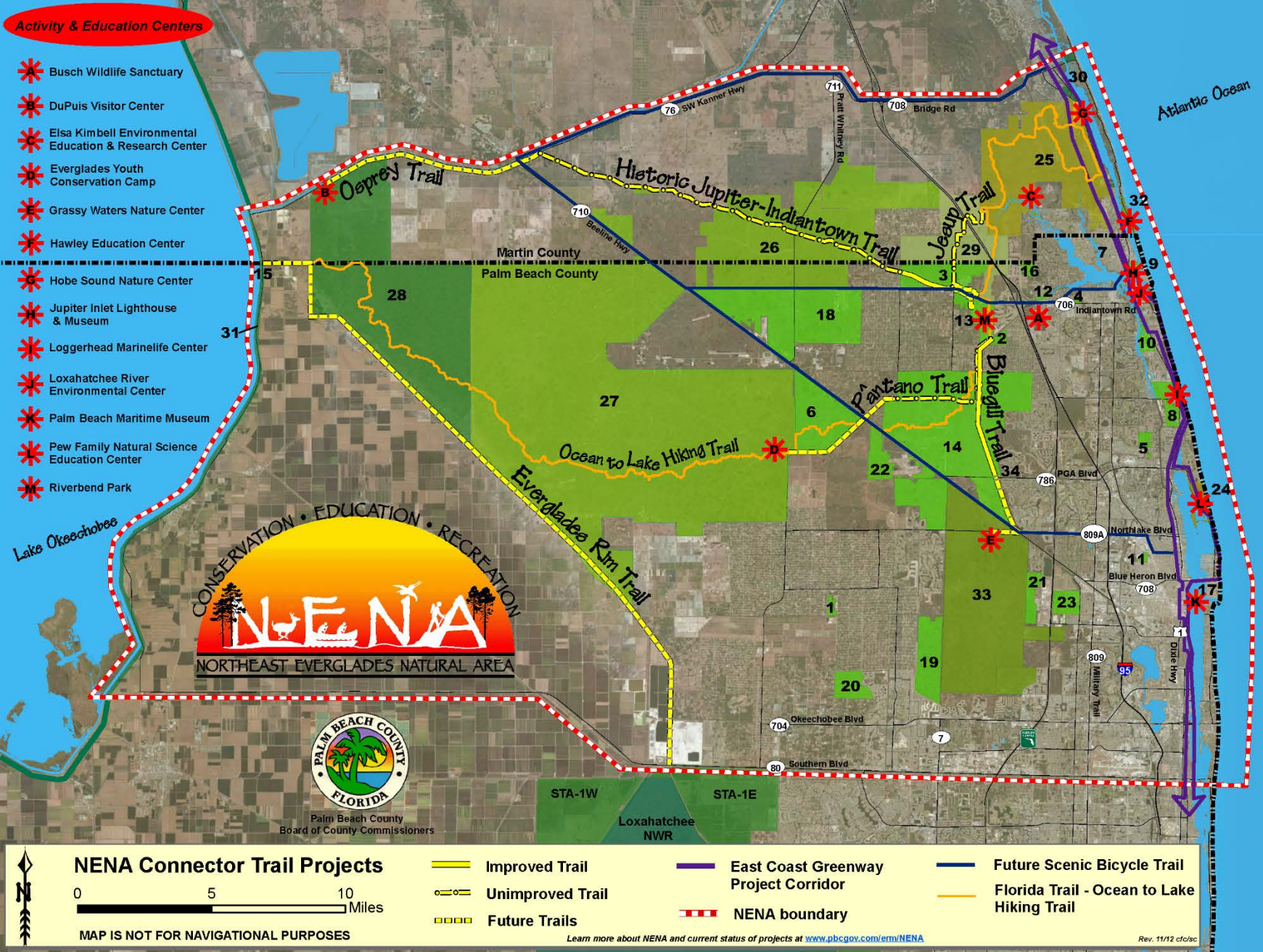


Professional Services
J. W. Corbett Wildlife Management Area
Hydrologic Assessment

Florida Fish and Wildlife Conservation Commission
RFSOQ No. FWC 14/15-024



South Florida Engineering and Consulting, LLC
Environmental Solutions through Science and Technology



Palm Beach County
Board of County Commissioners

Activity & Education Centers

- Busch Wildlife Sanctuary
- DuPuis Visitor Center
- Elsa Kimbell Environmental Education & Research Center
- Everglades Youth Conservation Camp
- Grassy Waters Nature Center
- Hawley Education Center
- Hobe Sound Nature Center
- Jupiter Inlet Lighthouse & Museum
- Loggerhead Marinlife Center
- Loxahatchee River Environmental Center
- Palm Beach Maritime Museum
- Pew Family Natural Science Education Center
- Riverbend Park

- County Park or Natural Area (NA)**
 - 1 Acreage Pines NA
 - 2 C18 Triangle NA
 - 3 Cypress Creek NA
 - 4 Delaware Scrub NA
 - 5 Frenchman's Forest NA
 - 6 Hungryland Slough NA
 - 7 Jackson Riverfront Pines NA
 - 8 Juno Dunes NA
 - 9 Jupiter Inlet NA (JILONA)
 - 10 Jupiter Ridge NA
 - 11 Lake Park Scrub NA
 - 12 Limestone Creek NA
 - 13 Loxahatchee River Battlefield & Riverbend Parks
 - 14 Loxahatchee Slough NA
 - 15 NENA/LOST Trailhead
 - 16 North Jupiter Flatwoods NA
 - 17 Peanut Island Park
 - 18 Pine Glades NA
 - 19 Pond Cypress NA
 - 20 Royal Palm Beach Pines NA
 - 21 Solid Waste Authority
 - 22 Sweetbay NA
 - 23 Winding Waters NA
- State Park (SP)**
 - 24 John D. MacArthur Beach SP
 - 25 Jonathan Dickinson SP
- Wildlife Management (WMA)/ Environmental Area (WEA)**
 - 26 Jones/Hungryland WEA
 - 27 JW Corbett WMA
- South Florida Water Management District (SFWMD)**
 - 28 DuPuis Management Area/WEA
- Martin County/SFWMD**
 - 29 Loxahatchee River/Cypress Creek Management Area
- Federal Refuge (NWR) or Trail**
 - 30 Hobe Sound NWR
 - 31 Lake Okeechobee Scenic Trail
- Preserve or City Park**
 - 32 Blowing Rocks Preserve
 - 33 Grassy Waters Preserve
 - 34 Sandhill Crane Access Park

NENA Connector Trail Projects

0 5 10 Miles

MAP IS NOT FOR NAVIGATIONAL PURPOSES

- Improved Trail
- Unimproved Trail
- Future Trails
- East Coast Greenway Project Corridor
- NENA boundary
- Future Scenic Bicycle Trail
- Florida Trail - Ocean to Lake Hiking Trail

Learn more about NENA and current status of projects at www.pbcgov.com/em/NENA

Rev. 11/12 cfc/sc

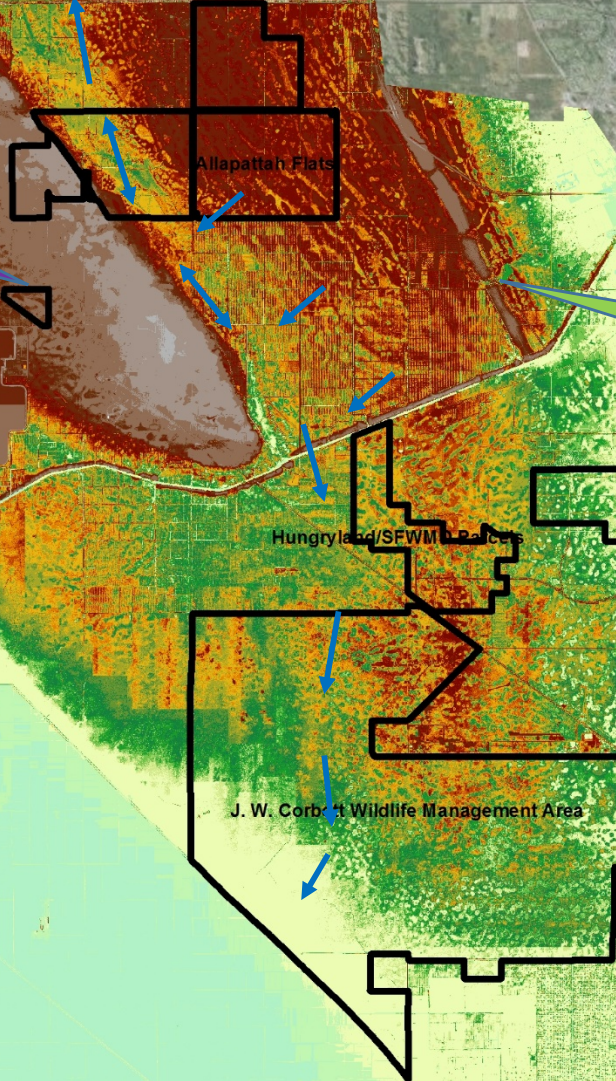


Orlando Ridge

Green Ridge

LiDAR (ft-NAVD)

-21.4 - 1
1.01 - 10
10.1 - 15
15.1 - 20
20.1 - 20.5
20.6 - 21
21.1 - 21.5
21.6 - 22
22.1 - 22.5
22.6 - 23
23.1 - 23.5
23.6 - 24
24.1 - 24.5
24.6 - 25
25.1 - 26
26.1 - 27
27.1 - 28
28.1 - 29
29.1 - 30
30.1 - 35
35.1 - 45
45.1 - 50
50.1 - 55
55.1
55.1 - 92.9



Source: Esri, DigitalGlobe, GeoEye, i-cubed, Earthstar-Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

