COMPLETING MODIFIED WATER DELIVERIES TREE ISLANDS AS A PERFORMANCE INDICATOR FOR COMBINED OPERATIONS PLANNING

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Rationale

Regional condition

Tree island decline across WCA3A, WCA3B, and ENP has been extensively documented by Fred Sklar and Ted Schall (SFWMD and USACE respectively).

There has been a ~10% reduction in the number of tree islands larger than 1 acre each decade beginning 1952-2004.

The rate of loss of tree island larger than 1 acre is different in different portions of the landscape (National Park Service in press).

Localized conditions

The central portion of Water Conservation Area 3A has the largest number of tree islands per square mile.

This portion of the landscape also exhibits tree islands occurring adjacent to each other which have very different tendency to be inundated.

Between May 1, 2016 and April 30, 2017 there were many examples of adjacent tree islands where the highest elevation portion of one tree island was never below the water surface while a tree island next to it had over 300 days of inundation.

Figure 4. Mean annual (optima) and range of hydroperiods (tolerance) of 18 common tree species found on tree islands in the central and southern Everglades. From Sah (2004).
Figure 3. Histogram of mapped tree islands across the regions of interest in WCA3A, WCA3B, and ENP. These are counts of inundation over a 41 year period of simulating the operations of the Existing Condition Baseline 19RR (ECB19RR).
Figure 4. Histogram of mapped tree islands across the regions of interest in WCA3A, WCA3B, and ENP. These are counts of inundation over a 41 year period of simulating the operations of the Alternative N2 (ALT N2).
Figure 5. Histogram of mapped tree islands across the regions of interest in WCA3A, WCA3B, and ENP. These are counts of inundation over a 41 year period of simulating the operations of Alternative O (ALTO).
### Table 1.
Total number of tree islands inundated less than 10% of time period. For Observed this = 950 days over 26 years (1991 – 2017), for ALTs this = 1461 days over 40 years (1965 – 2005).

<table>
<thead>
<tr>
<th>Alternative</th>
<th>WCA3AC</th>
<th>WCA3AN</th>
<th>WCA3AS</th>
<th>WCA3B</th>
<th>ENPN</th>
<th>ENPS</th>
<th>ENPW</th>
<th>Gap</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observed</td>
<td>16</td>
<td>3</td>
<td>19</td>
<td>11</td>
<td>4</td>
<td>14</td>
<td>18</td>
<td>6</td>
<td>91</td>
</tr>
<tr>
<td>ECB19RR</td>
<td>45</td>
<td>1</td>
<td>24</td>
<td>9</td>
<td>4</td>
<td>14</td>
<td>18</td>
<td>23</td>
<td>138</td>
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<tr>
<td>Alt N2</td>
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<td>15</td>
<td>4</td>
<td>14</td>
<td>18</td>
<td>27</td>
<td>174</td>
</tr>
<tr>
<td>Alt O</td>
<td>52</td>
<td>4</td>
<td>30</td>
<td>12</td>
<td>4</td>
<td>14</td>
<td>18</td>
<td>19</td>
<td>153</td>
</tr>
</tbody>
</table>

### Table 2.
Percent of mapped tree islands inundated less than 10% of time period. For Observed this = 950 days over 26 years (1991 – 2017), for ALTs this = 1461 days over 40 years (1965 – 2005).

<table>
<thead>
<tr>
<th>Alternative</th>
<th>WCA3AC</th>
<th>WCA3AN</th>
<th>WCA3AS</th>
<th>WCA3B</th>
<th>ENPN</th>
<th>ENPS</th>
<th>ENPW</th>
<th>Gap</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observed</td>
<td>12%</td>
<td>50%</td>
<td>17%</td>
<td>38%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>9%</td>
<td>24%</td>
</tr>
<tr>
<td>ECB19RR</td>
<td>35%</td>
<td>17%</td>
<td>22%</td>
<td>31%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>34%</td>
<td>37%</td>
</tr>
<tr>
<td>Alt N2</td>
<td>47%</td>
<td>17%</td>
<td>31%</td>
<td>52%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>40%</td>
<td>46%</td>
</tr>
<tr>
<td>Alt O</td>
<td>40%</td>
<td>67%</td>
<td>27%</td>
<td>41%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>28%</td>
<td>40%</td>
</tr>
</tbody>
</table>

Table 1. Total number of tree islands inundated less than 10% of time period. For Observed this = 950 days over 26 years (1991 – 2017), for ALTs this = 1461 days over 40 years (1965 – 2005).

Table 2. Percent of mapped tree islands inundated less than 10% of time period. For Observed this = 950 days over 26 years (1991 – 2017), for ALTs this = 1461 days over 40 years (1965 – 2005).
Alt N2 consistently produces the most tree islands that are inundated less than 10% of the total time period in all portions of WCA3A and WCA3B.

None of the mapped tree islands are ever inundated in ENP.

Alt O and N2 have more tree islands inundated less than 10% of the time than ECB19R.
Implications and future development opportunities

Proposed development of integrated Tree Island Performance Measure and Assessment procedure
The Seminole Tribe requested that tree islands less than 1 acre in size to be incorporated into the analysis.

Formalize into a performance measure for CERP – including associated monitoring/assessment
Proposed Expanded Landscape monitoring design

32 regions = entire ECISMA
Key hypotheses

- Ridge-slough-tree island landscape health is linked to exotic plant presence/absence, and health of faunal communities
- Everglades Restoration (COP and next CERP) will meaningfully improve the condition of the landscape and it’s faunal inhabitants
- Integrated system monitoring is cost-effective and provides conclusive evidence of system-level conditions
Proof that drivers are patchy

Change in water deliveries to
Everglades since 1959
(World Heritage Report, 2013)

Time since last fire

Fire frequency over
in BICY and EVER
for lifespan of these
NPS units
References


Special Thanks!