

Incorporating Future Environmental Variability in Restoration Project Planning

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Introduction

The Biscayne Bay and Southeastern Everglades Ecosystem Restoration (BBSEER) Project is the first Comprehensive Everglades Restoration Plan (CERP) project to incorporate future environmental change in restoration planning. The BBSEER identifies ecosystem restoration opportunities of nearshore conditions, coastal wetlands, and adjacent wetlands in central and southern Biscayne Bay and the Southeastern Everglades. Baseline and alternative scenarios considered in the BBSEER vary in the implementation of future environmental variation, which includes soil accretion and sea level change (SLC).

Methods

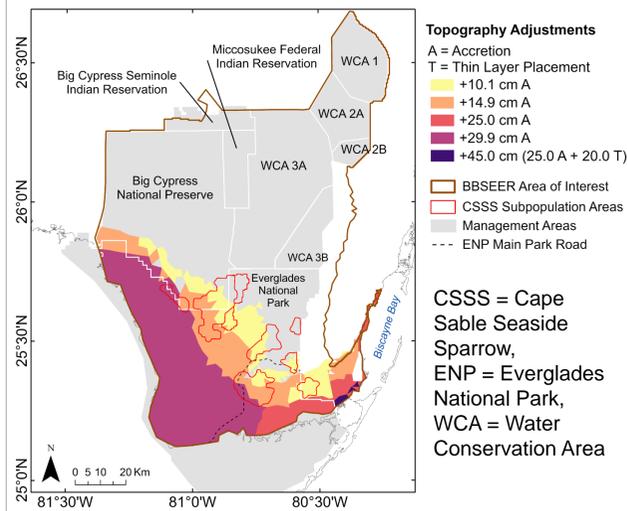
Table 1. Future changes included in the Biscayne Bay and Southeastern Everglades Ecosystem Restoration (BBSEER) Project. Alternative scenarios represent proposed alternative restoration plans for the BBSEER. Sea level changes are from the U.S. Army Corps of Engineers (USACE) intermediate curve (2085). Thin layer placement is a restoration activity that involves transfer of sand sediment to increase elevation.

| Scenario | ECB22, FWO | FWOi | ALT31, ALT32, SR31A, SR32A |
|-----------------------------|-------------------------------------|--------------------------------------|--------------------------------------|
| Scenario Type | Baseline | Baseline | Alternative |
| Sea Level Change | +12.2 cm (0.4 ft) relative 1992 SLC | +48.8 cm (1.6 ft) relative ECB22 SLC | +48.8 cm (1.6 ft) relative ECB22 SLC |
| Soil Accretion | No | +10.1 to 29.9 cm (0.33 to 0.98 ft) | +10.1 to 29.9 cm (0.33 to 0.98 ft) |
| Thin Layer Placement | No | No | +20 cm (0.66 ft) |

Abbreviations: ECB = Existing Conditions Baseline, FWO/i = Future Without Project/plus USACE intermediate curve 2085, ALT31/32 = Alternative 31/32, SR31A/32A = Sensitivity Run 31A/32A, SLC = Sea Level Change

BBSEER Area of Interest

Topography adjustments: soil accretion, thin layer placement



Topography Adjustments
 A = Accretion
 T = Thin Layer Placement
 +10.1 cm A
 +14.9 cm A
 +25.0 cm A
 +29.9 cm A
 +45.0 cm (25.0 A + 20.0 T)
 BBSEER Area of Interest
 CSSS Subpopulation Areas
 Management Areas
 ENP Main Park Road

CSSS = Cape Sable Seaside Sparrow, ENP = Everglades National Park, WCA = Water Conservation Area

Received BBSEER depth surfaces for FWOi, FWO, and ALT32 from Interagency Modeling Team and conducted:

Depth comparisons

FWOi – FWO, FWOi – ALT32

- Filtered out extreme depth values (> 4 m and < -4 m)
- Calculated mean # of days and the % of cells where FWOi was more than 5 cm higher or lower than the comparison

Ecological modeling

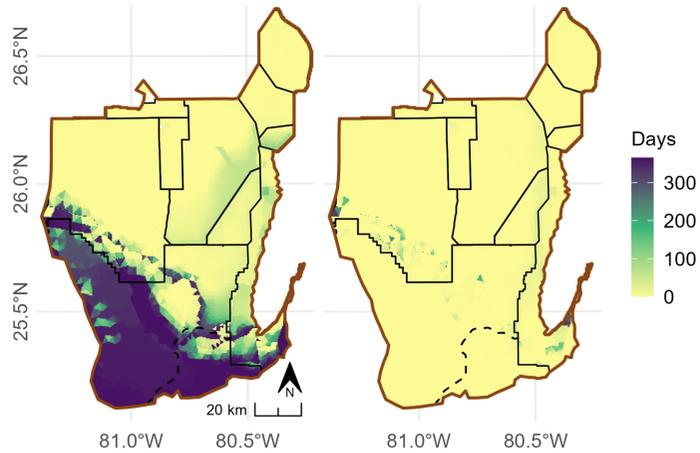
- Marl Prairie Indicator
- Alligator Production Suitability Index

Results

The additional SLC in FWOi compared to FWO results in saltwater inundation into the Everglades

