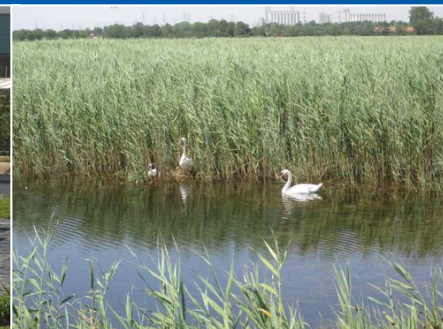
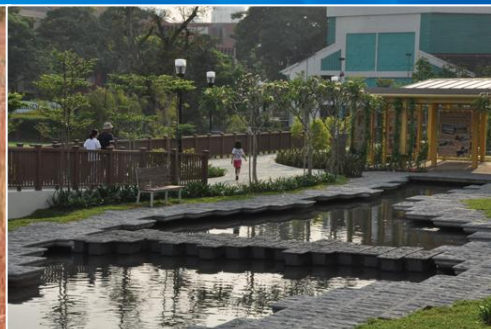


CH2MHILL®



Getting the Water Right: Practical Experience in Large-Scale Wetlands Restoration

9TH INTECOL International Wetlands Conference
June 7, 2012 Orlando Florida



Examples from USDA Natural Resources Conservation Service (NRCS) Wetland Reserve Program's Success in Florida

Client: USDA Natural Resources Conservation Service

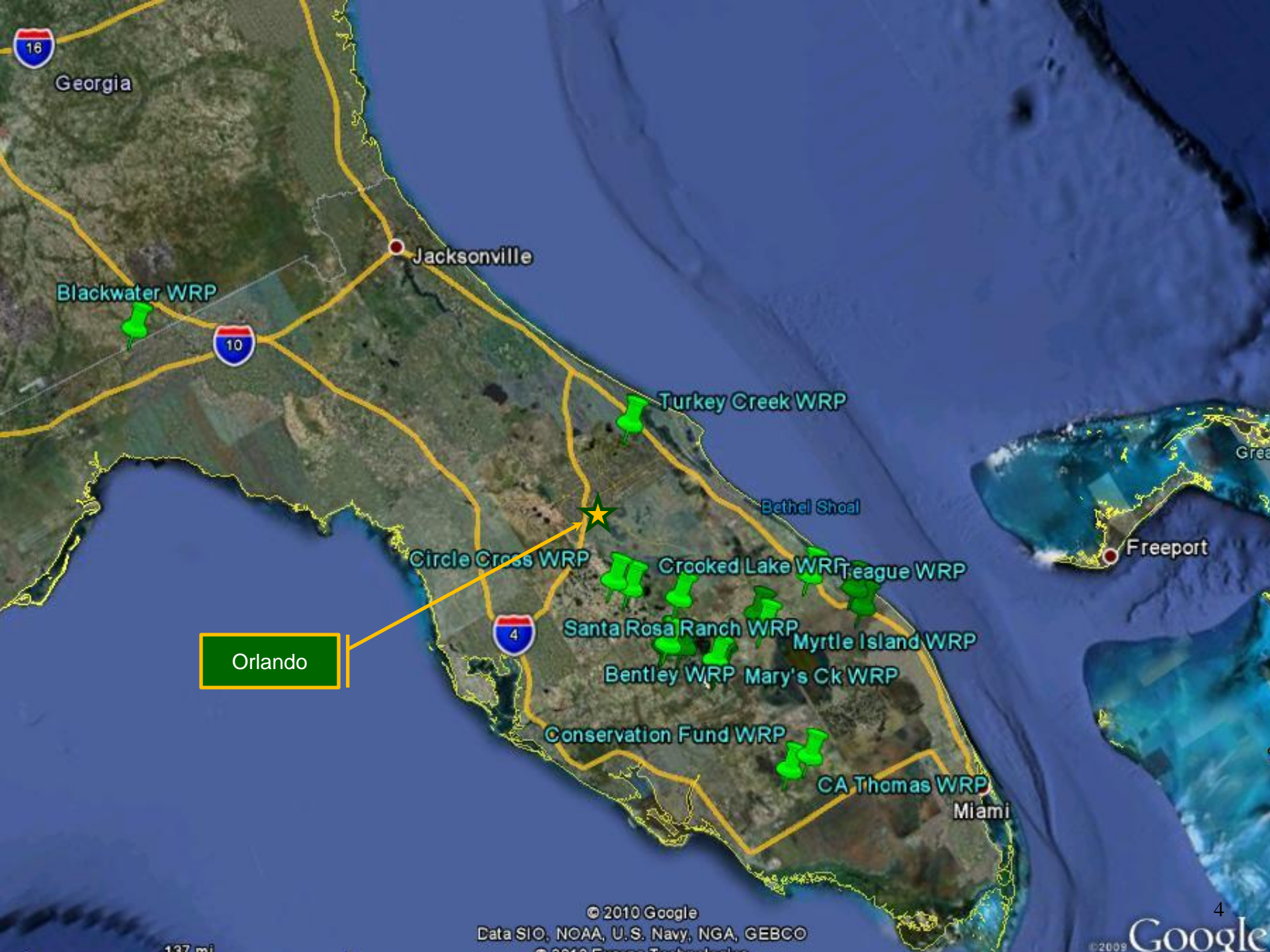
**Authors: Mitchell L. Griffin, Ph.D., P.E.
Richard T. Morrison, P.E.
Martha K. Burlingame**

