 & MWD

2012 ERTP EIS (Table ES-1):

- S-333: If G-3273 < 6.8 feet NGVD
 - ▶ Column 1: “Rainfall Plan target flow for S-333 (to NESRS)”
 - ▶ Column 2: “Rainfall Plan target flow for S-333 (to NESRS), plus as much of the remaining Rainfall Plan target flow that the S-12s cannot discharge to be passed through S-334 and subject to capacity constraints...”
 - ▶ When WCA 3A is in Zone E1 or Zone A, maximum practicable through S 333 to NESRS” (Column 1 and 2 operations)
- S-333: If G-3273 > 6.8 feet NGVD
 - ▶ Column 1: “Closed”
 - ▶ Column 2: “Match S-333 with S-334 flows”
- L-29 Borrow Canal: ”In order to raise the L-29 Borrow Canal above 7.5 feet, NGVD additional NEPA would need to be completed.”
- S-356: “When conditions permit (i.e., G-3273 and L-29 constraints), discharges from S-356 will go into L 29. Pumping will be limited to the amount of seepage into L-31N in the reach between S-335 and G-211. A technical team will evaluate pumping limits and operations.” (Column 1);
 - ▶ Column 2 operations includes the additional condition of no S-334 releases



G-3273/S-356 & MWD

IOP 2002 and IOP 2006:

- S-356: Column 1 and Column 2 criteria are the same as ERTTP (ERTTP retained from IOP)
- “Operational guidance for S-356 will use the recommended plan operation criteria as a starting point, and field tests will be conducted to further define and refine such criteria. Consequently, a series of tests during the dry and wet season are necessary to aid in refining these criteria.” (2006 IOP FSEIS p.19)

1992 MWD GDM:

- The S-356 pump station would “provide a means of controlling additional inflows to L-31 N borrow canal caused by increased seepage into the canal...” (1992 GDM p. 69)



Increment 1: Strategy & Objectives

- Water Management Operational Criteria:
 - WCA-3A Regulation Schedule (including Rainfall Plan)
 - Maintain L-29 canal stage at or below 7.5 feet
 - Maintain L-31N and SDCS canal levels consistent with 2012 WCP, including both Column 1 and 2 operations
- Use existing gages as part of field test monitoring plan
- Assess water quality as part of field test monitoring plan
- Monitor effects of G-3273 incremental stage increase

All stages in NGVD29 unless otherwise noted.



Constraints

- Agency and stakeholder input will be taken through regularly scheduled calls
- USACE assessment of hydro-meteorological conditions, with USACE consideration of agency and stakeholder input, may suspend or discontinue the field test
- Maintain the multiple purposes of the C&SF Project to provide flood control, water supply for municipal, industrial, and agricultural uses, prevention of saltwater intrusion, water supply for ENP, and protection of fish and wildlife
- S-333/S-355s/S-356 inflows to L-29 canal conducted to not exceed maximum stage of 7.5 feet
- S-356 will not be operated if G-3273 < 6.8 feet
- S-356 can be operated above 6.8 feet (H&H/Ops Sub-team to define)

All stages in NGVD29 unless otherwise noted.



Constraints (continued)

- Triggers and criteria assume 8.5 SMA operated according to 2012 IWCP; if not feasible, triggers and criteria will be revisited and adjusted accordingly
- 8.5 SMA detention cell water depth consistent with revised future 8.5 SMA Draft IWCP
- C-111SD SDA water depth consistent with IOP 2006
- To ensure urban stormwater would not be pulled in from the east (C-4 basin) by the S-356 into ENP, operation of S-356 would be limited
- Potential effects of the field test on wildlife resources, including threatened and endangered species, will be coordinated with FWS and FWCC
- Forecasted rainfall or exceedance of other pre-determined test constraints may require temporary suspension or modification to the field test



Constraints on Maintaining G-3273 up to 7.5 ft NGVD

- USACE may suspend or discontinue maintaining G-3273 up to 7.5 ft NGVD based on, but not limited to, the following:
 - ▶ Water Quality
 - ▶ Anticipated forecasted rainfall
 - ▶ Approaching tropical event
 - ▶ L-29 Canal stage anticipated to exceed 7.5'
 - ▶ S-356 pump availability
 - ▶ S-331 pump availability
 - ▶ S-176 opening anticipated
 - ▶ Water supply deliveries to the South Dade Conveyance System

All stages in NGVD29 unless otherwise noted.



