CENTRAL EVERGLADES PLANNING PROJECT

Soil Restoration Thresholds Specific to Central Everglades Planning Project Success

GEER Conference 2015 Session 15

Performance Measures for Central Everglades Adaptive Management

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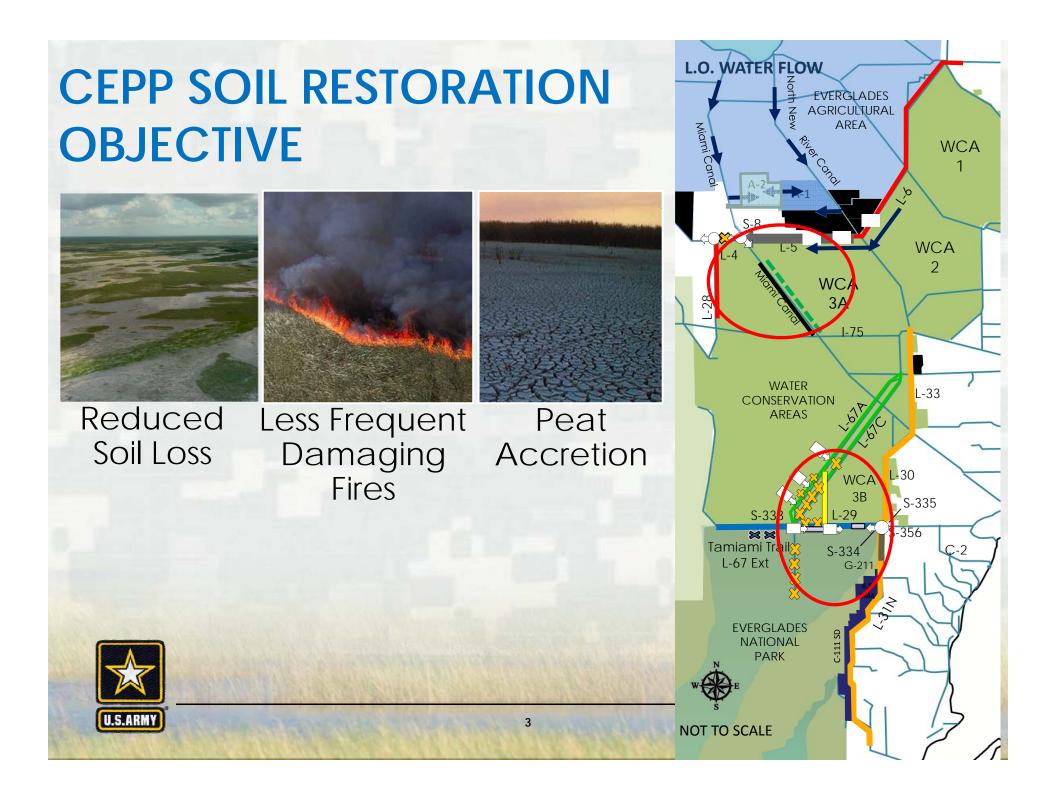**U.S. Army Corps of Engineers, Jacksonville District**

April 21, 2015

OVERVIEW

- CEPP Objective – Reduce Soil Subsidence & Damaging Peat Fires

- Soil & Fire History

- Soils & Landscape Rebuilding

- Climate Change Factor

- Soil Regeneration Slow

- Potential Parameters to Measure

- Potential Soil Performance Thresholds

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CEPP SOIL RESTORATION OBJECTIVE

Reduced Soil Loss

Less Frequent Damaging Fires

Peat Accretion

L.O. WATER FLOW

EVERGLADES AGRICULTURAL AREA

WCA 1

North New River Canal

Miami Canal

A-2

A-1

S-8

L-6

L-5

L-4

WCA 2

L-28

Miami Canal

WCA 3A

I-75

WATER CONSERVATION AREAS

L-33

L-67A

L-67C

L-30

WCA 3B

S-335

S-333

L-29

S-356

Tamiami Trail
L-67 Ext

S-334

G-211

C-2

C-111 SD

L-31N

EVERGLADES NATIONAL PARK

NOT TO SCALE

SOIL & FIRE HISTORY IN EVERGLADES

AREA	M^3 PEAT LOST	METRIC TONS CO2 LOST	SUBSIDENCE AVERAGE (M)
WCA-3A	1.3×10^9	6.2×10^8	0.6
WCA-3B	2.5×10^8	1.2×10^8	0.6
ENP	1.2×10^8	6.1×10^7	0.01

