Assessing Hydroperiod & Vegetative Restoration Alternatives in Flatford Swamp, Florida

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- June 7, 2012

Assessing Restoration Alternatives in Flatford Swamp, FL

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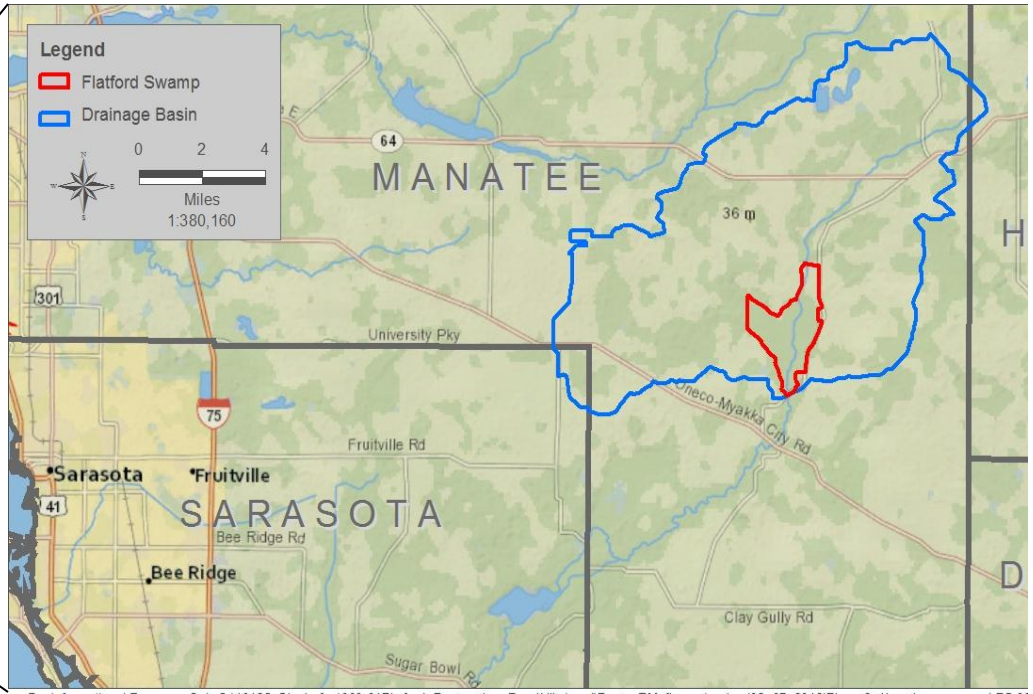
  - Six Alternatives
  - Final Selected Alternative
- PROPOSED VEGETATION RESTORATION ALTERNATIVES

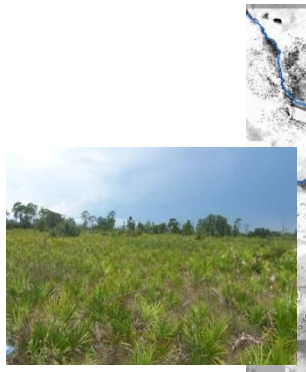
STUDY AREA

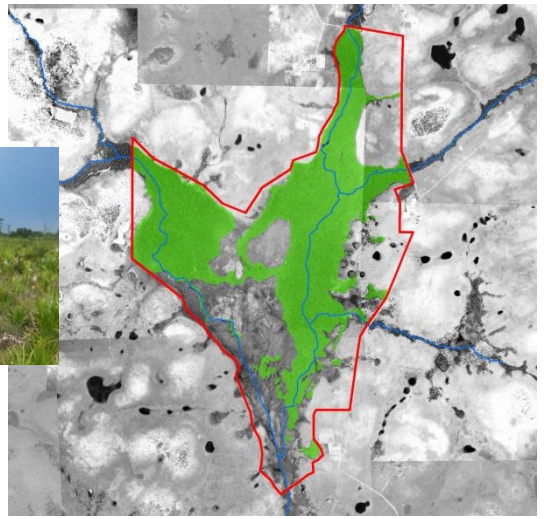


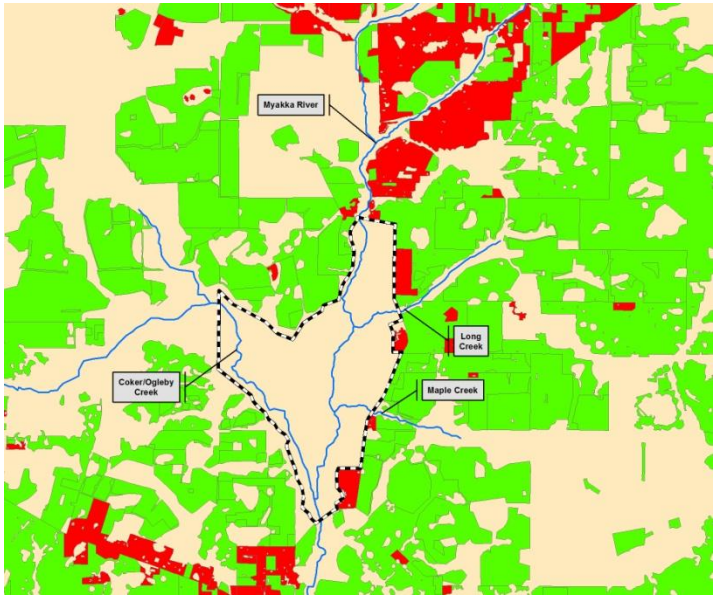
For Informational Purposes Only Q:\19425_Singhofen\009-01Flatford_Restoration_Feasibility\mxd\Resto_TM_figures\revised03_07_2012\Figure2_1location_map.mxd PS 03