**CH2M HILL Water Resources/Environmental
Management Technology Services**

CH2M HILL's Wetland Reserve Program contract with USDA in FL

- CH2M HILL has provided A&E design services for hydrologic restoration of over 22,235 ac. (9,000 ha) of conservation wetlands since 2005
- Twenty-two projects across Florida
 - 40 to 2,800 acres in size (16 to 1,135 ha)
 - 13 constructed
 - 3 under construction (or bidding)
 - 2 designs on shelf
 - 4 under planning and design





Orlando

Jacksonville

Blackwater WRP

Turkey Creek WRP

Bethel Shoal

Freeport

Circle Cross WRP

Crooked Lake WRP Teague WRP

Santa Rosa Ranch WRP

Myrtle Island WRP

Bentley WRP Mary's Ck WRP

Conservation Fund WRP

CA Thomas WRP

Miami

© 2010 Google

Data SIO, NOAA, U.S. Navy, NGA, GEBCO

© 2009 Google

137 mi

Wetland Reserve Program

- Voluntary federal program eligible to individual farmers/rural
 - Annual enrollment, must have degraded wetlands that would benefit from restoration
 - Permanent conservation easements allows NRCS to do what it needs to restore wetlands
 - Owner retains land ownership but are subject to NRCS management plans

Field Office Technical Guide
Section IV

NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD

WETLAND RESTORATION
(Acre)

CODE 657



CONDITIONS WHERE PRACTICE APPLIES

This practice applies only to natural wetland sites with hydric soils which have been subject to the degradation of hydrology, vegetation, or soils.

This practice is applicable only where the pre-disturbance hydrologic conditions can be approximated by actions such as modifying drainage, restoring stream/floodplain connectivity, removing diversions, dikes, and levees, and/or by using a natural or artificial water source to provide conditions similar to the pre-disturbance conditions.

For more details, see:

http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/programs/farmbi11/?&cid=nrcs143_008419



Recipe for Success

- A long-term commitment to conservation management
 - The WRP is a permanent easement (current practice)
- Soils!
 - Have to have hydric soils (considered in enrollment)
- Hydrology
 - Poor drainage potential
 - No offsite impact if existing drainage is blocked/controlled

The potential restoration must be considered in the enrollment process.

You have to be able to keep the site wet longer post-restoration!



Getting the Water Right!