12/30/2002

Hungry Land Slough Dry – 12/30/2002

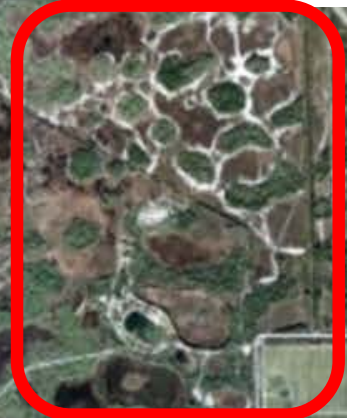
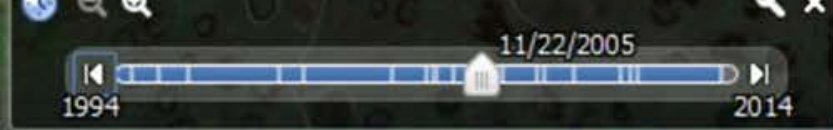


Image U.S. Geological Survey

Google earth



Hungry Land Slough Wet – 11/22/2005

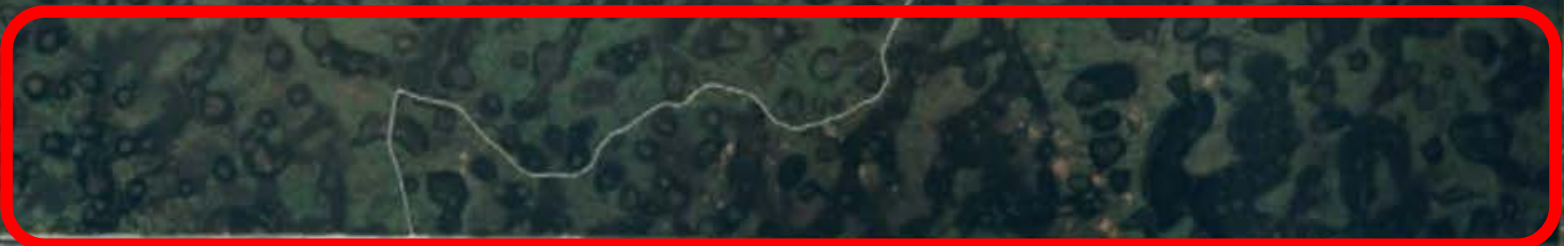
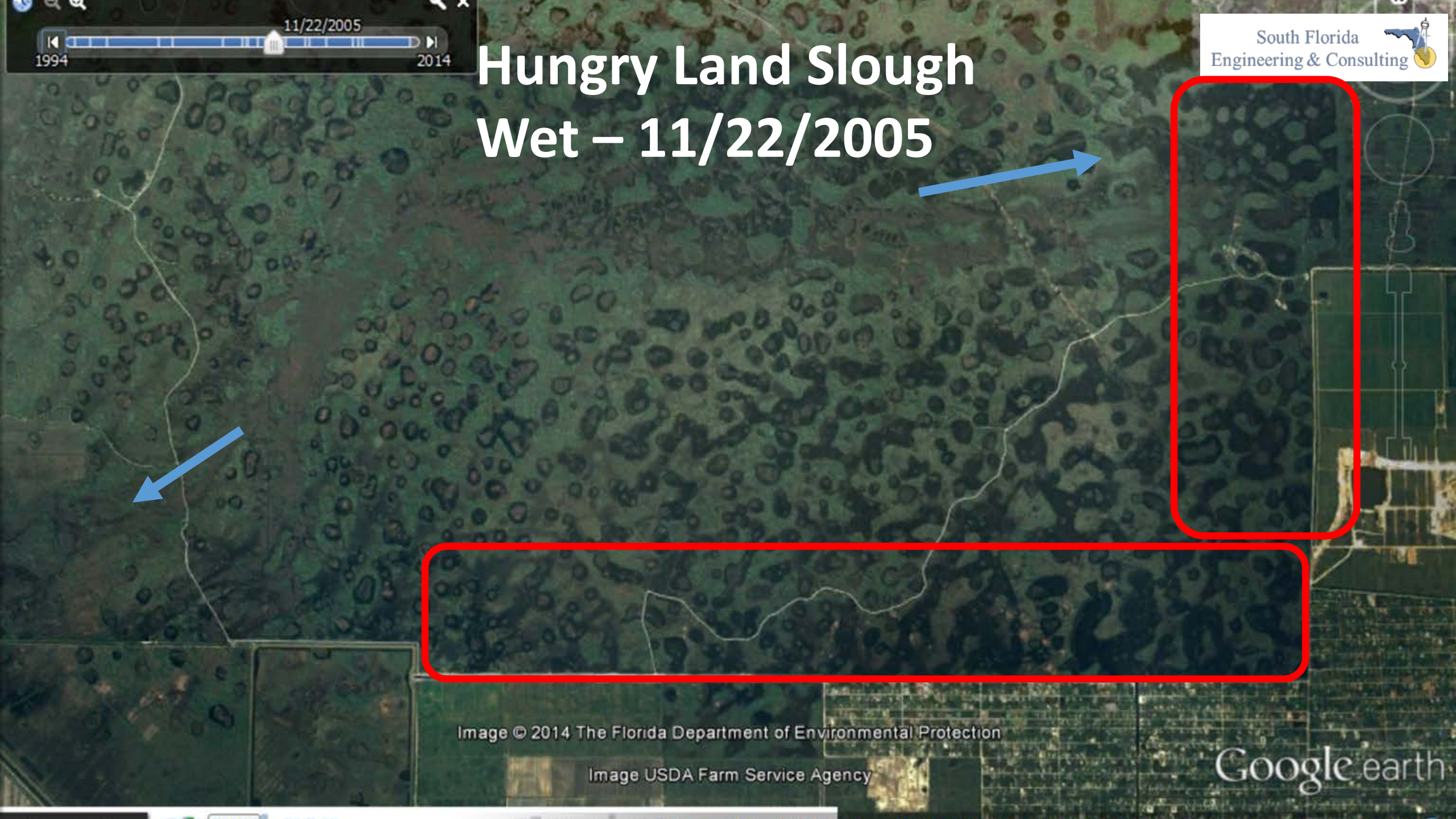
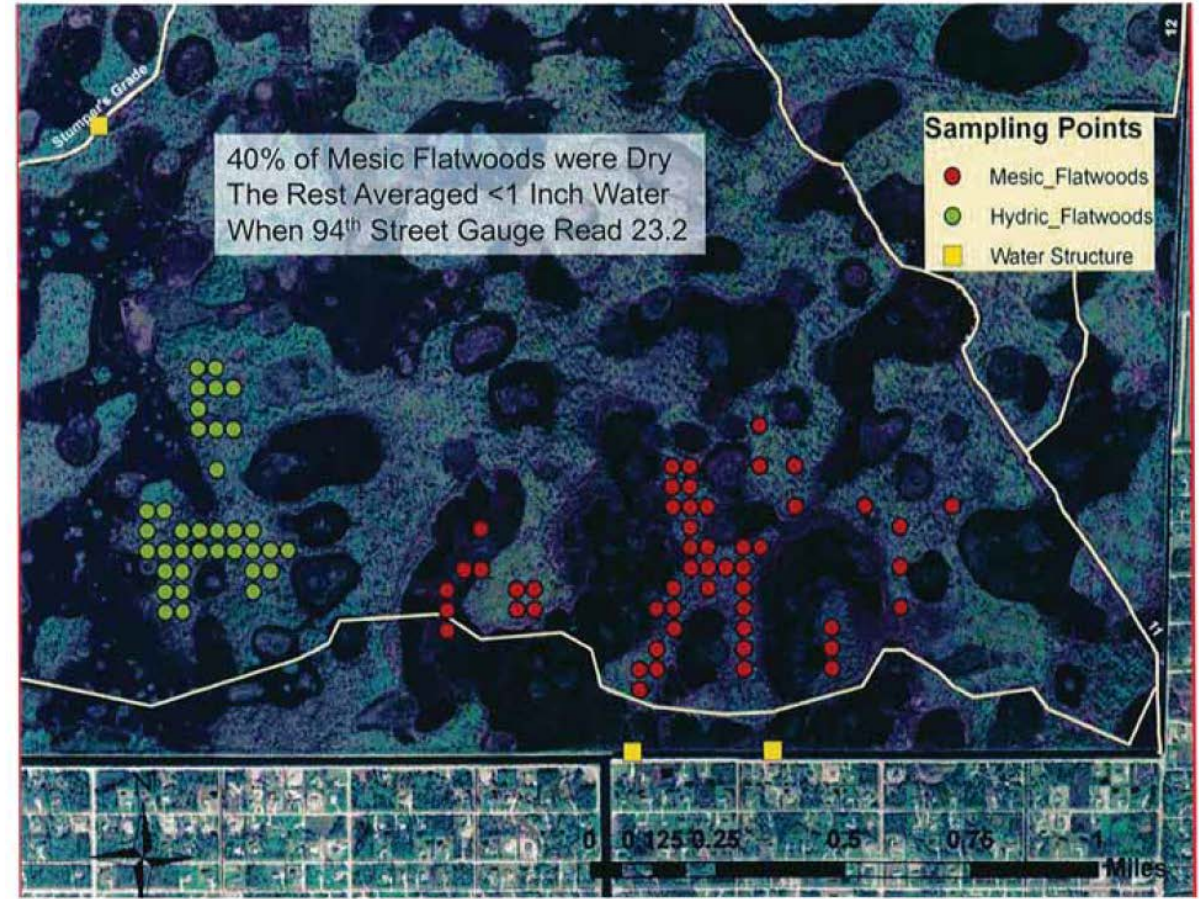
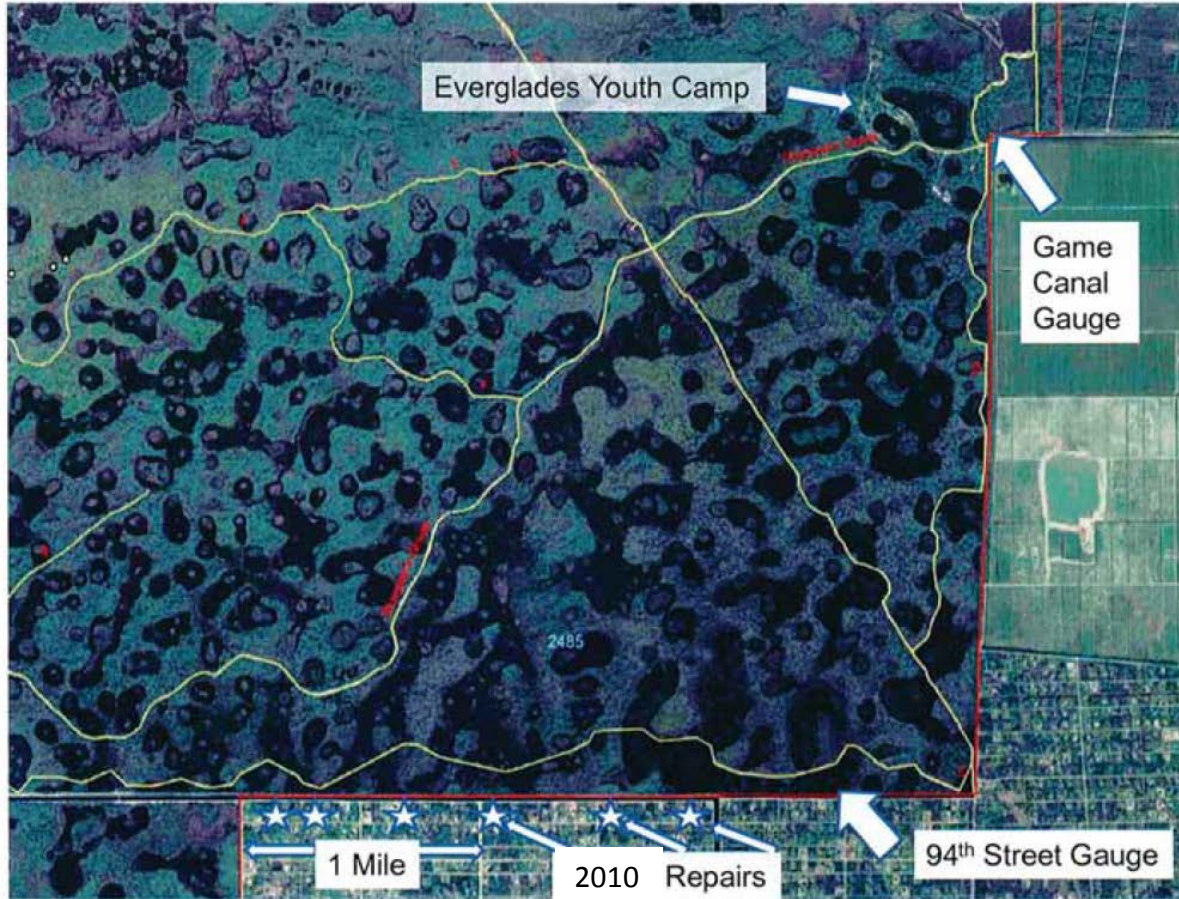