Operational Strategy Overview

- Intent is to utilize S-333 and S-355A/B (pending separate permit process) to increase flows to NESRS/stage at G-3273
- S-333 is main driver to achieve up to 7.5' at G-3273
- S-356 used to mitigate for the incremental increase seepage to L-31N
- Maintain 7.5' in L-29 Canal
- 8.5 SMA not to be negatively impacted
- No reduction in WCP WCA-3A releases
- Use current 2012 WCP operating criteria except S-333/S-334 matching of flows (Column 2) to occur less frequently

H&H/Ops Sub-team to define:

- Constraints on incremental G-3273 increase from 6.8' up to 7.5'
- S-356 pumping start before S-338/G-211 opens
- Operating criteria for new S-357N/C-358

All stages in NGVD29 unless otherwise noted.



Operational Strategy 8.5 SMA

- Current 2012 WCP operating criteria in effect at S-357 and S-331
 - S-357 (500 cfs capacity) is used but constrained to 125 cfs (SW corner)
 - S-331 also used if S-357 pumping is restricted due to water levels in southwest corner of 8.5 SMA
- When S-357N construction complete, S-357N operating criteria and C-358 to allow S-357 to pump more than currently, but will also prevent drainage of ENP lands at western end of C-358



MONITORING PLAN



Field Test Species Monitoring

- In accordance with the Terms and Conditions within the FWS 2010 BO on ERTP, USACE is required to provide an annual assessment of ERTP operations.
- USACE will continue existing hydrologic and species monitoring plans to ensure that the Incidental Take as defined within the FWS 2010 BO is not exceeded.
- USACE proposes additional monitoring to measure potential hydrologic impacts within CSSS subpopulations (CSSS-E and CSSS-F) and wood stork colonies located adjacent to Tamiami Trail and within NESRS (TT-West, TT East 1, TT East 2, and Grossman Ridge West).
- Proposed monitoring has been adapted from ERTP performance measures and reinitiation triggers defined in the FWS 2010 BO. Proposal to be shared with ENP and FWS for input and concurrence.