BACKGROUND & THE PROBLEM

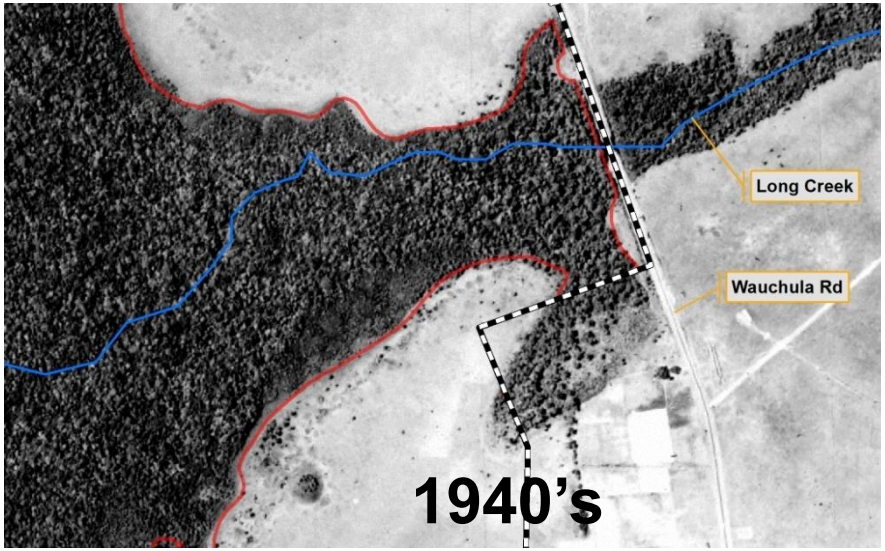
- Historically, large portion of Flatford Swamp was a forested system dominated by large swamp tupelo (*Nyssa sylvatica* var. *biflora*)
- Historically, uplands were dominated by native rangeland
- Late 1980's extensive tree mortality observed
  - Loss of large swamp tupelo
  - Swamp typically permanently inundated
  - Shift to cattail and primrose willow

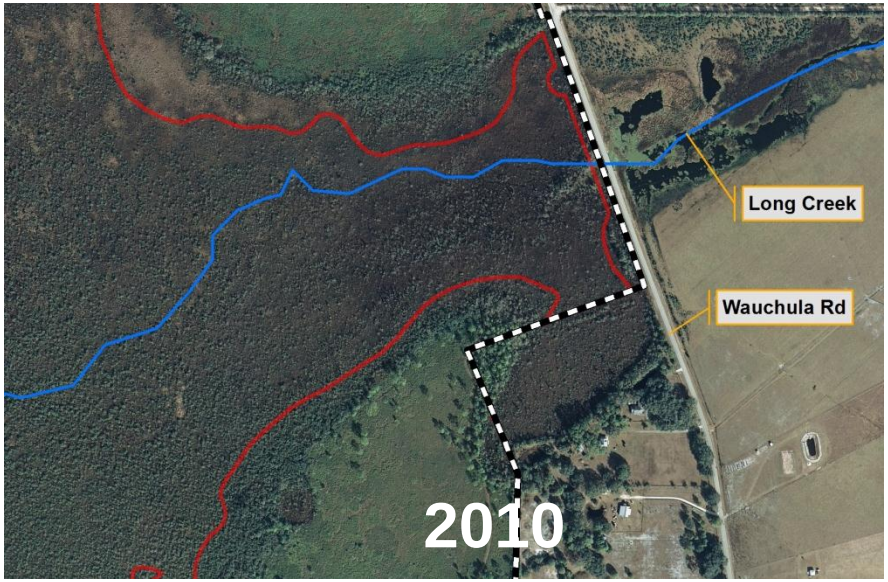






THE PROBLEM





SARASOTA HERALD-TRIBUNE / MONDAY, NOVEMBER 23, 1998

E. D. 'SONNY' VERGARA/ *Consider all impacts*

Flatford Swamp requires careful study

In response to a recent *Herald-Tribune* article regarding the tree die-offs in the Flatford Swamp area of Manatee County, we agree that action is needed quickly to curtail the environmental damage. But in developing a solution, the district must consider the resultant impacts upon all concerned parties.

term.

We are also looking at cooperative efforts with the farmers in the area to develop irrigation practices which will reduce the amount of irrigation runoff into the swamp. The district and its Manasota Basin Board are contributing $200,000 to fund an Agricultural Conservation Partnership program. This program is designed to foster new and more effective methods to reduce irrigation runoff. Through this cooperative effort,

THE PROBLEM

- Historical Conditions
  - Large and tall swamp tupelo & other species; fringing live oaks
  - Exposed soils allowed regeneration
  - Less anoxic stress on root zone

FLATFORD: WHAT IS KILLING TREES?