Image © 2014 The Florida Department of Environmental Protection

Image USDA Farm Service Agency

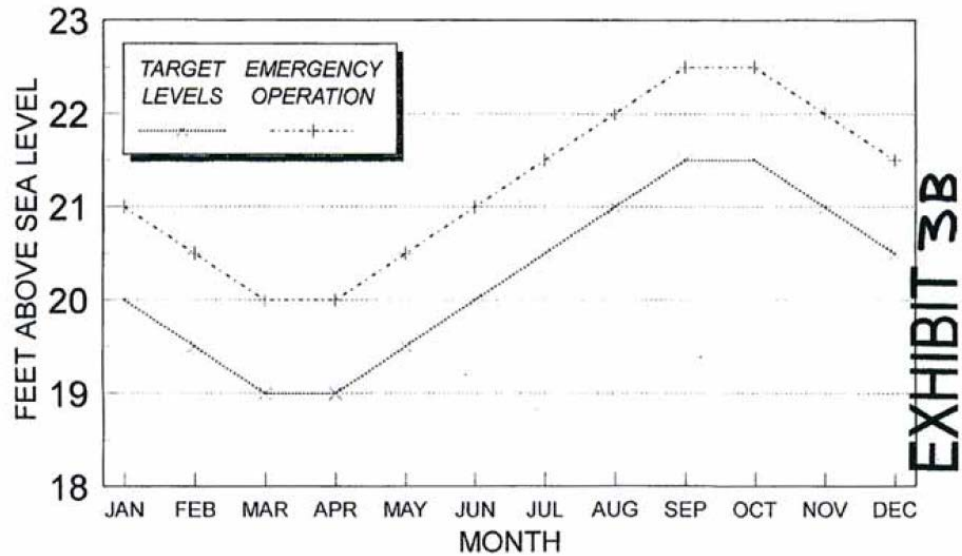
Google earth

South East Corner of Corbett



Regulation Schedules and Operations

J.W. CORBETT WMA
SOUTHEAST CORNER
Target Water Levels 001208-18



Water Levels (2005-2010) at Water Gauge
Referenced in
Emergency Authorization Permit
Compared to
Corbett Operation Schedule

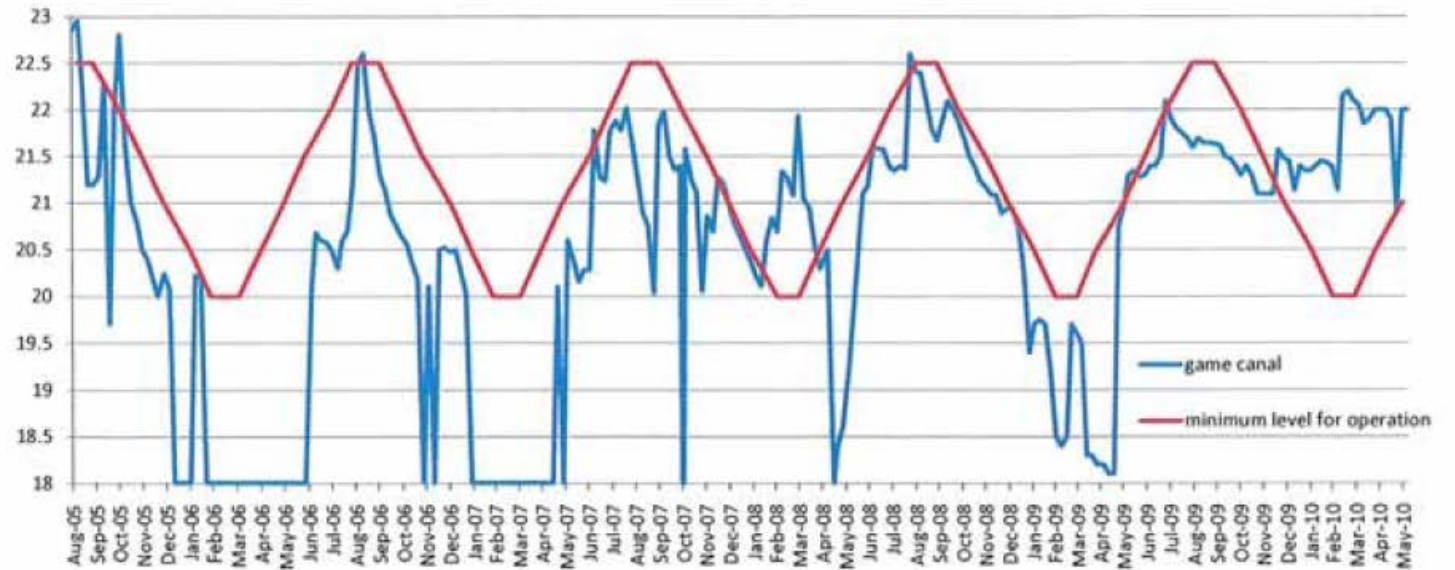


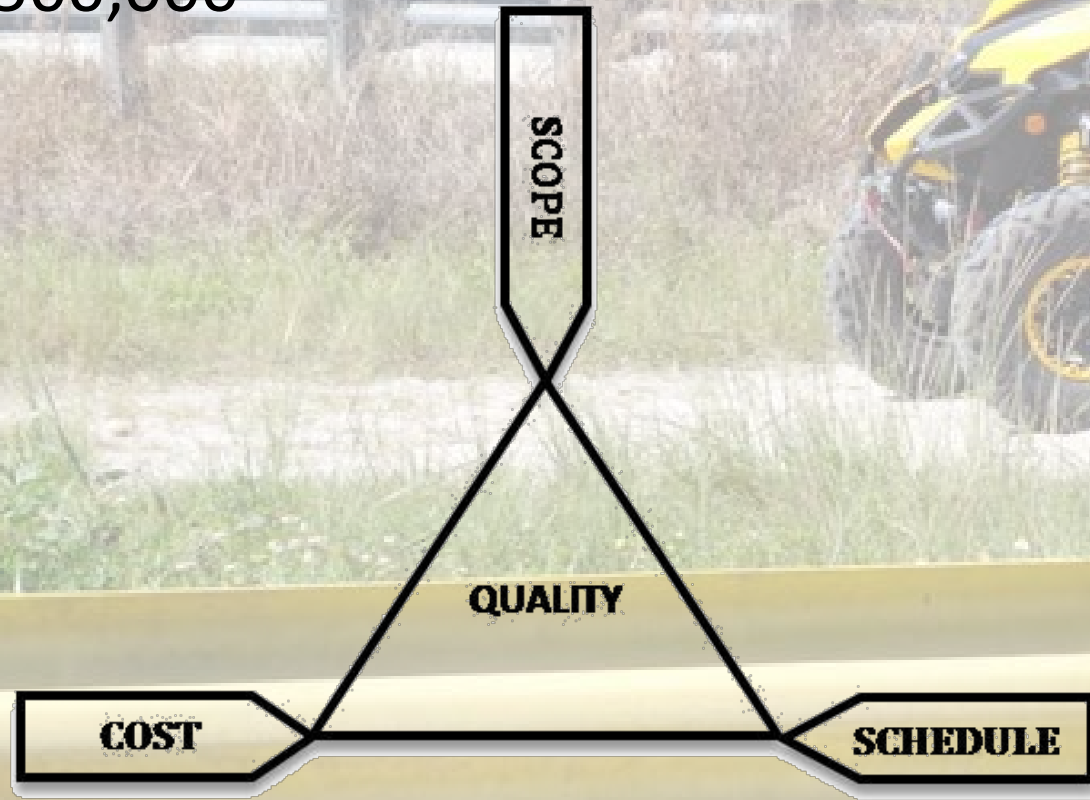
EXHIBIT 3B

Communities Represented at Corbett

- **Pine Flatwoods**
- **Cypress Sloughs and Domes**
- **Marshes**
- **Prairies**

Project Management

- Start Date January 20, 2015 – June 16, 2015
- \$500,000



10 12 2014

Approach

- 1) Public Outreach
- 2) Data Collection & Surveying
- 3) Basin Delineation
- 4) Model Development & Calibration
- 5) Performance Measures
- 6) Restoration Strategies/Management Activities
- 7) Evaluation of Management Options
- 8) Monitoring Plan

Develop and support restoration strategies and management activities that reestablish sheet flow and rainfall driven hydroperiods in order to improve the function of both terrestrial and aquatic habitats.