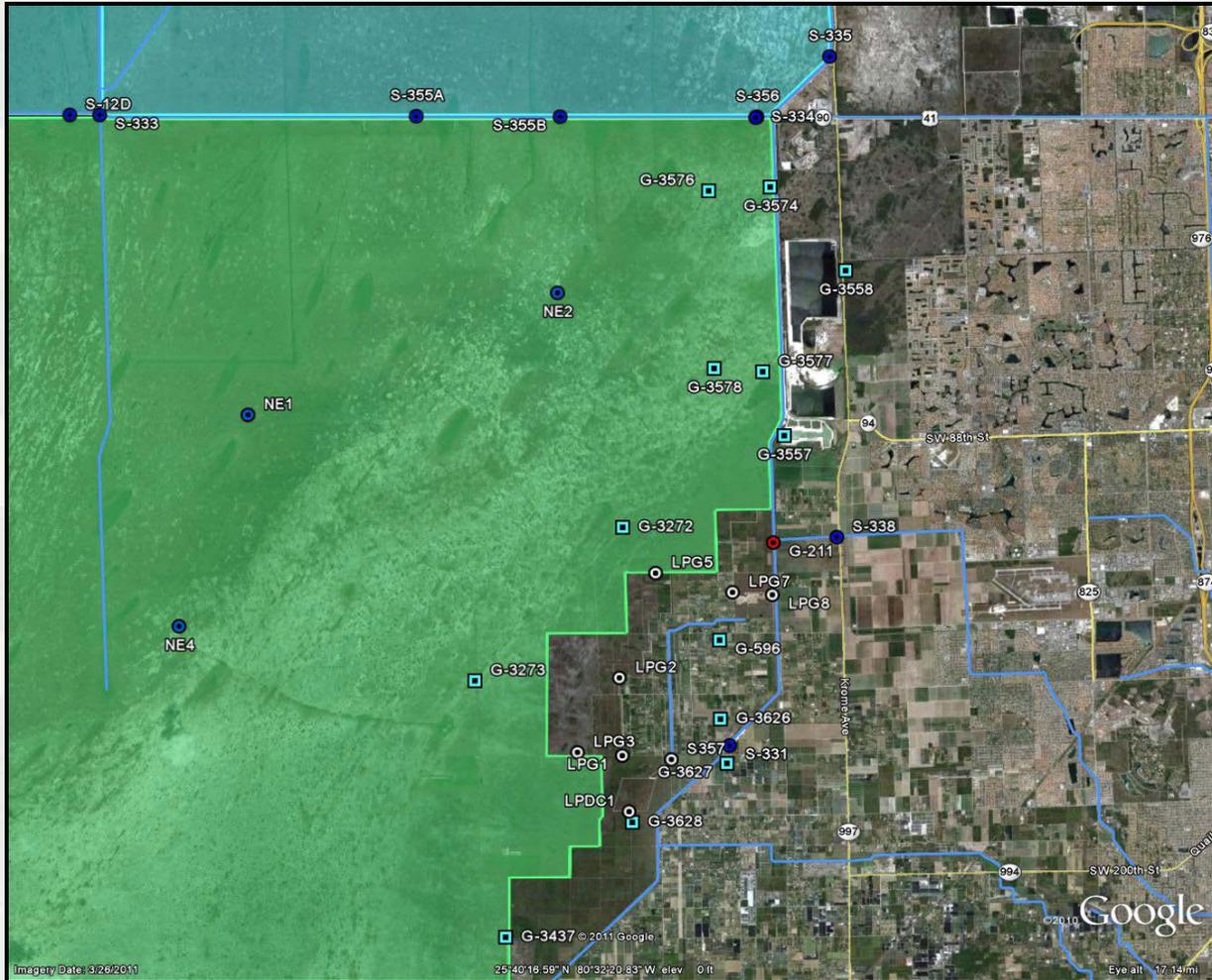


Monitoring Plan

- Will use existing groundwater and surface water monitoring instrumentation and locations or wells
- Multi-agency effort – Resources provided by SFWMD, USACE, ENP, USGS, possibly also Lake Belt MDLPA
- Real-time data are available – SFWMD DBHydro database, USACE seepage management portal