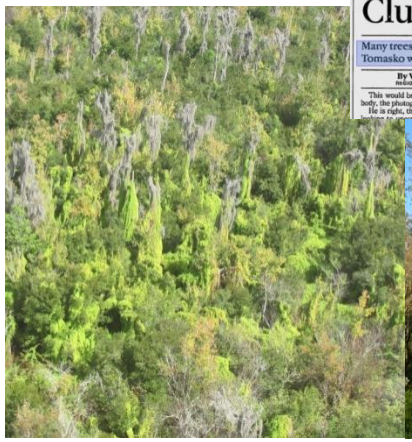
David Tomasko slogs through the muck recently in the Flatford Swamp in eastern Manatee County.

Clues are buried in swamp

Many trees are dead or sick, and scientist David Tomasko wants to know the reason.

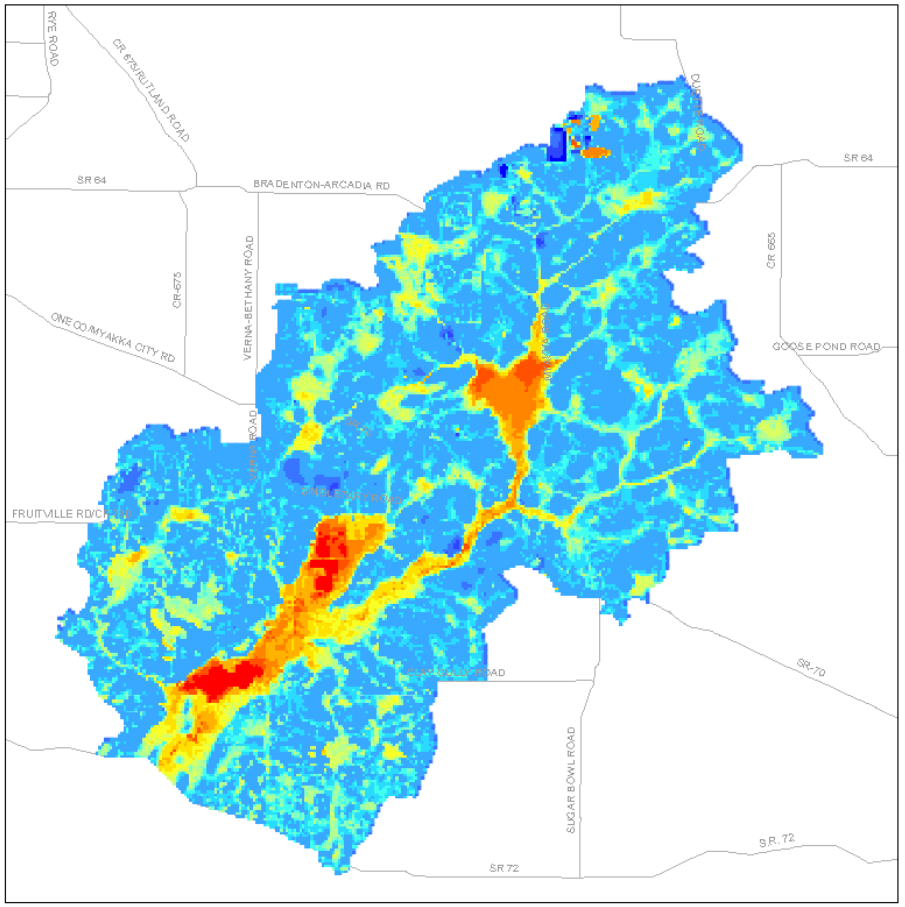
By Victor Hull

- Current Conditions
  - Swamp receives significantly more inflow
  - Results in prolonged inundation
  - Limited dry season soil exposure
  - Dominance of short clonal species
  - Dense primrose willow & cattail
    - Hinders swamp tupelo regeneration
  - Old world climbing fern (*Lygodium*)
  - Extremely difficult access



PROJECT GOALS

- The Project Goals:
  - Model hydrologic restoration alternatives to restore the hydroperiod of Flatford Swamp to historical conditions (early 1950's)
  - Identify vegetation restoration alternatives