Public Outreach

- Public meetings with Stakeholders at key project milestones
- let them know our objectives and what we plan to do
- Get their feedback



Data Collection

Not limited to:

- Documents (L-8 Basin Divide Structure Modeling Report), Historic Hydrologic and Meteorological Data, Existing Survey Data, LIDAR, Soils, Land Use, and Management Plans
- Historic Aerial Photographs
- Historic Surveys
- Biological inventory of selected wetlands for monitoring
- SFWMD Permits in and around Corbett



Historic Aerial Photos of J.W. Corbett WMA

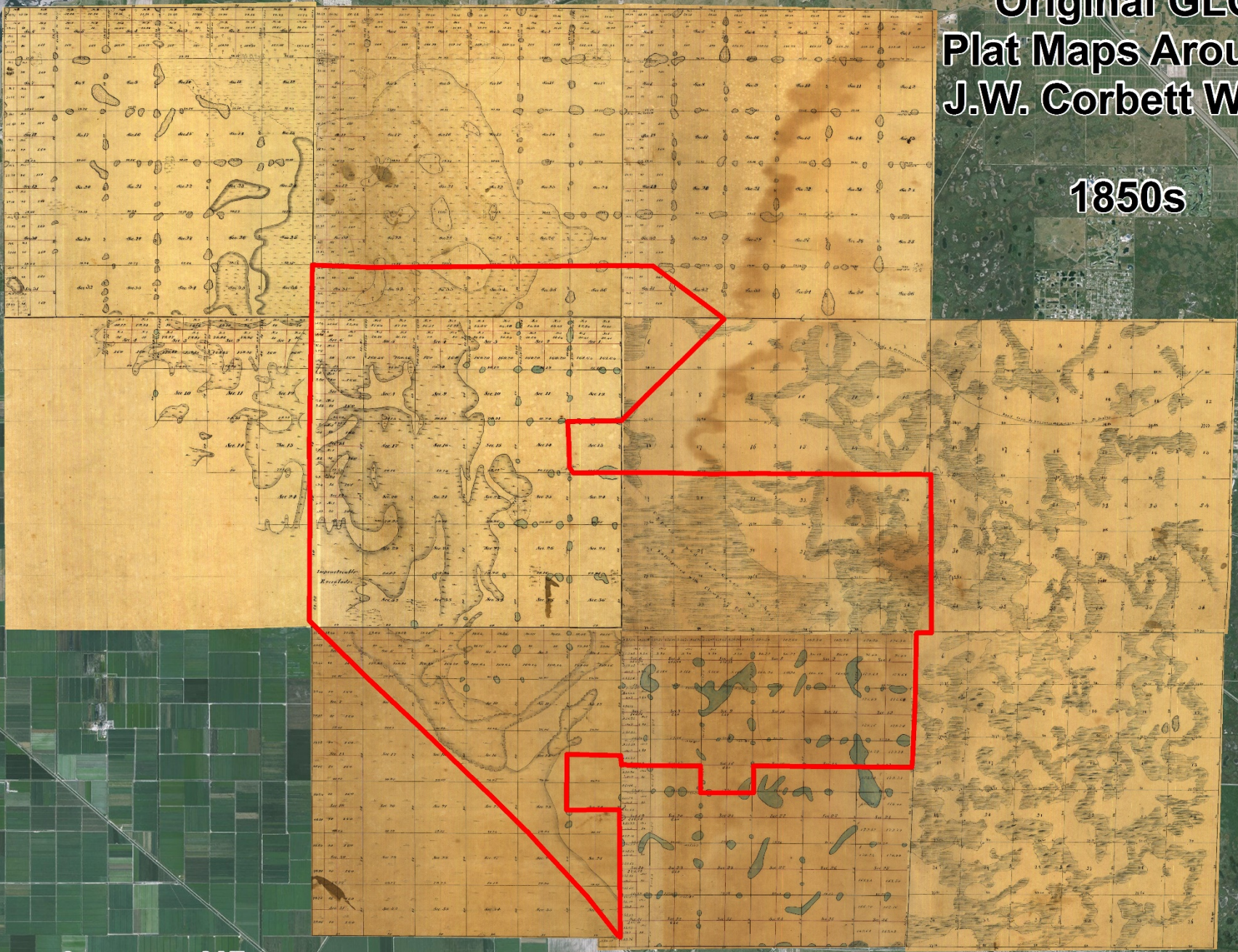


0 3 6 Miles



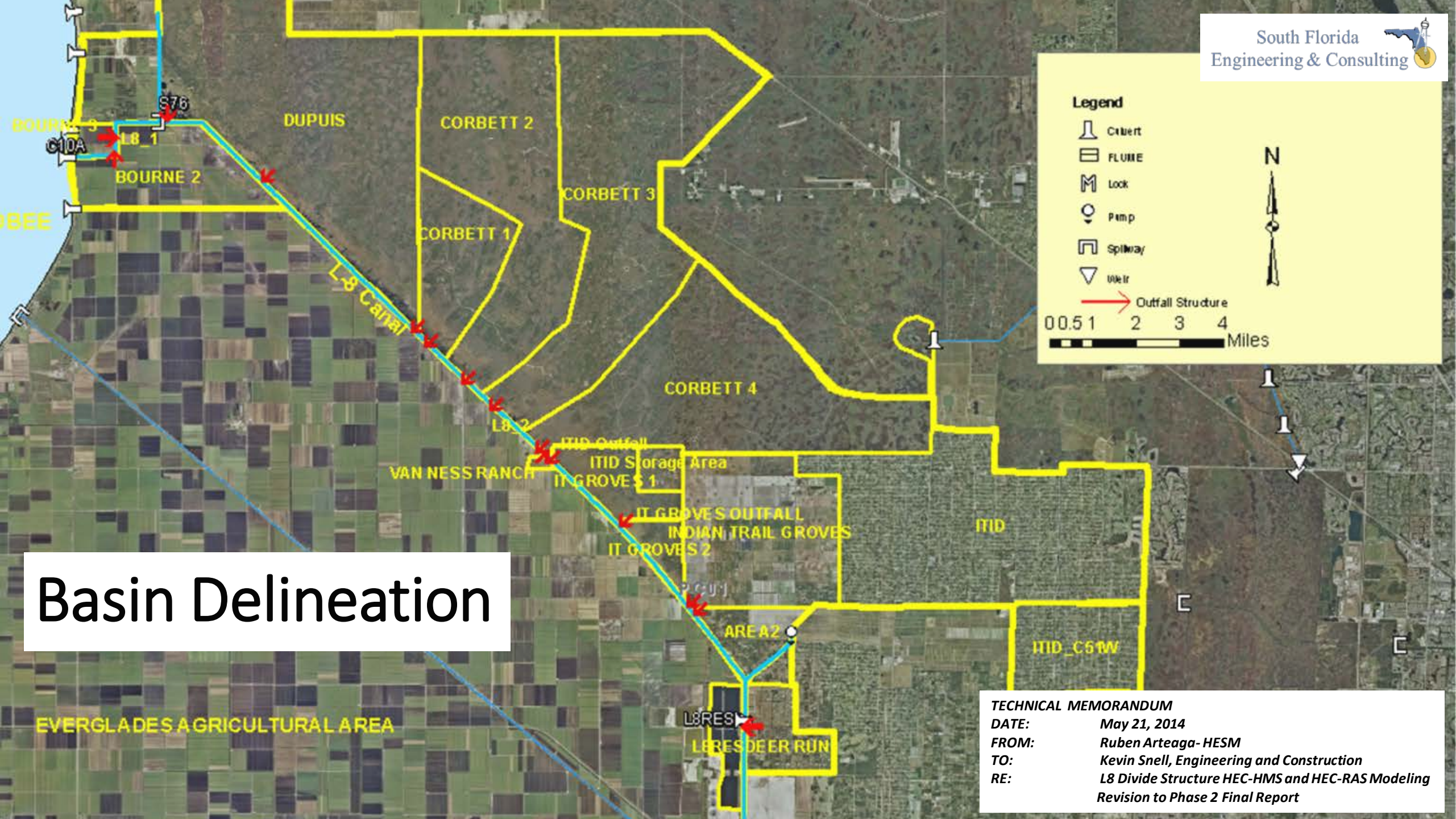
Original GLO Plat Maps Around J.W. Corbett WMA

