Presentation Objectives

• Describe the salinity performance measure for Florida Bay
• Describe the use of the PM in determining the best restoration alternative for Florida Bay from the suite of the Central Everglades Planning Project alternatives
Florida Bay Salinity Estimates

2 Steps:

1. Predict stage in the Everglades for each planning alternative using Regional System Model (RSM) hydrologic model

2. Translate predicted stage in Everglades to salinity in Florida Bay using Multiple Linear Regression models (MLRs include stage, wind, sea level)

- □ = bay salinity sites
- ● = wetland stage sites
- ○ = wind sites
- ▲ = sea level (at Key West)
Target Setting

3 Steps:

1. Predict stage in the Everglades for each planning alternative using Natural Systems Model (not RSM).

2. Translate predicted stage in Everglades to salinity in Florida Bay using MLR models (MLRs include stage, wind, sea level).

3. The NSM/MLR salinity predictions are then adjusted using paleo-salinity information provided by Lynn Wingard (USGS).
Florida Bay Salinity Performance Measure Basics

Three component metrics:

1. Regime Overlap: the distribution of the restoration alternative salinity record is compared to the target salinity distribution between the 25th and 75th percentiles (mid range); calculated as frequency of days the restoration alternative salinity values are within the target range.

2. High Salinity: estimates frequency of harmful high salinity; calculated as frequency of salinity exceeding the NSM target 90th percentile.

3. Salinity Offset: quantifies magnitude of central tendency deviation between scenario and target; calculated as difference between target and scenario means.
The Bigger Picture

- Roll up individual station data into 6 zones (Florida Bay zones of similar influence).
- Salinity performance measure scores averaged for stations within each zone.
CENTRAL EVERGLADES PLANNING PROJECT (CEPP) PROPOSES TO:

- Move water south from Lake Okeechobee through Everglades Agricultural Area (EAA)
- Improve benefits to the east and west coast estuaries
- Store and treat flows in facilities within the EAA
- Send treated water south to improve conditions within Water Conservation Area 3A and 3B (WCA 3) and Everglades National Park and Florida Bay
ALTERNATIVE 1

- STORAGE AND TREATMENT
  - A-2 FEB integrated with State Remedies FEB on A-1

- DISTRIBUTION/CONVEYANCE
  - HRF: Spreader canal ~ 3 miles east & west of S-8
  - Backfill Miami Canal from S-8 to I-75
  - L-28 Triangle – gap levee

- DISTRIBUTION/CONVEYANCE
  - Increase S-333 capacity to 3000 cfs
  - One 750 cfs gated structure in L-67 A
  - One 6000-ft gaps in L-67C levee
  - Tamiami Trail western 2.6 mile and eastern 1 mile bridge
  - L-29 canal max stage at 9.7

- SEEPAGE MANAGEMENT
  - Increase S-356 to 1000 cfs
  - Two 250 cfs pumps on L-31N to return seepage
  - G-211 flood control operations, if needed
  - Utilize coastal canals to convey seepage
PROPOSED ALTERNATIVE 4

**STORAGE AND TREATMENT**
- Construct A-2 FEB and integrate with A-1 FEB operations
- Lake Okeechobee operation refinements within LORS

**DISTRIBUTION/CONVEYANCE**
- Diversion of L-6 flows and L-5 canal improvements
- Spreader canal: ~3 miles west of S-8 (3,000 cfs), ~3 miles east of S-8 (800 cfs) and ~1.5 miles east of G-206 (400 cfs)
- Backfill Miami Canal from S-8 to I-75

**DISTRIBUTION/CONVEYANCE**
- Increase S-333 capacity to 3,000 cfs
- Two 500 cfs gated structures in L-67A, 0.5 mile spoil removal west of L-67A north and south of structures
- Include levee in WCA 3B
- Degrade L-67C levee in Blue Shanty flowway
- One 500 cfs gated structure north of Blue Shanty levee and 6,000-ft gap in L-67C levee
- Degrade L-29 levee in Blue Shanty flowway, divide structure east of Blue Shanty levee at terminus of western bridge
- Tamiami Trail western 2.6 mile bridge and L-29 canal max stage at 9.7 ft (FUTURE WORK BY OTHERS)
- Degrade entire L-67 extension levee

**SEEPAGE MANAGEMENT**
- Increase S-356 to 1,000 cfs
- Partial depth seepage barrier south of Tamiami Trail 5 miles along L-31N
- G-211 operational refinements; use coastal canals to convey seepage
Evaluations of 6 Total Alternatives

ECB = Existing Condition Baseline = Current Conditions
FWO = Future Without Project (based on 2050 projections)

Alt 1 = Planning Alternative 1
Alt 2 = Planning Alternative 2
Alt 3 = Planning Alternative 3
Alt 4 = Planning Alternative 4
PM Metric 2: High Salinity

Approaching Target

High Salinity Metric Index (0 – 1)

ECB_wet
FWO_wet
ALT1_wet
ALT2_wet
ALT3_wet
ALT4_wet

ECB_dry
FWO_dry
ALT1_dry
ALT2_dry
ALT3_dry
ALT4_dry
Benefits Calculations

Weight each of the 4 metric index values by multiplying each by 0.25
Sum the 4 weighted values to get a Summed Index Value
Summed Index Value x Acreage = Habitat Units (HUs)

Example: Existing Condition Base in East-Central (EC) Zone

Dry Season Regime Overlap Index = 0.16 x 0.25 = 0.04
Wet Season Regime Overlap Index = 0.36 x 0.25 = 0.09
Dry Season High Salinity Frequency = 0.23 x 0.25 = 0.06
Wet Season High Salinity Frequency = 0.30 x 0.25 = 0.08
Summed Metric Index Value = 0.26

Summed Index Value x EC Zone Area = 0.26 x 87,926 acres = 22,861 HUs
## Habitat Units by Zone and Alternative

<table>
<thead>
<tr>
<th>Florida Bay Zone</th>
<th>Size (acres)</th>
<th>ECB</th>
<th>FWO</th>
<th>ALT1</th>
<th>ALT2</th>
<th>ALT3</th>
<th>ALT4</th>
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<tbody>
<tr>
<td>Florida Bay West</td>
<td>157,951</td>
<td>23,693</td>
<td>20,534</td>
<td>42,647</td>
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<td>82,048</td>
<td>8,204</td>
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<td>15,589</td>
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<td>97,728</td>
<td>16,614</td>
<td>14,659</td>
<td>30,296</td>
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<td>33,228</td>
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<tr>
<td>Florida Bay East Central</td>
<td>87,936</td>
<td>22,861</td>
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<td>Florida Bay North Bay</td>
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<td><strong>Total</strong></td>
<td><strong>476,095</strong></td>
<td><strong>82,966</strong></td>
<td><strong>74,333</strong></td>
<td><strong>139,586</strong></td>
<td><strong>137,787</strong></td>
<td><strong>154,677</strong></td>
<td><strong>165,767</strong></td>
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Summary

• The salinity PM uses a set of metrics that can provide ecologically relevant salinity information over a relatively broad range of time scales (days, months, seasons, years).

• Metrics proved sensitive enough to differentiate between CEPP project alternatives

• Index values can be applied over spatial areas to yield system benefits in “habitat unit” currency.

• The PM should be applicable to any estuarine system, and it can be used for assessing empirical data, in addition to evaluating restoration scenarios.
Questions??

http://www.evergladesplan.org/pm/recover/perf_se.aspx