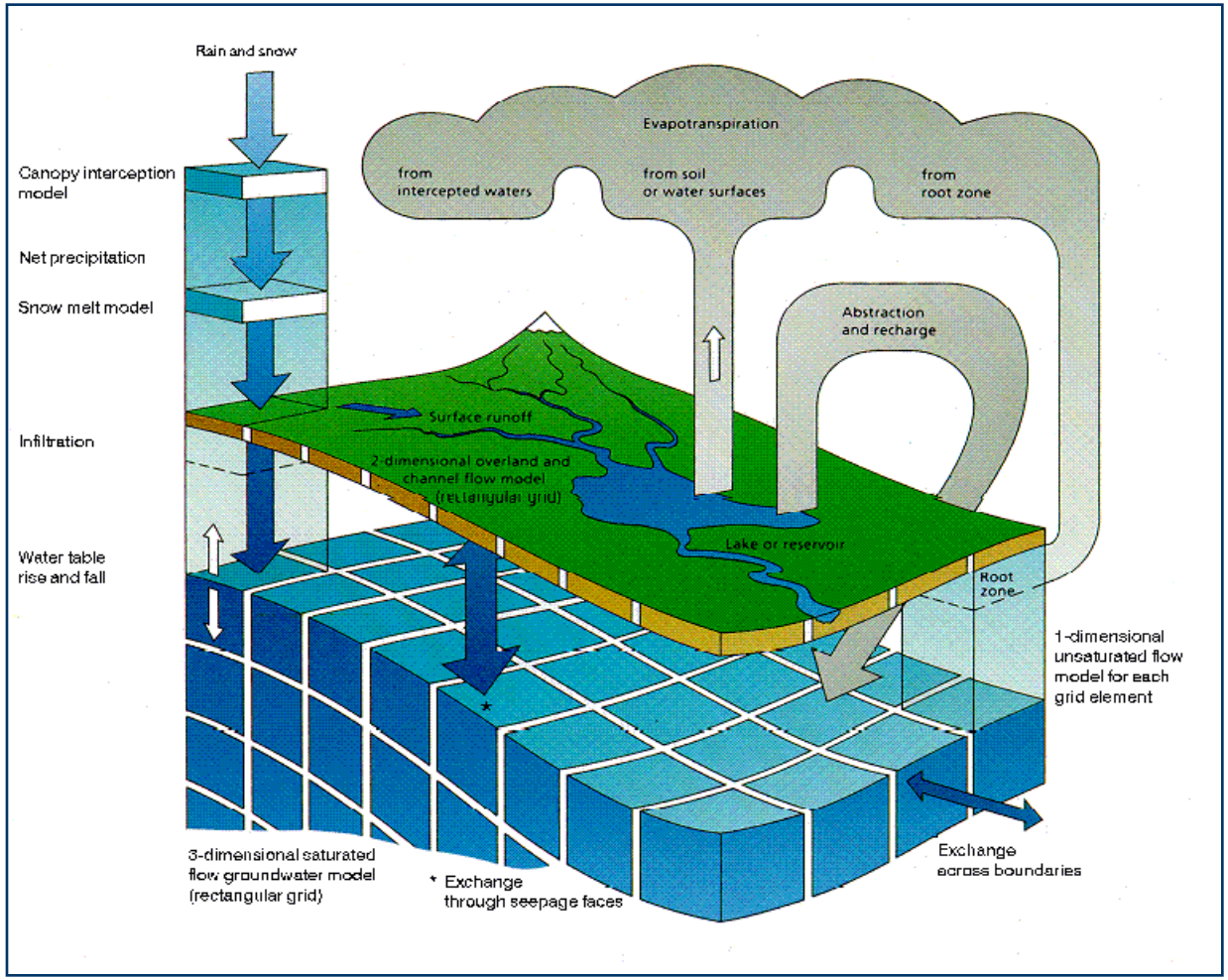


RESTORATION ASSESSMENTS

- Hydrologic Modeling
  - Develop integrated model
  - Model scenarios that will reduce hydroperiod to historic conditions
  - Recommend most feasible and cost effective alternative
- Soil Biogeochemistry
  - Established 10 transects to investigate soil nutrients
  - Transects parallel and perpendicular to stream inflows
- Vegetation Mapping
  - High resolution (<0.25 ac MMU) aerial vegetation mapping
- Invasive/Exotic Plant Species
  - Evaluated vegetation mapping data to determine areas dominated by invasive exotics

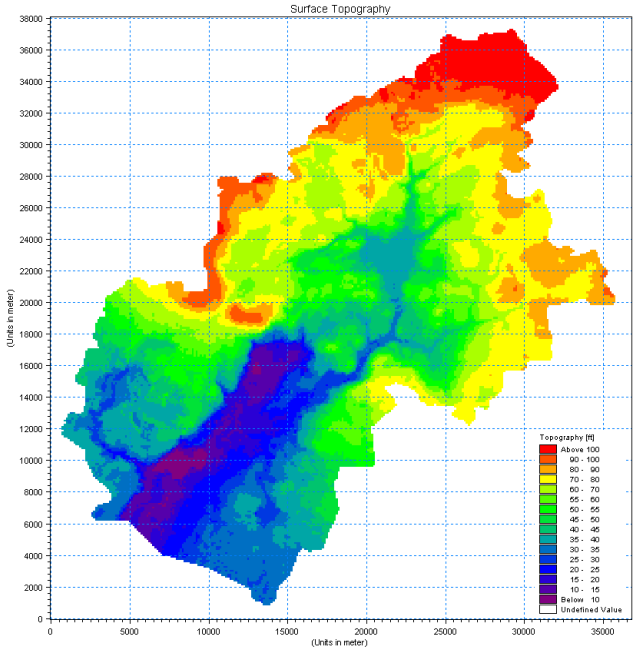
HYDROLOGIC MODELING

- Model Tool Selection: MIKE SHE
  - Integrated GW and SW model
  - Coupled with a dynamic streamflow routing model
  - Physically-based representations of all processes of the hydrologic cycle
  - Fully distributed in space and time
- Simulated changes in wetland hydroperiods based on extraction scenario.