1850s



Data Collection - Surveying

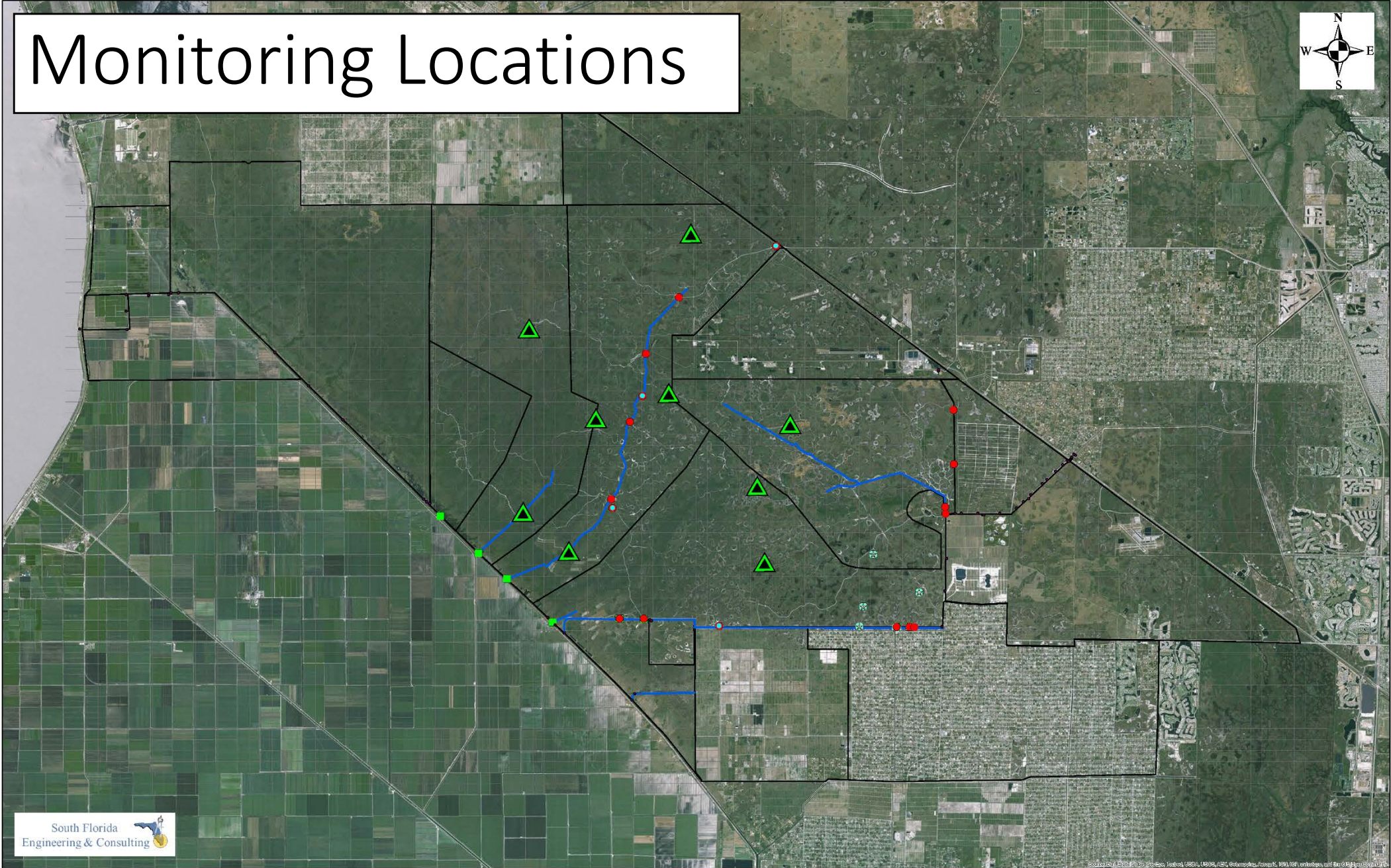




Basin Delineation

TECHNICAL MEMORANDUM
DATE: May 21, 2014
FROM: Ruben Arteaga- HESM
TO: Kevin Snell, Engineering and Construction
RE: L8 Divide Structure HEC-HMS and HEC-RAS Modeling
 Revision to Phase 2 Final Report

Monitoring Locations



Modeling Development & Calibration – S2DMM Model

- In order to evaluate the response of the project domain to hydrologic inputs and restoration induced changes: the selection and use of a hydrologic/Hydrodynamic Model is necessary
- For the this project we re using the S2DMM Model developed by TCE
- S2DMM is a coupled surface and groundwater model
- Versatile for studying changes to watershed/ with what if scenario
- **One model can be used for wetland restoration/preservation, flood studies, water management studies (permitting), and water use studies**
- S2DMM has been **certified** by SFWMD and FEMA for flood studies and has been accepted by SFWMD for hydrologic/hydrodynamic model applications for long term simulations (multiple years) of hydro-periods and hydro-patterns.

Modeling Development & Calibration – S2DMM Model

- Calibrate the Model
- Then run a 10-Year Period of Record for:
 - Existing Case Model
 - Natural Condition Model
 - Future Projects Model

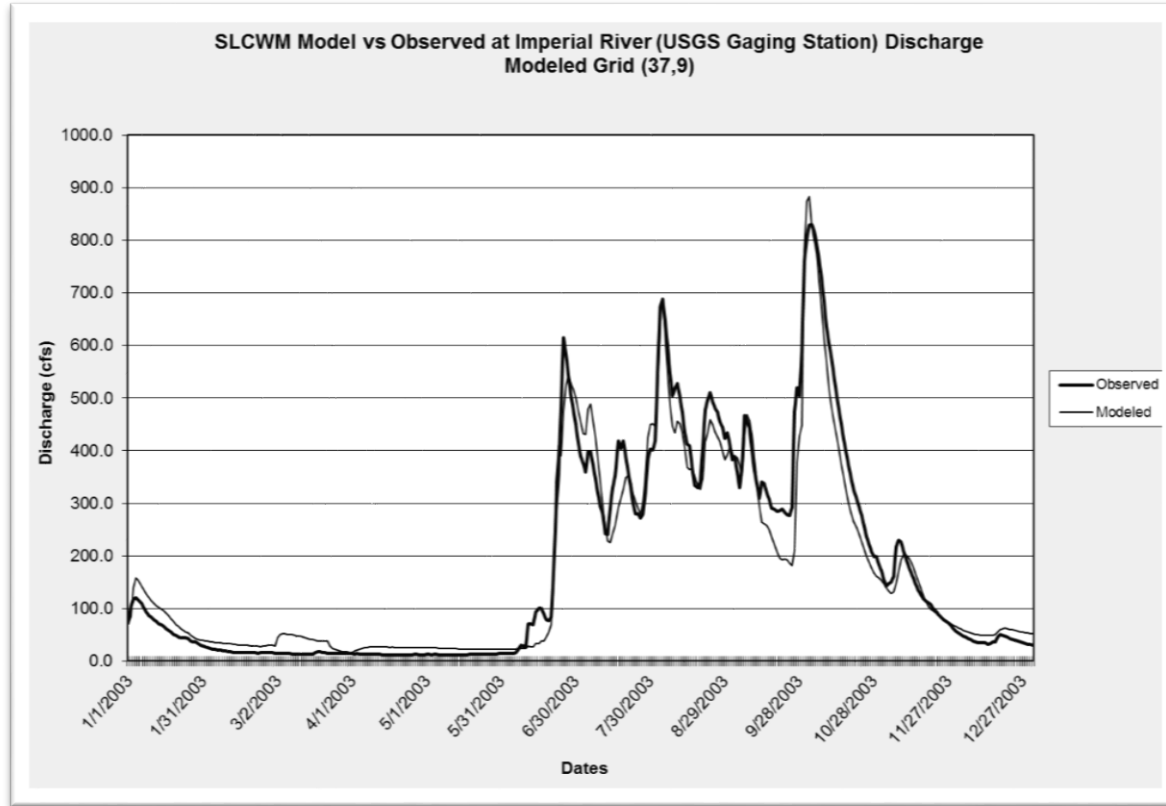
S2DMM Model Features – Natural Systems Model

2 –dimensional grid based model

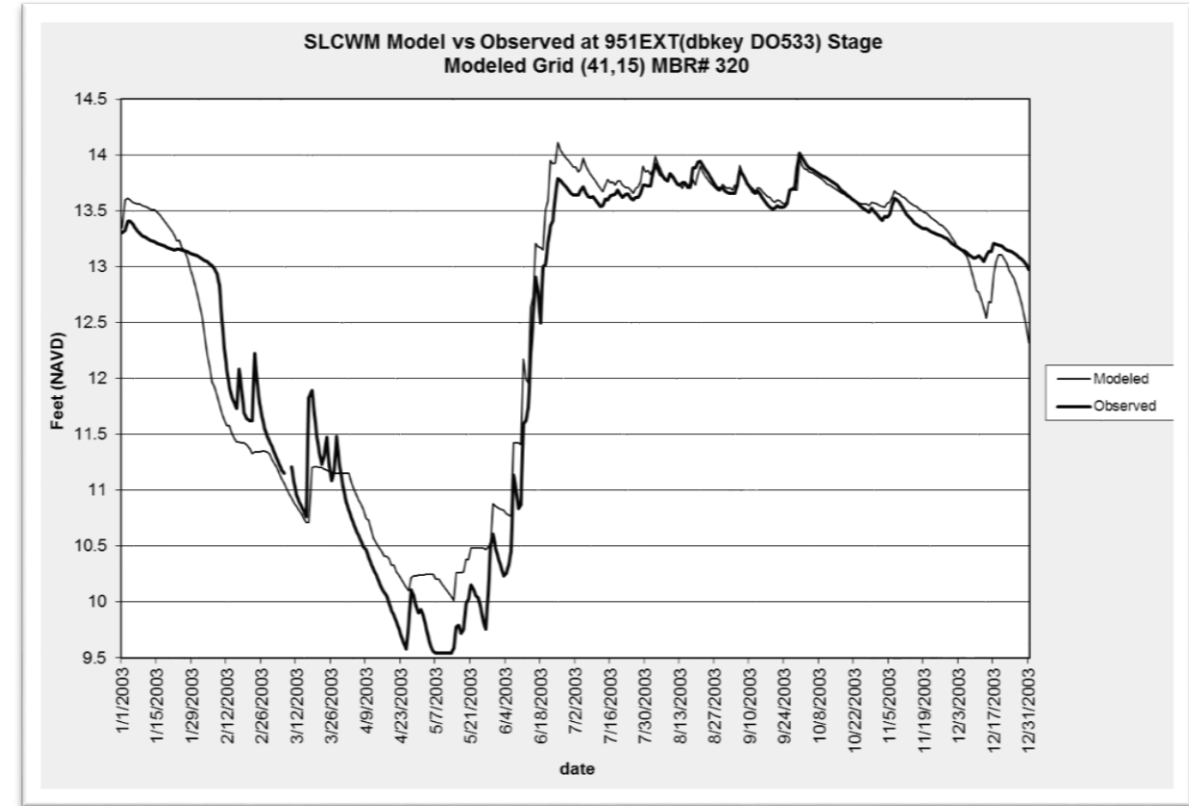
- 100 subcells per computation cell (soils and LiDAR topography using GIS processing) – stage/storage and sheetflow cross sections.
- GIS processed Land use/cover determines sheetflow friction and evaporation factors
- Channel hydrodynamics
- Numerous options for structure inputs
- Permitted water management systems
- Closed conduits for storm sewer systems
- Ground water handled by integrated MODFLOW routines (MODFLOW grid coincident with S2DMM grid)

