Freshwater Inflows
Biscayne Bay Coastal Wetlands

Are All Flows Equal?

Melody Hunt
GEER 2018
BISCAYNE BAY COASTAL WETLANDS

Improve quantity, quality, timing and distribution of freshwater inflow to Biscayne Bay.

Improve nearshore salinity conditions

Phase 1

Deering
Cutler Flow-Way
L31E Flow-Way
OBJECTIVE

HYDROLOGIC BASED

- Data Evaluations
- Assessment Relative to Salinity Targets / Expectations

When are targets currently met?

How to manage inflows to achieve targets in future?
APPROACH

- SE Coastal Rainfall
- Managed flows by structure
  - S20F, S21A, S21
- Nearshore Salinity
  
  Scales
  1) Long (POR) & Short-term (2015-2018)

2) Annual, Season & Month
SALINITY TARGETS

Daily Average Salinities

WBZ

• < 30 (Throughout year)
• 15 - 25 (March – Aug.)
RAIN DATA

NOAA / NCDC maintains long-term climate set
- 1895 - 2018 (>120 Yrs)

Network of established stations
- computational approach & climatologic interpolation

Division 6 (SE Coastal)
SE COASTAL RAIN: ANNUAL

Division 6
Average = 57.27 "(2008)

DIFERENCE FROM AVERAGE
PERCENTILE RANK

RAIN: SEASONAL/MONTHLY

EVER SE Rain 1895-2018

High Extremes
2015 Dec.*
2016 Jan.
2018 May *

Low Extremes
2016 April
2016 May
2016 Oct

IRMA-Sept. 2017
UPPER L31 E Flow-Way (S21A)

Project Components in Place Along L31 E

2010-2012: 4 Culverts

2018: 6 Culverts
MONTHLY FLOW: S21A

Flows Through S21A 1980-2018

- 1980-2019
- 2015
- 2016
- 2017
- 2018

2015
Late Dry Season: Low
Early Wet Season: Low

2016
Dry Season: High
Wet Season: Mod.

2017 (IRMA)
Late Dry: Low
Early Wet: Mod-High

2018
Late Dry Season: High
Wet Season: Mod-Low

Extremes: Highs and Lows
Highs: Dec 2015; Feb-April 2016
June 2015
FLOW & SALINITY 2015-2018

Flow S21A

Bisc B4

Salinity

Sum AcreFeet/Month


0 5 10 15 20 25 30 35 40 45


0 10000 20000 30000 40000 50000
LOWER L31 E Flow-Way (S20F)

Some capacity to move water into Lower L31 E Flow-way to raise stage, provide water to wetlands

- Late 2014-2015: Testing with Temporary Pumps
- April 2017: Interim pump installed
MONTHLY FLOW: S20F

2015
Late Dry Season: Low
Early Wet Season: Low

2016
Dry Season: High
Wet Season: Mod.

2017 (IRMA)*
Late Dry: Low
Early Wet: Mod-High

2018
Late Dry Season: High
Wet Season: Mod-Low

Some Extremes
High: Feb-April 2016; Sept 2017
Lows: May-June 2015
INFLOWS: ANNUAL 2015-2018

2016 and 2017 Comparable Annual Canal Inflows
Different Annual Rainfall

(acre-ft)
INFLOWS: JANUARY- MAY

Flows through dry season each structure:
2015 and 2017 comparable
2018 and 2016 higher

(Kacre-ft)
RAIN SUMMARY

Rainfall 120 Year Record

2017 (>80%)
2015, 2016, 2018 (<40%)

Last 20 Yrs: No Annual Extremes

Last 4 Yrs: Several Monthly Extremes
Dec 2015, (Jan 2016) May 2018
STRUCTURE FLOW SUMMARY

Flows ~40 Years Record

Flows Through Dry Season at Structures:
2015 and 2017 comparable
different annual flow
2018 and 2016 higher dry
season flows

Some Monthly Extremes s20F
High: Feb-April 2016; Sept 2017
Lows: May-June 2015
Nearshore Salinity 20 Year Project record

- 2016 & 2018 Within/Near Target Ranges (Monthly) despite below average annual rain (<40%)
- 2017 – Not within target ranges despite large annual flows and rainfall
CONCLUSIONS

**Annual Expressions** – (e.g. Targets/ Performance Measures) not adequate to quantify rainfall, water delivery, or assess project expectations

**Rain** - seasonal or monthly analyses needed for predicting or measuring performance (e.g. last 4 years as example)

**Inflow**- Closer look at individual structures and delivery to project features on component basis. Move away from annual delivery estimates.

**Salinity** - Comparable Flow-Salinity Targets (e.g. Month- Month)

**Resiliency**- meeting targets future conditions
- Start Adaptive Management
- Climate Variability and Change – monthly extremes
- Sea- Level Rise – Project location
MORE TO DO.....

- L31E Stages
- Assess Monthly Conditions Over Longer Periods
- Comparable Flow-Salinity targets