An Evaluation of the CERP
Florida Bay Salinity Performance Measure

By
Patrick Pitts – U.S. Fish and Wildlife Service
Greg Graves – South Florida Water Management District
Darlene Marley – South Florida Water Management District
Frank Marshall – Cetacean Logic Foundation
Description of the Performance Measure

Metric Evaluated:
50% of daily average values should fall within salinity zone target. Target determined by best professional judgement.

Alternate Target:
Salinity should closely resemble historical salinity values of a predevelopment condition as provided by NSM.

Other Metrics not used:
• Mean of all daily salinities below range
• Mean of all daily salinities above range
• Duration (consecutive weeks) exceed low
• Duration (consecutive weeks) exceed high
• Timing: duration that low salinities extend into dry season from wet season
Summary of Data Evaluated

- Monitoring data from 36 sites in 11 zones (provides existing condition); POR = 2004-2008

- Output from SFWMM and F.Marshall’s MLR equations to provide pre-drainage condition (provides insight on target suitability); POR = 1996-2000

- Calculates daily average for all sites within a given zone for POR and compares to target
Table showing targets, number of monitoring stations and model output stations for each zone.

<table>
<thead>
<tr>
<th>Zone</th>
<th>Target Range (psu)</th>
<th>Number of Salinity monitoring Stations</th>
<th>Number of NSM Output Stations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5-15</td>
<td>11</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>15-30</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>25-35</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>30-35</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>5</td>
<td>15-35</td>
<td>2</td>
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</tr>
<tr>
<td>6</td>
<td>25-35</td>
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<td>2</td>
</tr>
<tr>
<td>13</td>
<td>5-15</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>14</td>
<td>15-30</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>14A</td>
<td>10-20</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>17</td>
<td>5-15</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>17A</td>
<td>5-20</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>
Florida Bay Zone 17A, Observed Data

Criteria met 53% of time.

Florida Bay Zone 17A, NSM-Based Data

Criteria met 77% of time.

Results from Zone 17A (Whitewater Bay near Clearwater Pass); 1 monitoring site and 1 NSM output site; existing condition and NSM prediction meet target.
Florida Bay Zone 3, Observed Data

Florida Bay Zone 3, NSM-Based Data

Criteria met 37% of time.

Criteria met 82% of time.

Results from Zone 3 (North-central Florida Bay including Whipray Basin; 2 monitoring sites; 2 NSM output sites; existing condition does not meet target but NSM does.
Florida Bay Zone 4, Observed Data

Criteria met 41% of time.

Florida Bay Zone 4, NSM-Based Data

Criteria met 47% of time.

Results from Zone 4 (Johnson Key and Murray Key area); 3 monitoring sites; 3 NSM output sites; neither existing condition nor NSM meet target (existing condition above target whereas NSM below target).
Florida Bay Zone 13, Observed Data

Criteria met 1% of time.

Florida Bay Zone 13, NSM-Based Data

Criteria met 2% of time.

Results from Zone 13 (Manatee Bay and Middle Key); 5 monitoring sites and 1 NSM site; neither time series meets target.
<table>
<thead>
<tr>
<th>Zone</th>
<th>Observed Values</th>
<th>NSM-predicted Values</th>
<th>Observed Salinity Meets Target?</th>
<th>NSM Output Consistent with Target?</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>27</td>
<td>40</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>2</td>
<td>53</td>
<td>66</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>3</td>
<td>37</td>
<td>82</td>
<td>No</td>
<td>Yes</td>
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<td>4</td>
<td>47</td>
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<td>No</td>
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<td>55</td>
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<td>Yes</td>
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<td>41</td>
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<td>No</td>
<td>No</td>
</tr>
<tr>
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<td>No</td>
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<tr>
<td>17A</td>
<td>53</td>
<td>77</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>
Key Findings from the Evaluation

- Current conditions meet the target in only 3 of 11 zones (27%) evaluated.
- NSM output indicates target inconsistencies in about half the zones.
- Current conditions in SE Biscayne Bay and NE Florida Bay deviate greatly from restoration targets (only 1-27% of values fall within the target).
- Significant spatial gaps exist in the current monitoring and model output.
- Need to reduce/streamline PM metrics and use one target for each metric.
So, where so we go from here….

- The PM is being significantly revised to streamline and simplify.
  
  ✓ The new target will use a modified NSM that has been adjusted with paleosalinity information.

  ✓ Primarily uses Everglades National Park’s Marine Monitoring Network salinity data for assessment purposes.

  ✓ Assessment is a statistical comparison of empirical data against the modified NSM output and will be converted to a 0 to 1 scale.

  ✓ Sub-divides the bay into 6 major zones based on WQ and salinity characteristics—using interpretations from Nuttle et al. 2000; Boyer et al. 2007; Madden et al. 2009.
Salinity Suitability Index

- Comprised of 3 sub-indices:
  - Hypersaline Index - % of time >36 psu
  - Optimal Index - % of time <25 psu
  - Stability Index - % of time <5 psu change per day

- Suitability Index is geometric mean of 3 sub-indices

- Results presented as contour maps
Hypersalinity Index – Fraction of time that daily mean salinity was less than or equal to 36 psu. Left panel = current condition; right = predicted restoration condition.
"That's all folks!"

Questions??
Salinity Stability Index – Fraction of time that the area does not exceed 5 psu fluctuation in one day. Left panel = current condition, right = predicted restoration condition.
Optimum Range Index – Fraction of time the mean daily salinity is less than 25 psu. Increased blue denotes increased occurrence of optimum salinity. Left panel = current condition; right panel = predicted restoration condition.
Salinity Suitability Index – Geometric mean of 3 sub-indices.
Left panel = current condition; right panel = predicted restoration condition.