Model Setup and Calibration

- 2-layer GW model representing the upper and lower surficial aquifer system
- 125 x 125-meter (410 x 410 ft) grid cells in 3D GW and 2D SW models (about 40,000 cells per layer)
- 1D open channel flow model of River & 9 tributaries
- Incorporated substantial survey data
- NEXRAD radar rainfall data used
- Explicit representation of irrigation
- Calibration Period: May ‘99-April ‘10
- Verification Period: May 1994-April ‘99
- Peer Reviewed



MIKE SHE Modeling of Water Extraction Scenarios

Initially evaluated the sensitivity of Flatford Swamp hydroperiods to 6 methods of diverting or extracting water from Flatford Swamp; 3 chosen for further study:

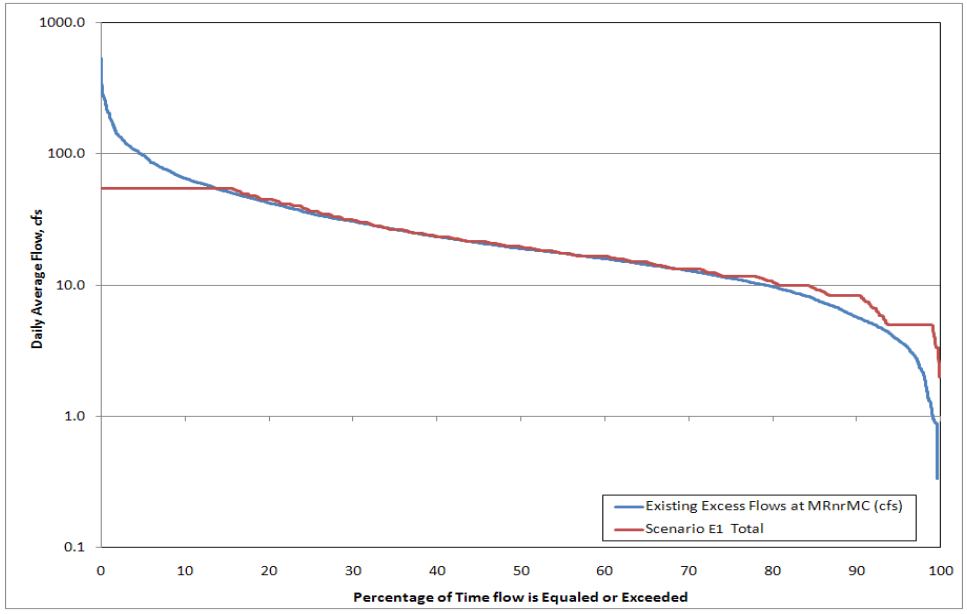
- Interception: Diversion of water just downstream of the confluence of Coker and Ogleby Creeks, Maple Creek, and Myakka River just north of the swamp
- Channelization: Channelize flow through the swamp
- Interior Pumping: Pumping from various points within the swamp

HYDROLOGIC RESTORATION ALTERNATIVES ANALYSIS

- Alternatives Analysis:
  - Generated matrix table with 6 main categories
  - Results used to select proposed restoration alternative

- Capital costs
- Annual O&M
- Performance
- Maintainability
- Permittability
- Adaptive Mgmt

Interception Scenario

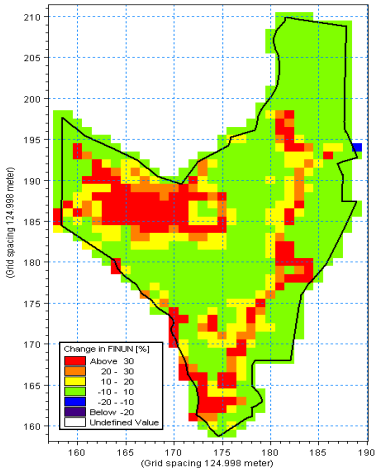


Average and Max Diverted Flows (cfs) for Interception Scenario

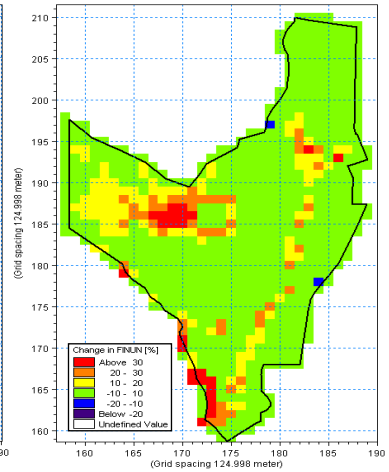
	Maple Creek Diversion	Myakka River Diversion	Ogleby Creek Diversion	Total
January average	1.63	4.21	12.33	18.17
February average	1.68	3.86	12.07	17.61
March average	1.33	2.75	12.72	16.80
April average	0.91	2.59	15.65	19.15
May average	0.87	2.49	13.58	16.94
June average	2.09	5.99	16.85	24.94
July average	3.99	16.78	25.76	46.53
August average	4.23	17.96	27.00	49.19
September average	4.04	17.94	27.15	49.13
October average	2.22	6.72	9.41	18.35
November average	1.42	2.83	7.78	12.04
December average	1.60	4.01	7.85	13.45
Maximum (all months)	5.00	20.00	30.00	55.00

Flatford Swamp Frequency of Inundation Comparison (10th Percentile; May)