S2DMM Applications

Flow (cfs)



Stage (ft)





Develop Performance Measures

Establish locations to Monitor & Evaluate for:

- **Pine Flatwoods**
- **Cypress Sloughs and Domes**
- **Marshes**
- **Prairies**

Hydroperiod – Water depths

Plant Community Composition

Water Regulation Schedules

- **Adjacent Landowners**

Develop and support restoration strategies and management activities that reestablish sheet flow and rainfall driven hydroperiods in order to improve the function of both terrestrial and aquatic habitats.

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Hydroperiod

Describes the **distribution, depth and duration/timing of water across the landscape**

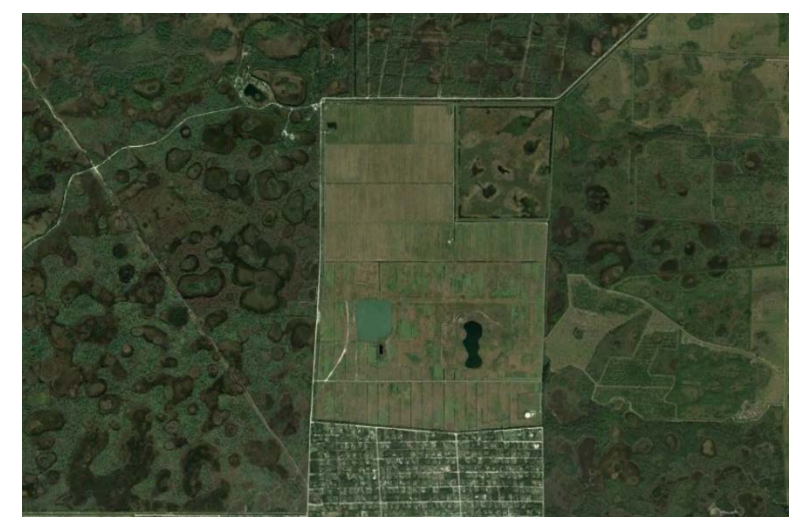
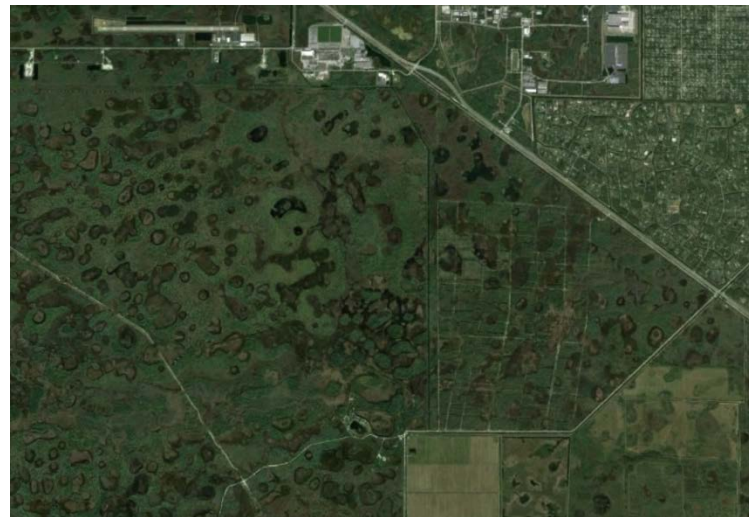
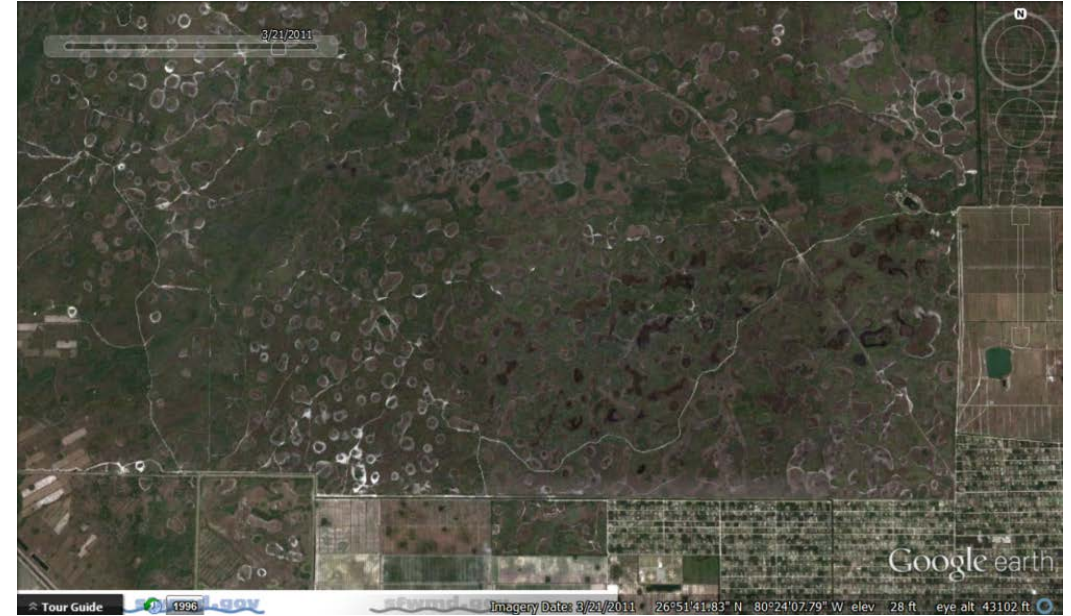
(Townsend et al. 2001, Gottlieb et al. 2006).

Effects landscape pattern and community structure (and function) (Browder et al 1981. Deuver et al. 1979)

Develop and support restoration strategies and management activities that reestablish sheet flow and rainfall driven hydroperiods in order to improve the function of both terrestrial and aquatic habitats.

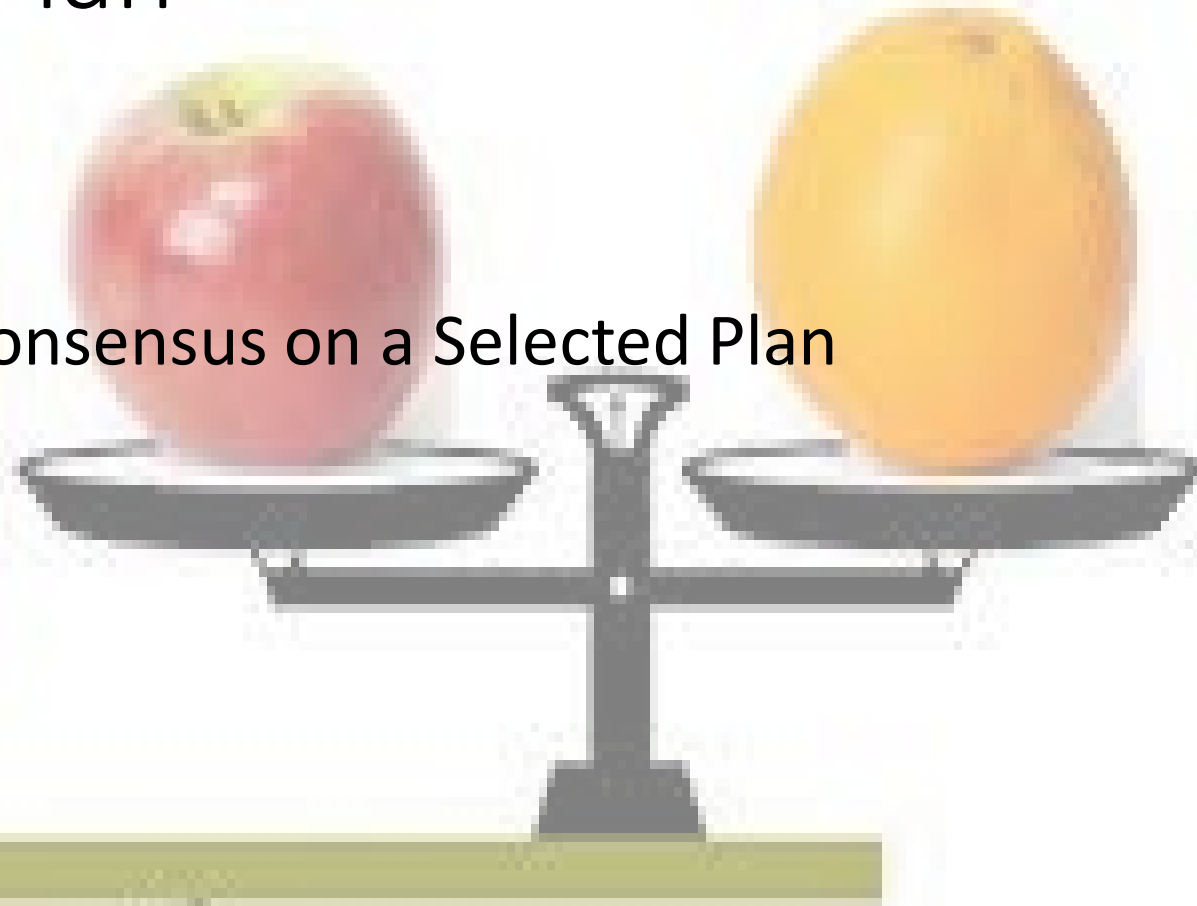
Development of Restoration Strategies & Management Activities