Mean number of days FWOi was > 5 cm higher than FWO

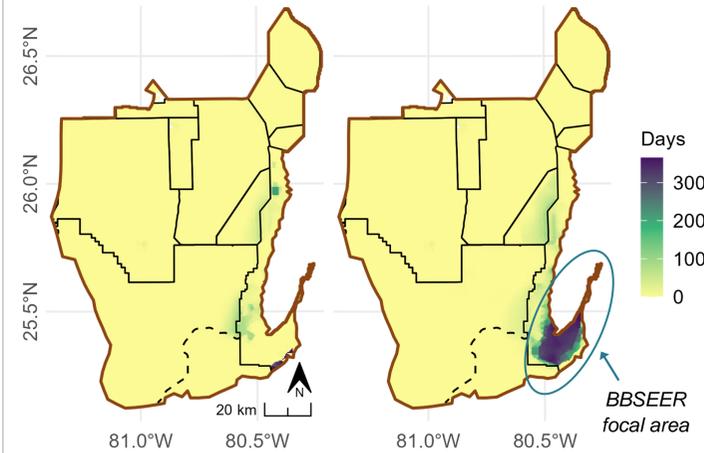
Mean number of days FWOi was > 5 cm lower than FWO



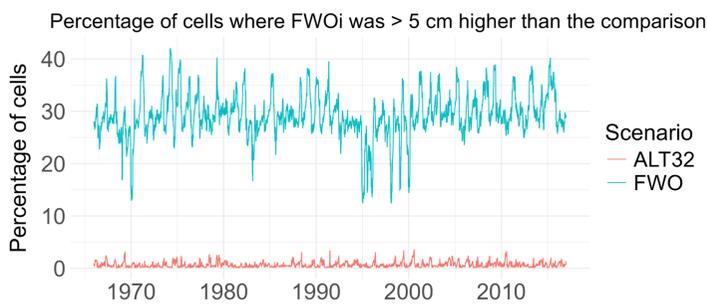
ALT32 can provide additional freshwater to the BBSEER focal area, a goal of restoration, even under SLC

Mean number of days FWOi was > 5 cm higher than ALT32

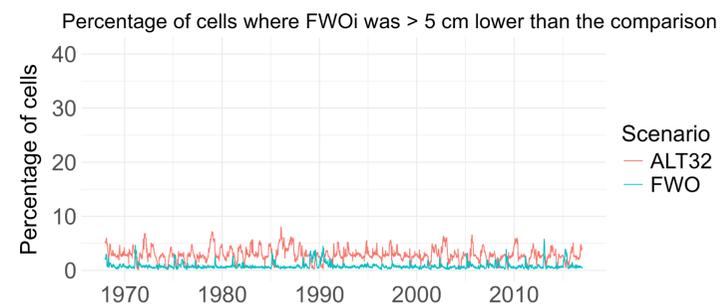
Mean number of days FWOi was > 5 cm lower than ALT32



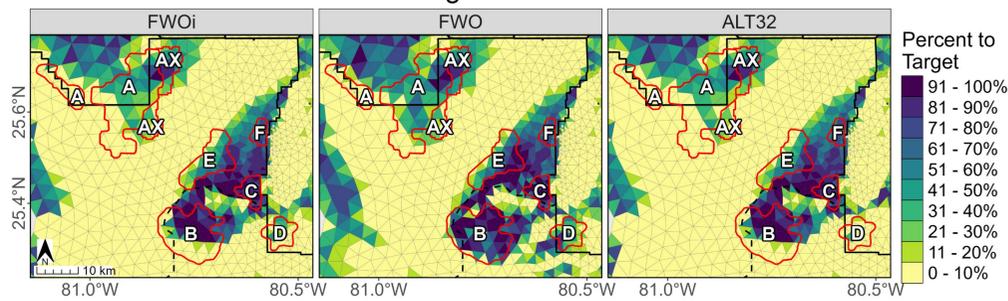
The % of cells where FWOi was deeper than FWO (> 5 cm) ranged from 12 to 42%



The % of cells where ALT32 was deeper than FWOi (> 5 cm) ranged from 0.2 to 8%



Marl Prairie Score: Percent to Target

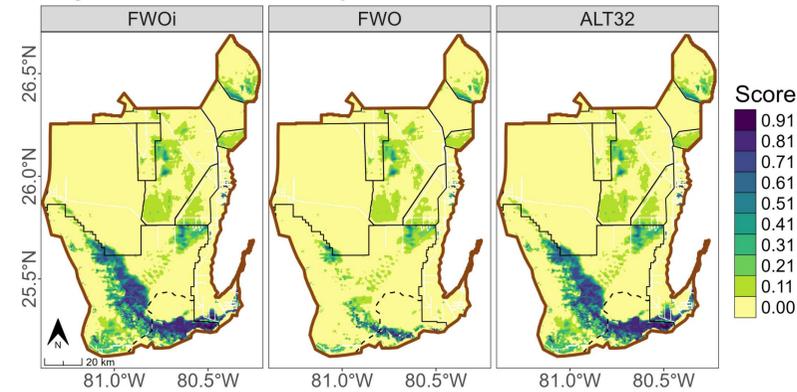


Marl prairie, the primary habitat of the CSSS, showed a lower score (less favorable conditions) in the southern area of subpopulation B for FWOi and ALT32 (period of record 1965 – 2016)



Credit: NPS, public domain

Alligator Production Suitability Index



Alligator Production Suitability Index was higher for FWOi and ALT32, indicating more favorable conditions (year shown = 2001). However, the BBSEER depth surfaces do not include salinity, which can negatively affect alligators.



Credit: NPS, public domain

Future Directions

- Incorporation of salinity into ecological models – efforts underway to incorporate in Alligator Production Suitability Index. Salinity already incorporated in Everglades Vulnerability Analysis
- Balancing objectives web-based interactive tool in development for evaluation of multiple ecological responses to hydrology

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