Interception Scenario

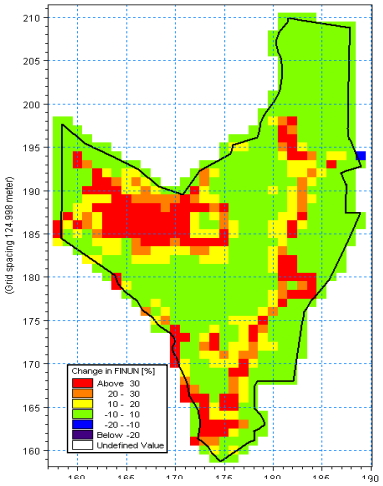


Existing Minus Historical

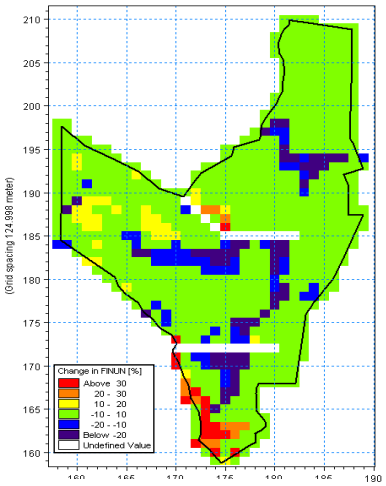


Scenario E1 Minus Historical

Channelization

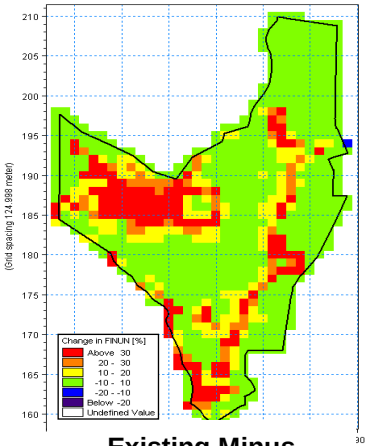


Existing Minus Historical

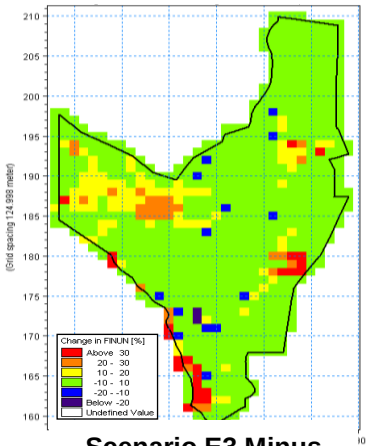


Scenario E2 Minus Historical

Interior Pumping



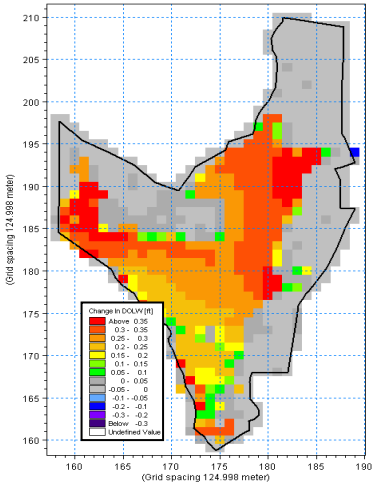
Existing Minus Historical



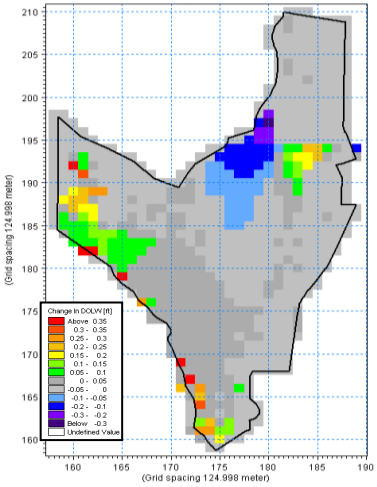
Scenario E3 Minus Historical

Flatford Swamp Depth of Inundation Comparison (10th Percentile; May)