- Optimize Operation of Existing System
- Revised Regulation Schedule
- Seepage Barriers, Culverts & Plugs
- Leon Moss Restoration
- Hungry Land Slough Restoration
- Mecca Farms Reservoir



Compare Options and Select a Recommended Plan

- Evaluate Environmental benefits
- Evaluate Costs
- With all of the facts work toward a consensus on a Selected Plan





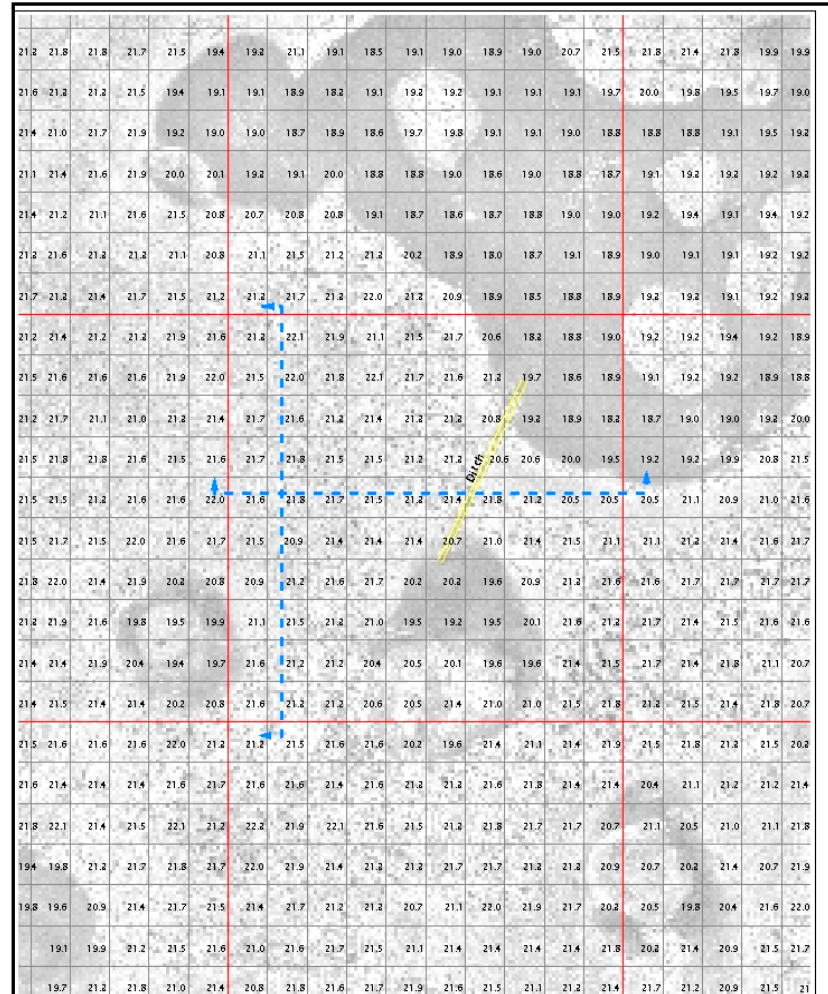
Develop Monitoring Plan & Final Report

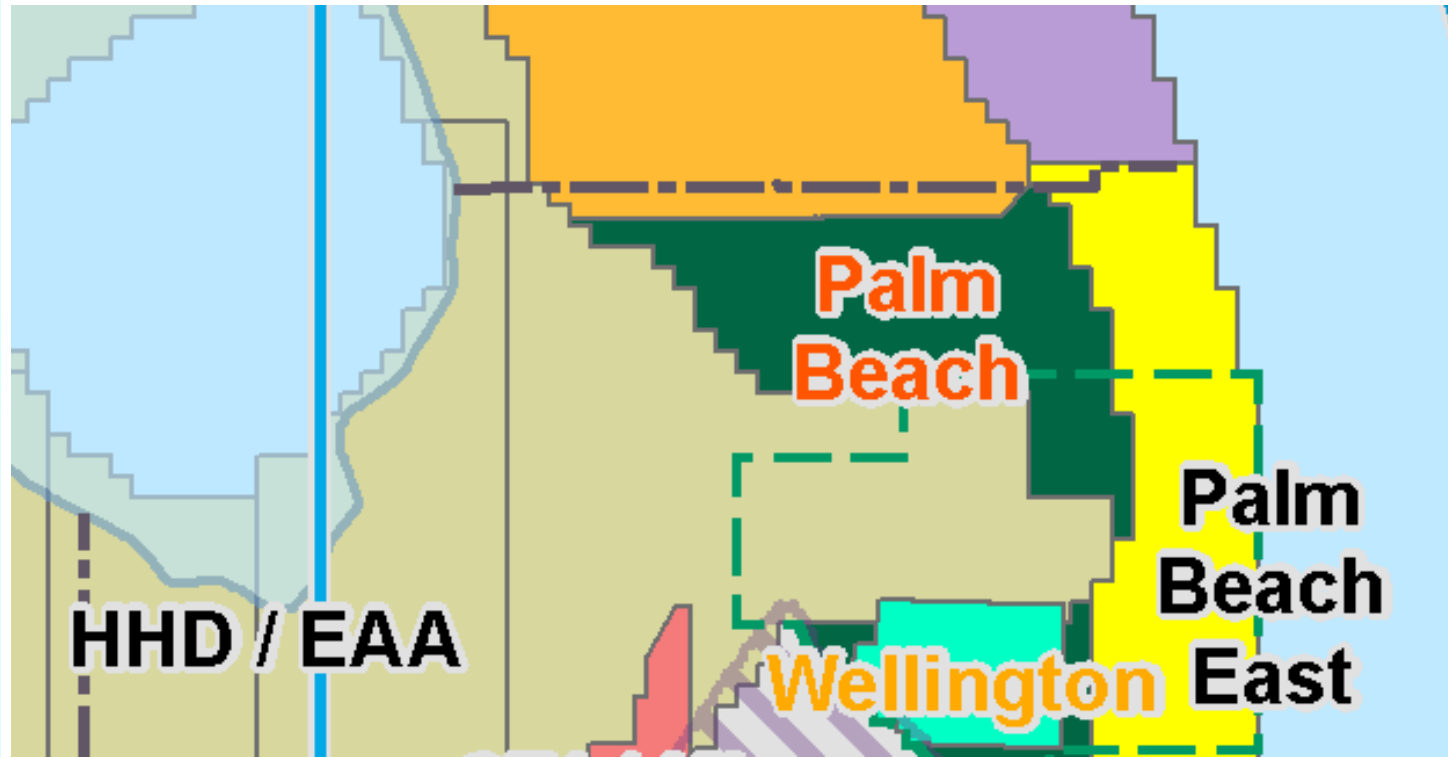
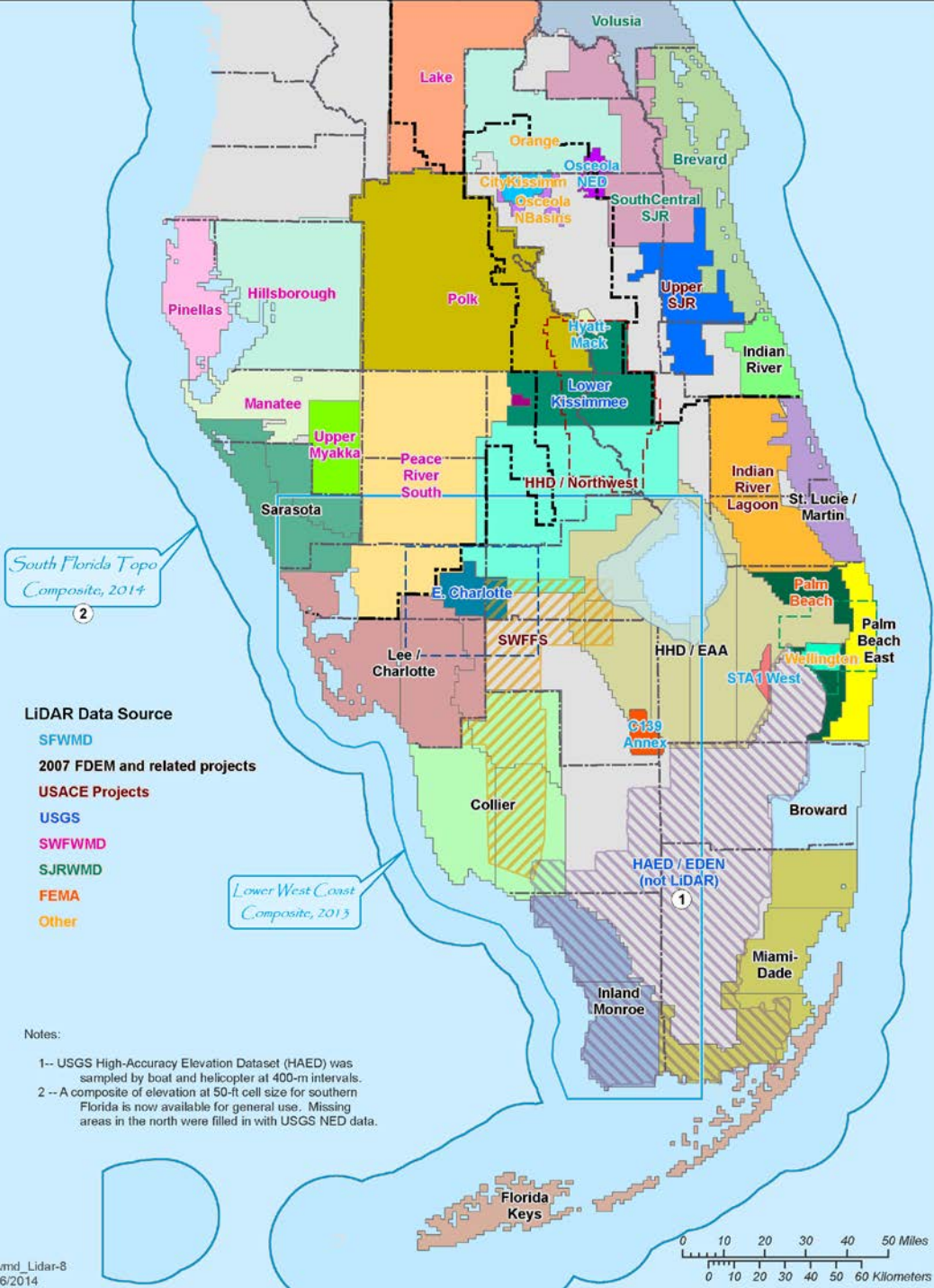
- Locations
 - Select Internal ponding areas (Trigger Sites)
 - Important Internal Structures as defined by project team
 - Boundary structures (Weirs, Culverts, Pumps etc)
- Types of Equipment
- Monitoring Frequency