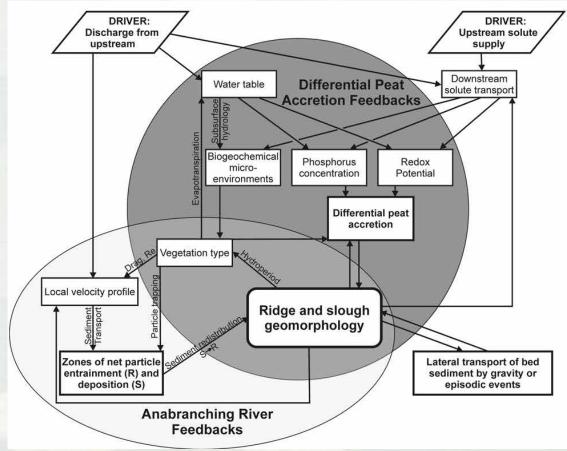Courtesy of: Aich, S. and T. W. Dreschel, 2011. Florida Scientist

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SOILS & LANDSCAPE REBUILDING

Differential Peat Accretion = Ridge & Slough Landscape

- Water depth & solute transport
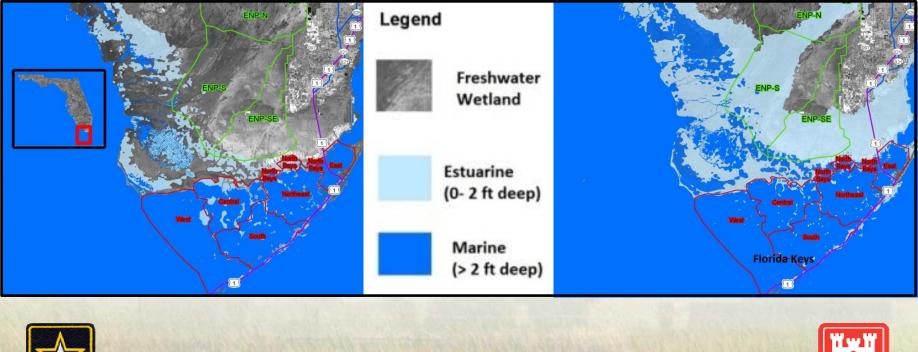- Water velocity & particle movement
- Vegetation type

Larsen, L.G., J.W. Harvey, and J.P. Crimaldi, 2007 – Ecological Monographs

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CLIMATE CHANGE EFFECTS & ECOSYSTEM RESILIENCY

- Less rainfall & more evapotranspiration = less peat soil

- Increase sea-level rise = less peat soil

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SLOW RATES OF SOIL REGENERATION

AREA	PEAT PER YEAR (MM)	CARBON (G*M) PER YEAR	5 YEAR ESTIMATE	10 YEAR ESTIMATE
Overdrained WCA 3A	2.0	88	1 cm	2 cm
WCA 3A	2.0	70	1 cm	2 cm
Long Hydroperiod WCA 3A	2.8	127	1.4 cm	2.8 cm

Craft, C. B., and C. J. Richardson, 1993, Ecological Applications

Meaningful Management Timeframes: 1-5 years

POTENTIAL PARAMETERS TO MEASURE

PARAMETER	JUSTIFICATION
Soil Moisture Content	Higher soil moisture content evidence of preservation
Organic vs. Inorganic Volumes and Concentrations	Higher Organic soil content evidence of peat maintenance &/or accretion
pH, Cations [Mg2+, Ca2+]	Indicative of local mineral conditions as well as products from the breakdown of organic matter
Nutrients,	Higher nutrients influences peat accretion rates & landscape type
Peat Accretion	Restoration objective as a precursor to landscape restoration
Vegetation Type	Influences degree of decaying matter deposited into soil – higher rates
Long-term Measurements	Measure conversion to more stable version of peat

SOIL RESTORATION THRESHOLDS

- Statistically significant increases in soil moisture content

- Organic soil characteristics moving towards reference conditions

- Soil porewater & non-extractive nutrient contents move towards reference conditions

- Peat elevation increases in ridges & tree islands

- Coast – Soil porewater salinity conditions decrease

QUESTIONS?

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