Interception Scenario

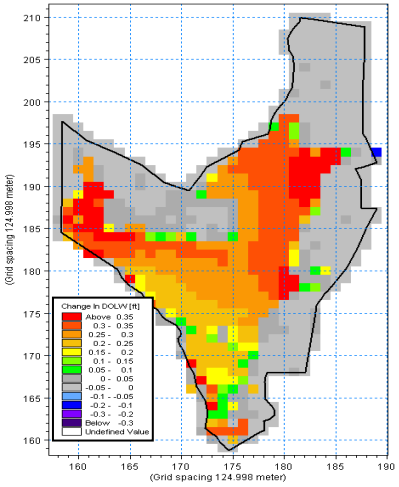


Existing minus Historical

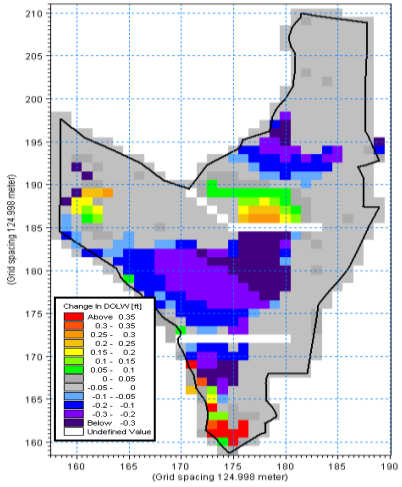


Scenario E1 minus Historical

Channelization

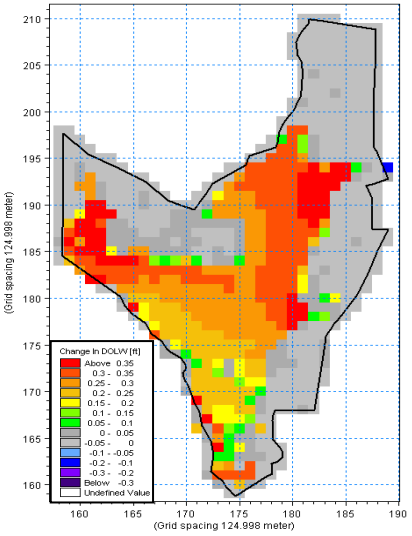


Existing minus Historical

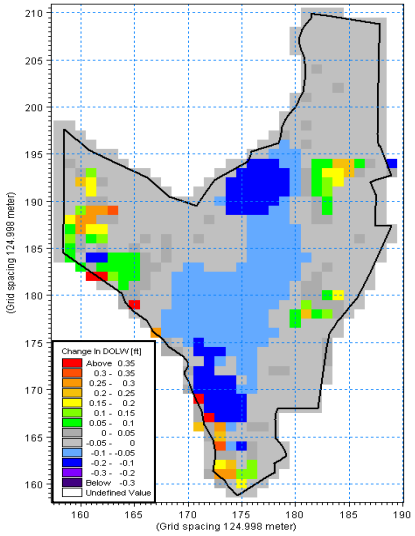


Scenario E2 minus Historical

Interior Pumping



Existing minus Historical



Scenario E3 minus Historical

PROPOSED ALTERNATIVE

Interception Scenario

Evaluated Collection & Storage Options

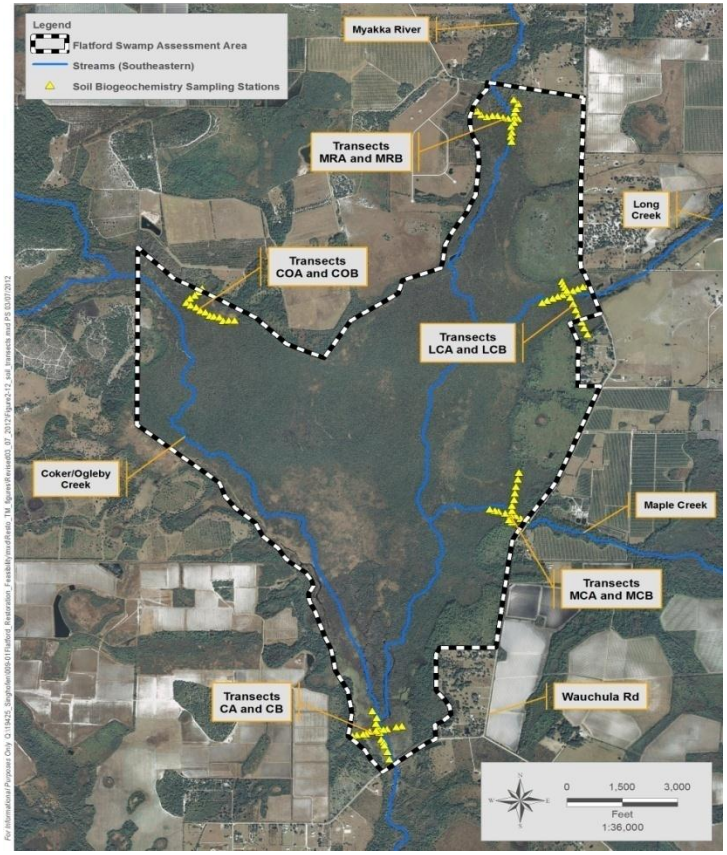
- Interception and routing to collection point for distribution

Excess Water Use

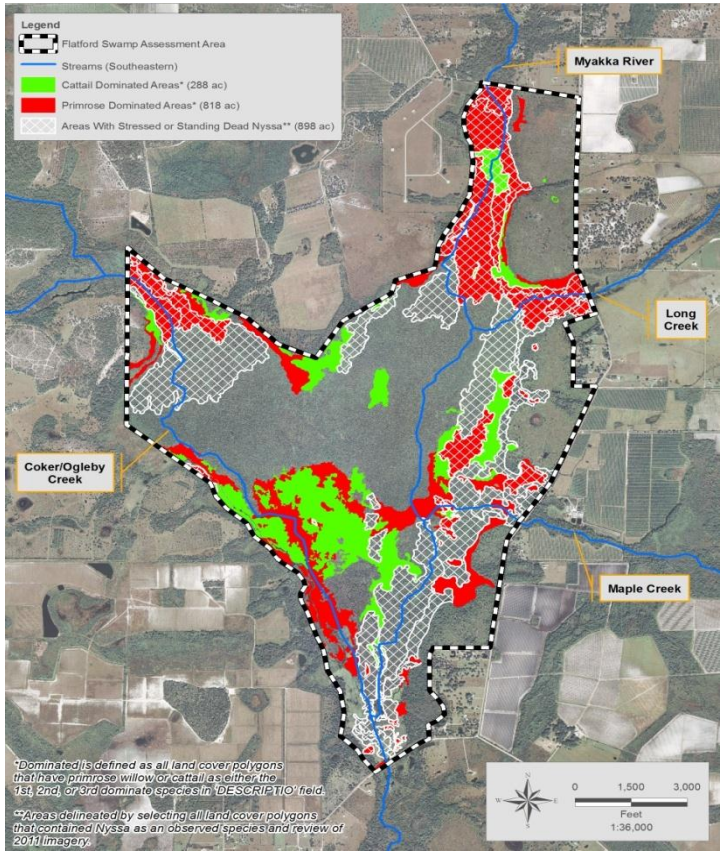
- Excess water for use in SWUCA
- Evaluated End-User Options
  - Mosaic phosphate mine potential alternative
  - SWFWMD currently conducting feasibility study