Surface Water Level and Flow



30 monitoring points at structures and gages

Measure stage and discharge



Groundwater Level and Flow

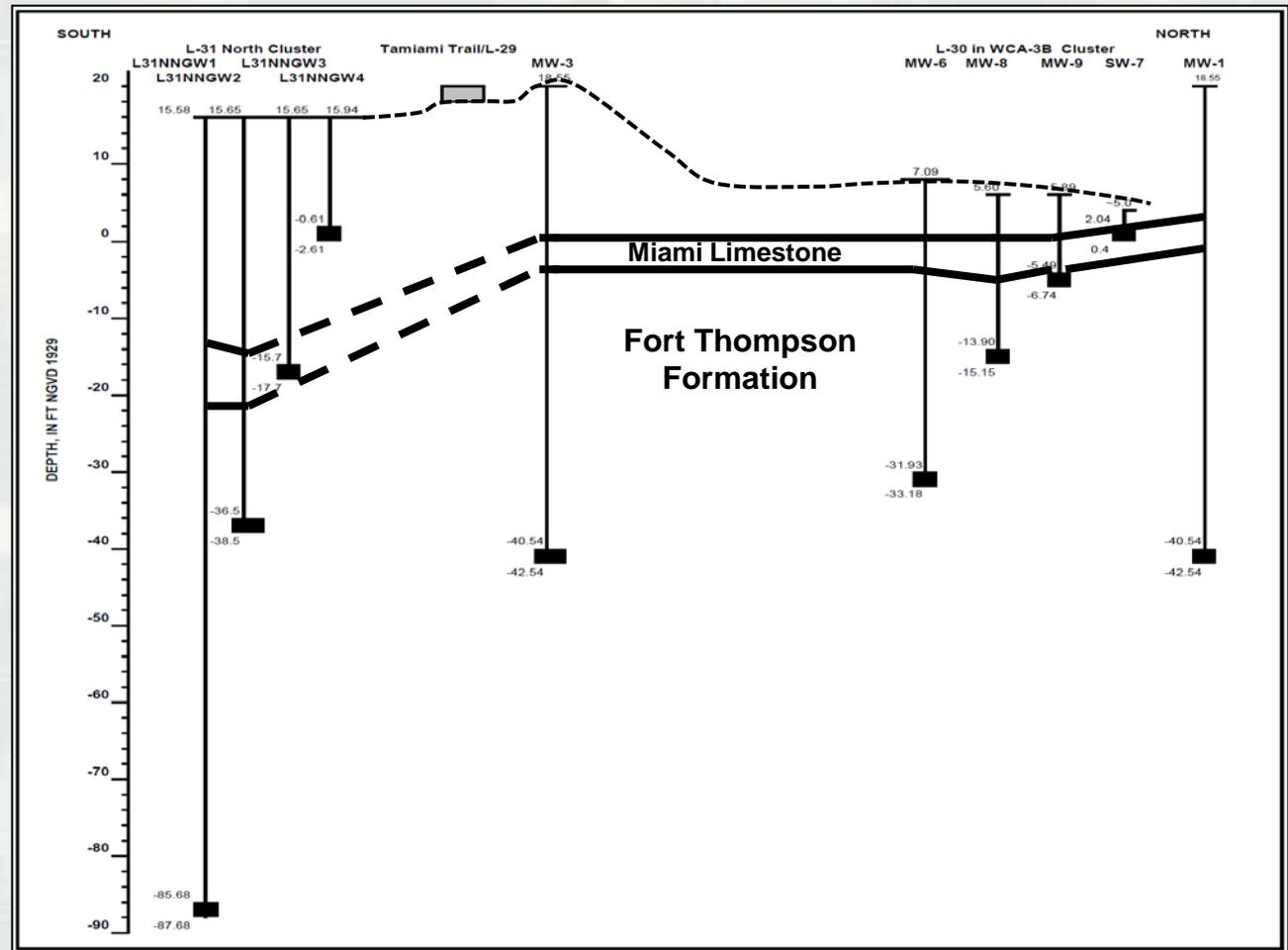


L-31N to L-30 Transect

- Level
- Flow rate
- Flow direction
- Temperature
- Specific Conductance

Real-time monitoring

<http://I30I31.dri.edu>



EVALUATION METHODOLOGIES



S356/G3273 Water Quality Evaluation Methodology

Two Components:

- 1. NEPA WQ Evaluation**
- 2. Operational Evaluation**

NEPA WQ Evaluation

Goal:

Develop WQ operational constraints for Test Increments that provide reasonable assurance but are also sufficiently flexible to allow comprehensive testing during most potential relaxation flow periods. The initial constraints are intended to be modified as each increment is completed.

Approach:

1. Develop potential operational scenarios for S333 / S356 and evaluate impact on Appendix A FWM calculations using historic data. Perform analysis by incrementally increasing historic flow at S333 and check FWY FWM vs LTL. Identify months where additional flow at S333 is unlikely to result in adverse impact to Appendix A calculation.

2. For months with potential for adverse impact to Appendix A per analysis in #1 above, analyze historic data to identify specific environmental conditions (for example, WCA-3A stage, lagging TP concentrations, cumulative WY flow, etc.) that indicate that additional S333 flow during these months is unlikely to adversely impact Appendix A compliance as long as the particular conditions are met.

3. Identify a set of WQ triggers based on #1, #2 above that when applied will provide the “reasonable assurance” that the relaxation flows will not cause or contribute to Appendix A exceedance.

Operational Evaluation Goal

G3273 / S356 Pumping Rule Development (timing, quantity)

- Flow / Stage Conditions/Constraints:

- » Examples: L-29 stage, G-3272 stage, season, WCA-3A stage, S-333 flow, CSSS nesting conditions, etc.

- Water Quality Conditions/Constraints:

- » Possible factors for operation: WCA-3A TP, S-333 TP, Season, Climate conditions, S-335 TP, S331 TP, WCA-3A Stage (surrogate for WQ), rolling Appendix A calculation, etc.

(Focus is on WQ as the other conditions/constraints are defined in the Ops plan and elsewhere.)

Operational Data Overview

TWO DATASETS:

Baseline Data: (collected when S356 is not operating and G3273 not relaxed)

Testing Data: (collected during S356/G3272 relaxed)

MONITORING LOCATIONS:

- Surface Water (Stage, Flow, WQ): At least 7 structures
- Groundwater Wells (Stage, flow, direction, field WQ): 23 wells
- ADCP (flow): 7 transects proposed for Increment 0, (assumed to be operational for Increments 1-3).

Approximately 100 different data streams (stage, flow, WQ) measured during testing and non-testing periods. Potentially 5,000 graphical comparisons could be generated. Most of these are probably not useful, so need to focus analytical efforts.

Operational Analysis Plan

- Perform comparisons for key relationships (monthly, and/or annual analysis)
 - Synoptic Comparisons
 - Baseline vs Testing Comparisons

Key Relationship Examples:

- S356 FWM vs S333 FWM, S356HW vs S356 FWM, S356 FWM vs L-31N transect flow, GW flow direction vs S356 flow vs G3273, GW flow direction vs S356HW, L31N Gradient (S356HW-G211HW) vs S356 flow / TP, S333+S356 flow vs NESRS Marsh TP stations.
- Perform Appendix A FWM calculation for actual flows and for estimated non-test flows (subtract out relaxation flows using G3273 stage as indicator).
 - Federal Water Year
 - Rolling 12 Month calculation (monthly, quarterly)
 - Compare with testing to theoretical without-testing condition to determine impact on Appendix A.
- Refine WQ Triggers using new data.

What we hope to learn?

- Where do the S356 flows come from and go to? How much recycling at this pump occurs?
- What months of S356 operations / G3273 relaxation are preferable from Appendix A and other WQ criteria?
- How much additional flow at S333 is advisable from Appendix A perspective.
- Relationship between S356 pumping rates and flows / stages at critical locations such as S333, S356 TW, G-3273, L-31N transects, L-29.
- Ecological Impact in NESRS of additional flows.

PUBLIC COMMENT



Pertinent Structures and G-3273