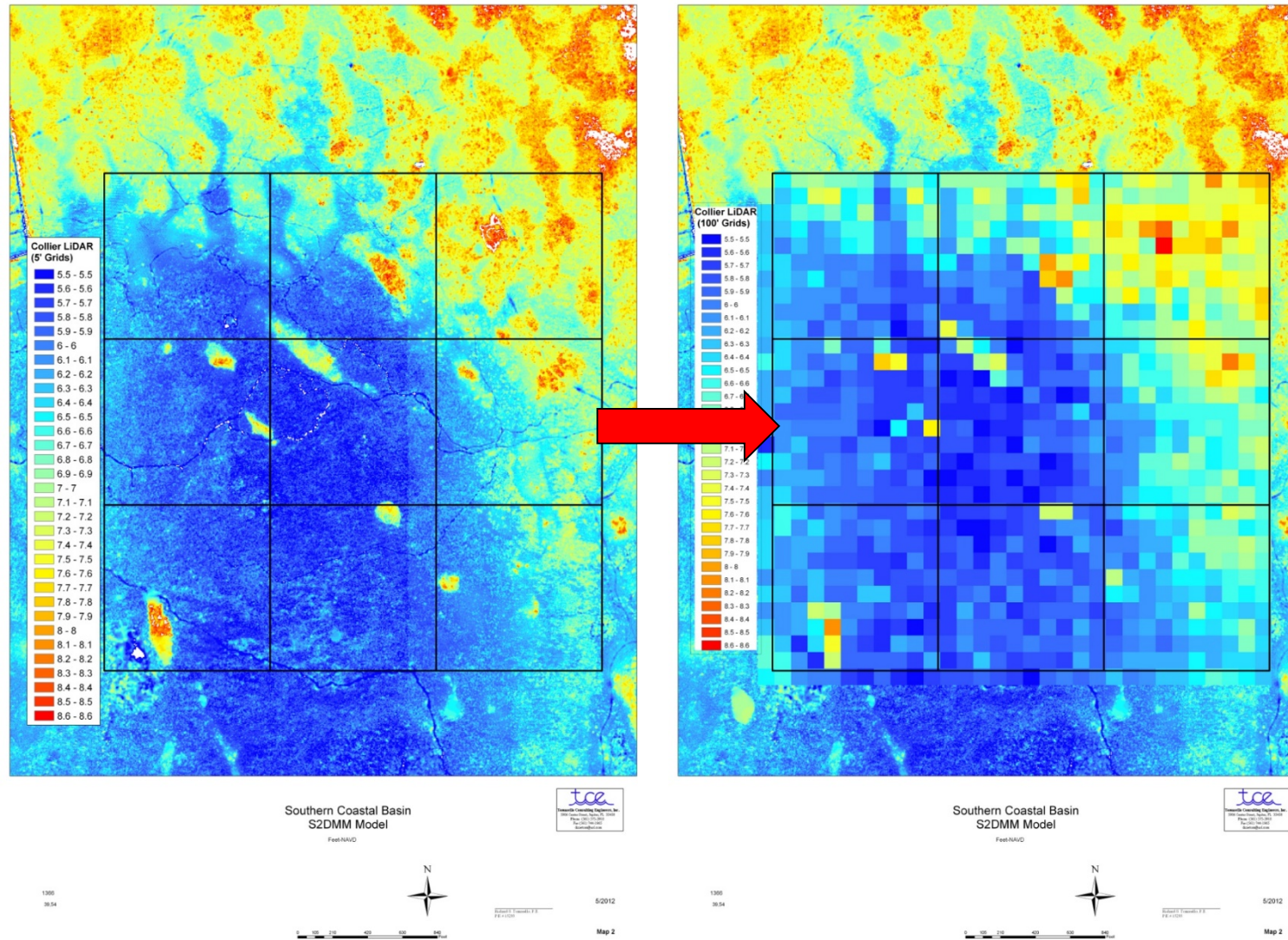


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The sub cell procedure of defining topography and soils allows for accurate stage/storage calculations and sheet flow cross – section definition





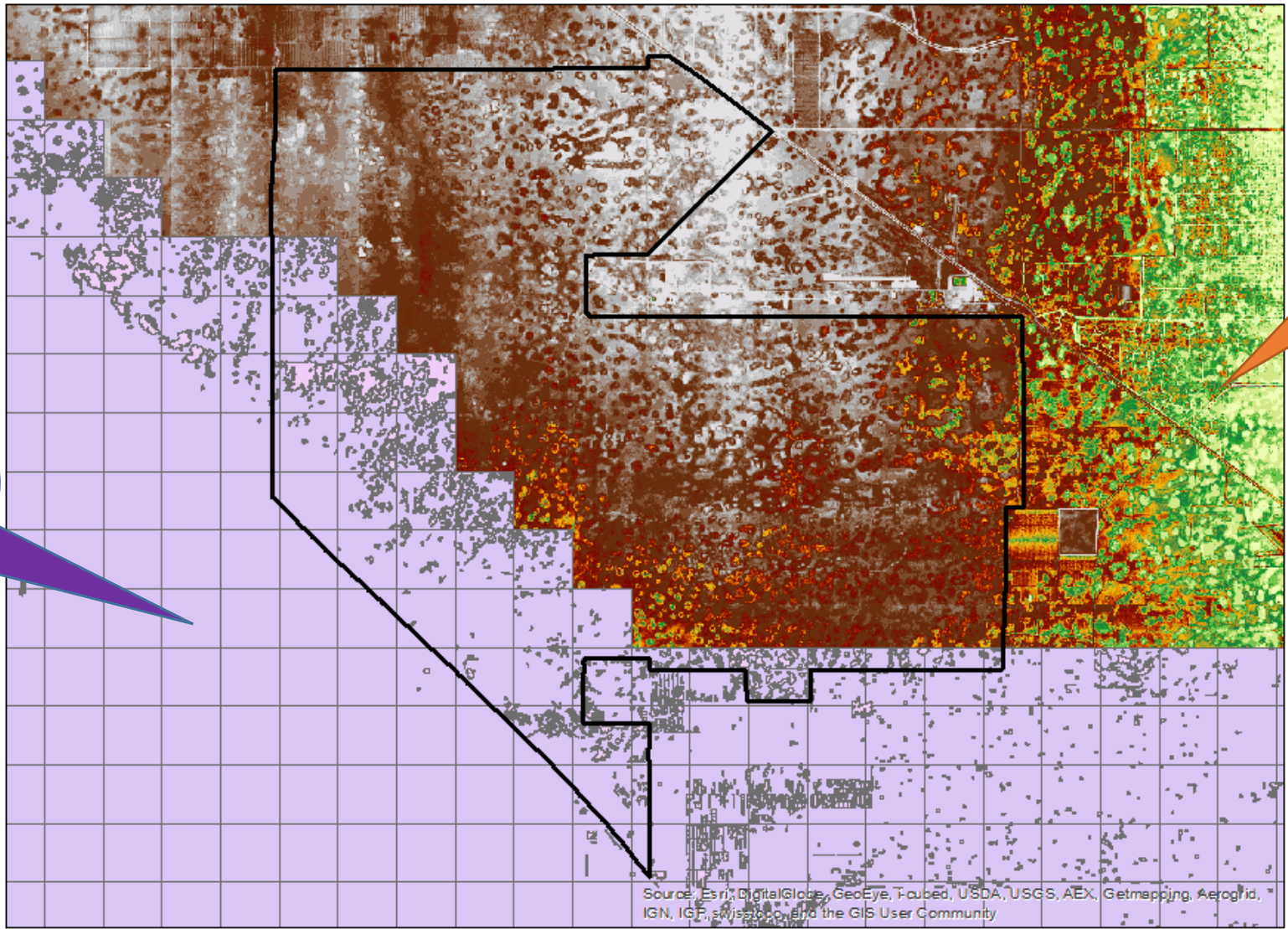


USACE 1999 VS
Herbert Hoover Dike/Everglades Agricultural Area LIDAR Coverage
Flown between Sep. and Dec. 2007



HHD EAA
LIDAR
Flown 2007

USACE LIDAR
Flown 1999



Source: Esri, DigitalGlobe, GeoEye, T-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