SOIL BIOGEOCHEMISTRY AND VEGETATION MAPPING

- Soil Biogeochemistry
  - 5 locations (10 transects)
  - Nutrient enriched soils
  - Elevated soil [SO4]

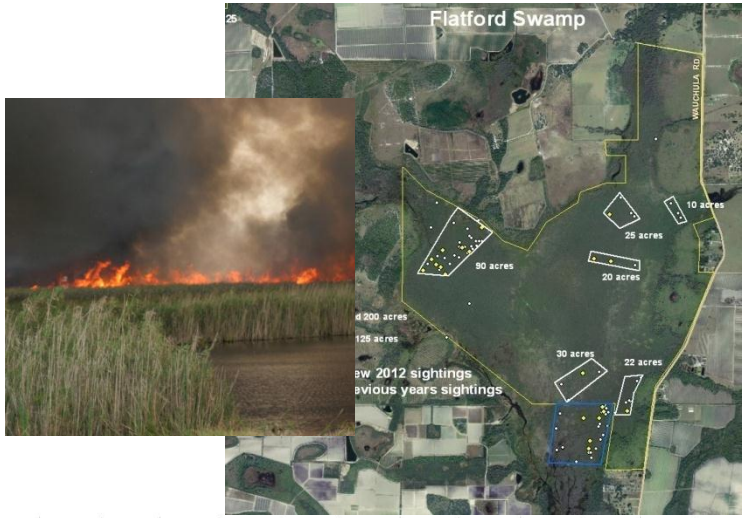


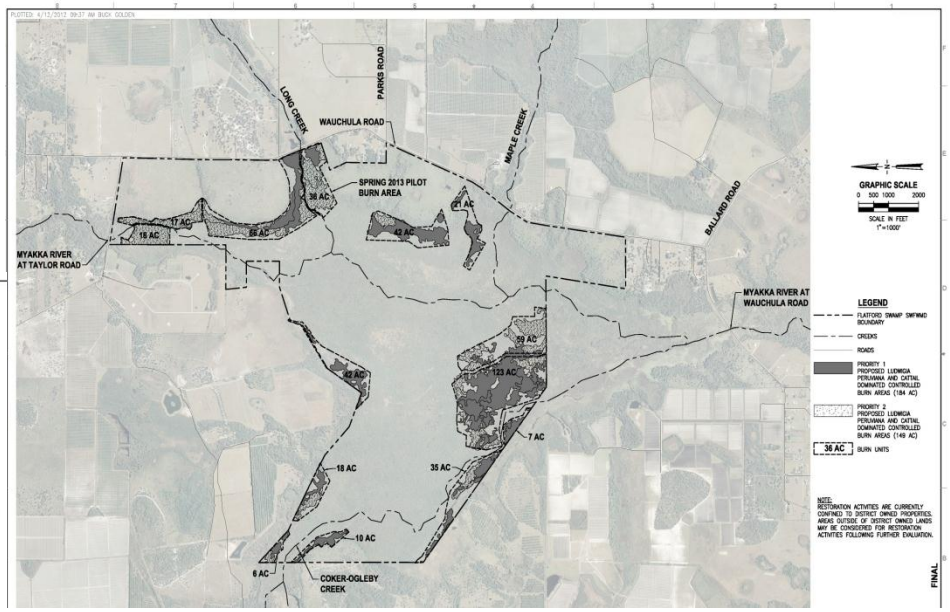
- Vegetation Mapping
  - Delineated cattail/primrose willow dominated areas
  - Identified areas where swamp tupelo remains

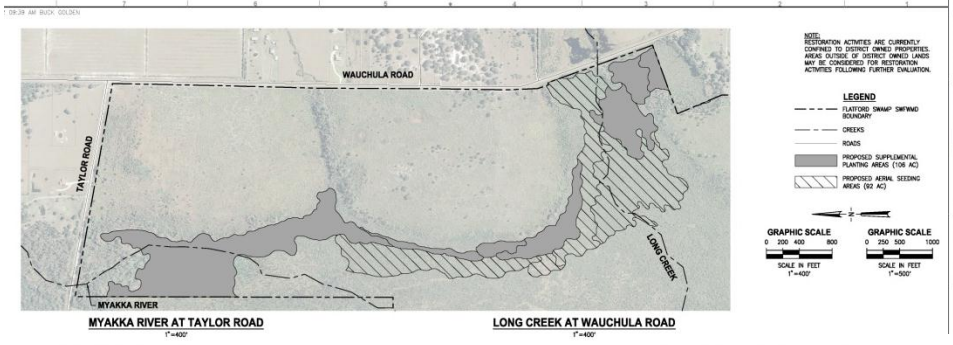


PROPOSED VEGETATION RESTORATION ALTERNATIVES

- Pre-Hydrologic Restoration Activities
  - Exotic/Invasive Plant Mgmt
    - Controlled pilot burn/aerial herbicide in Spring 2013
    - Implement *Lygodium* treatment trial
- Post-Hydrologic Restoration Activities
  - Controlled burn/aerial herbicide primrose willow/cattail areas
  - Aerial seeding of swamp tupelo
  - Supplemental planting of swamp tupelo & red maple
  - Ecosystem restoration monitoring








QUESTIONS??