“Field of Dreams” philosophy

- If the site is kept wet longer, wetland species will repopulate from the edaphic seed bank or by other natural paths
 - Adaptive management approach
 - Hydroperiod must be restored to historic elevations, as practical
 - Example range, marshes inundated 2 to 3 months (in FL)
 - Simulate water balance (SPAW model)
 - No offsite impacts during large storms
 - Peak runoff rates and elevations
 - Simulate stormwater design storms (ICPR model)



Hydroperiod Simulation by USDA SPAW Model

■ Field & Pond Hydrology

- Field-based water balance focused on soil profile and crop interaction to predict runoff

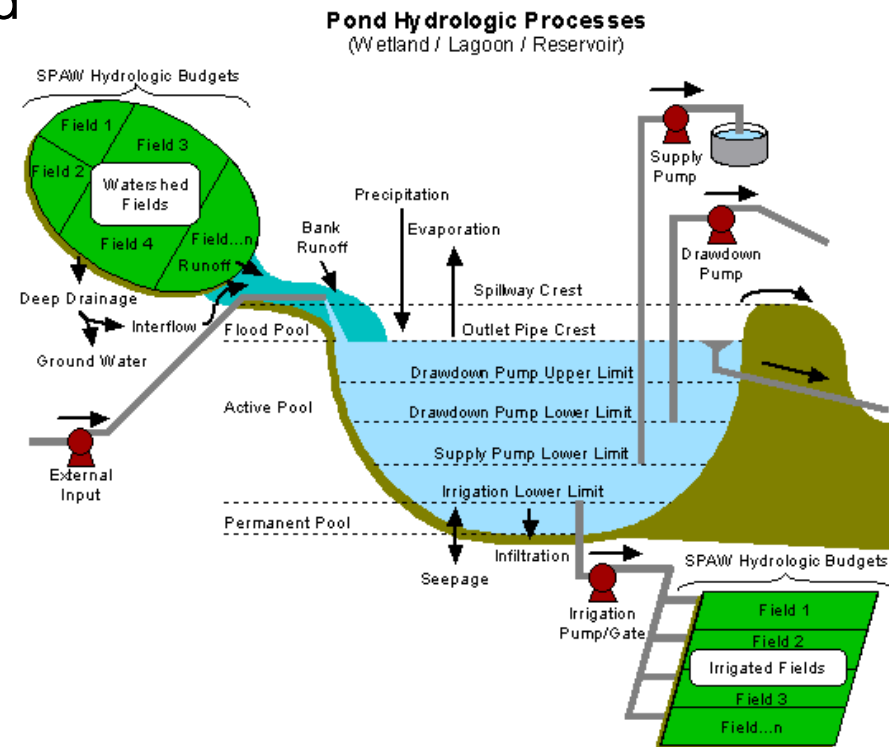
- Continuous simulation of 20+ years

- Pond Water Balance of Pond/Wetland Levels

- Inundation Period
 - Depth-Duration Curves

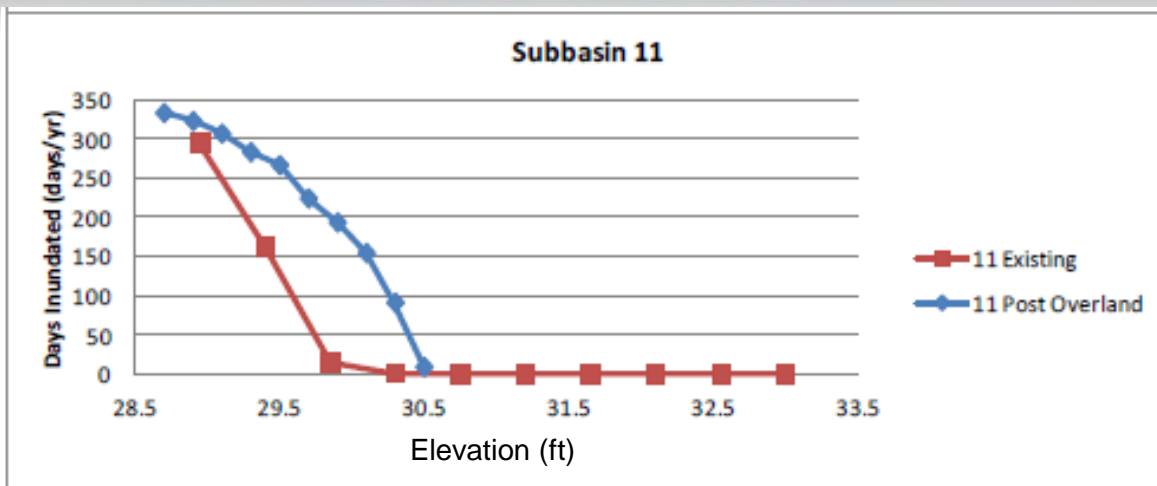
- Developed by:

Dr. Keith Saxton
USDA-ARS
Washington State University

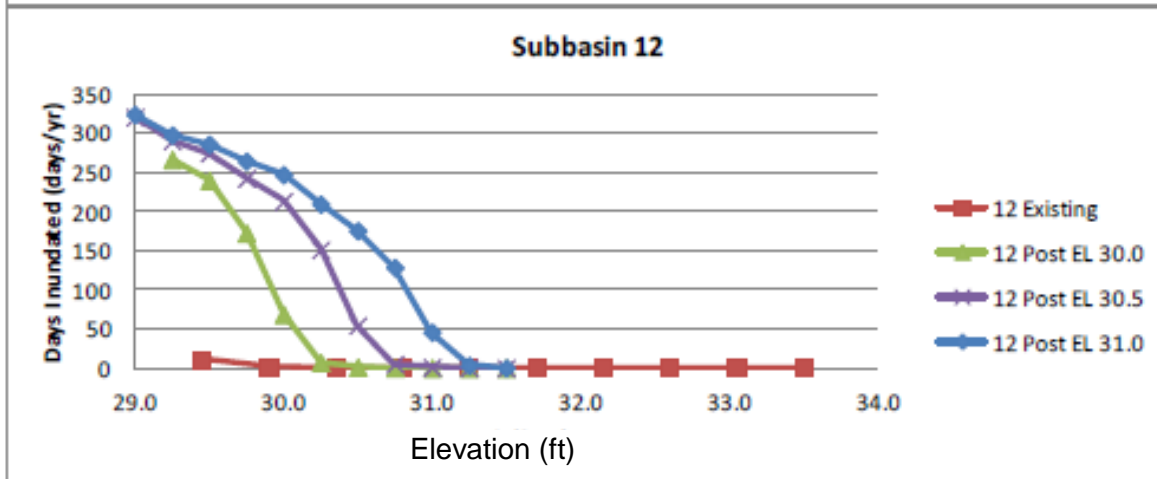


By Blocking or Raising Overflow Elevations, Inundation Periods Increase

- Block ditches to restore overland flow

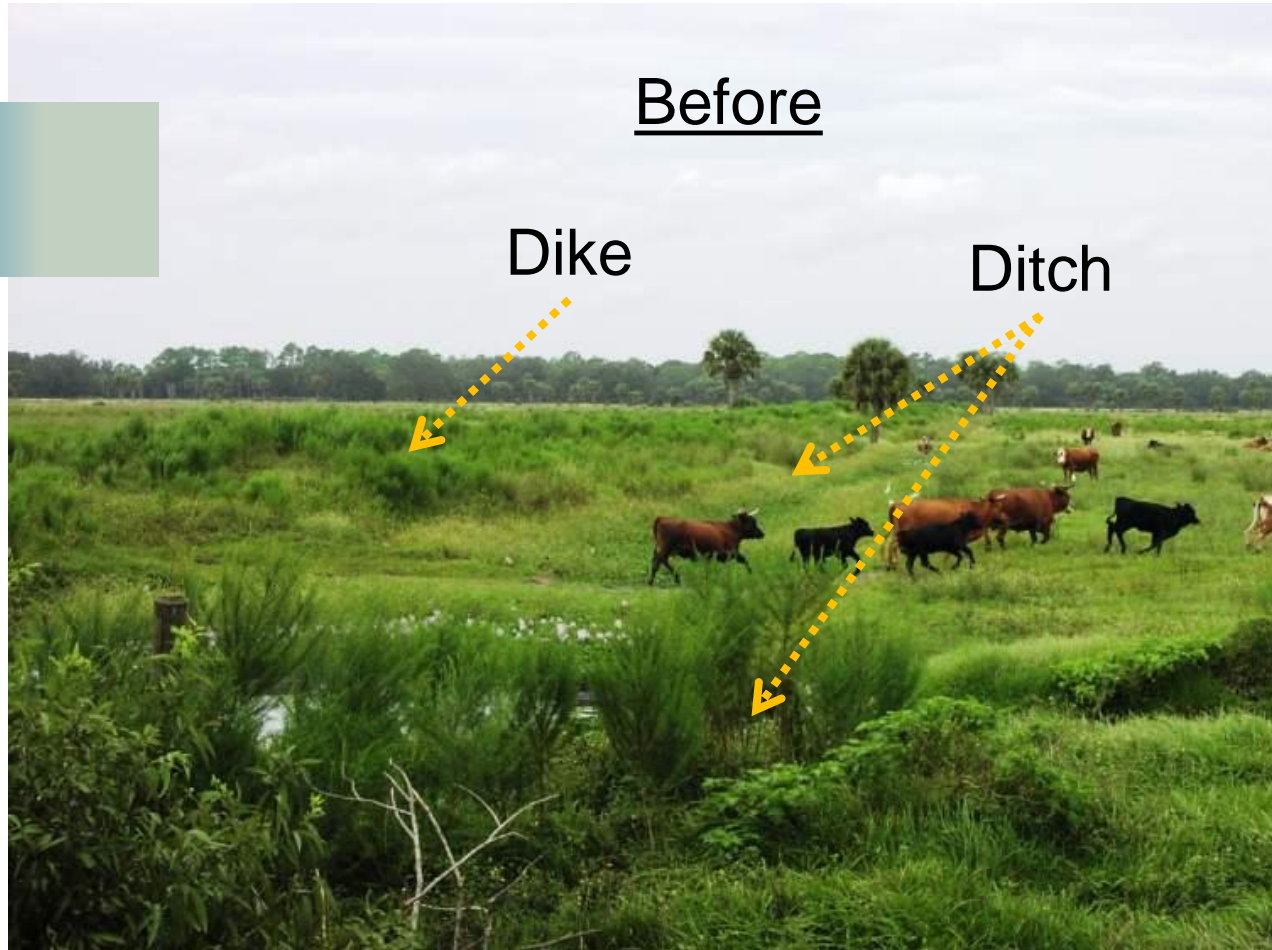


- Water Control Structure



Before and Targeted Post-Hydrologic Restoration Conditions

Before:
Ditched



Before and Targeted Post-Hydrologic Restoration Conditions

After:
No ditches

Target:
Next field over

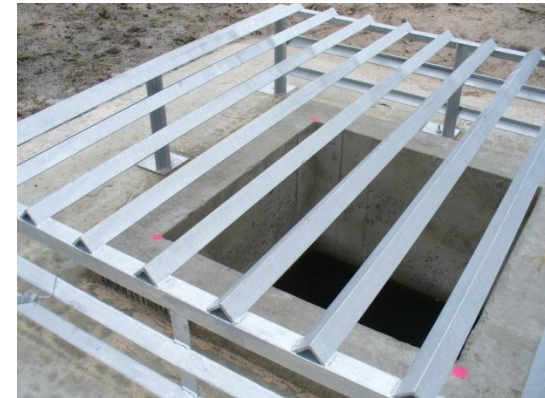


Tools to Hydraulically Restore Sites

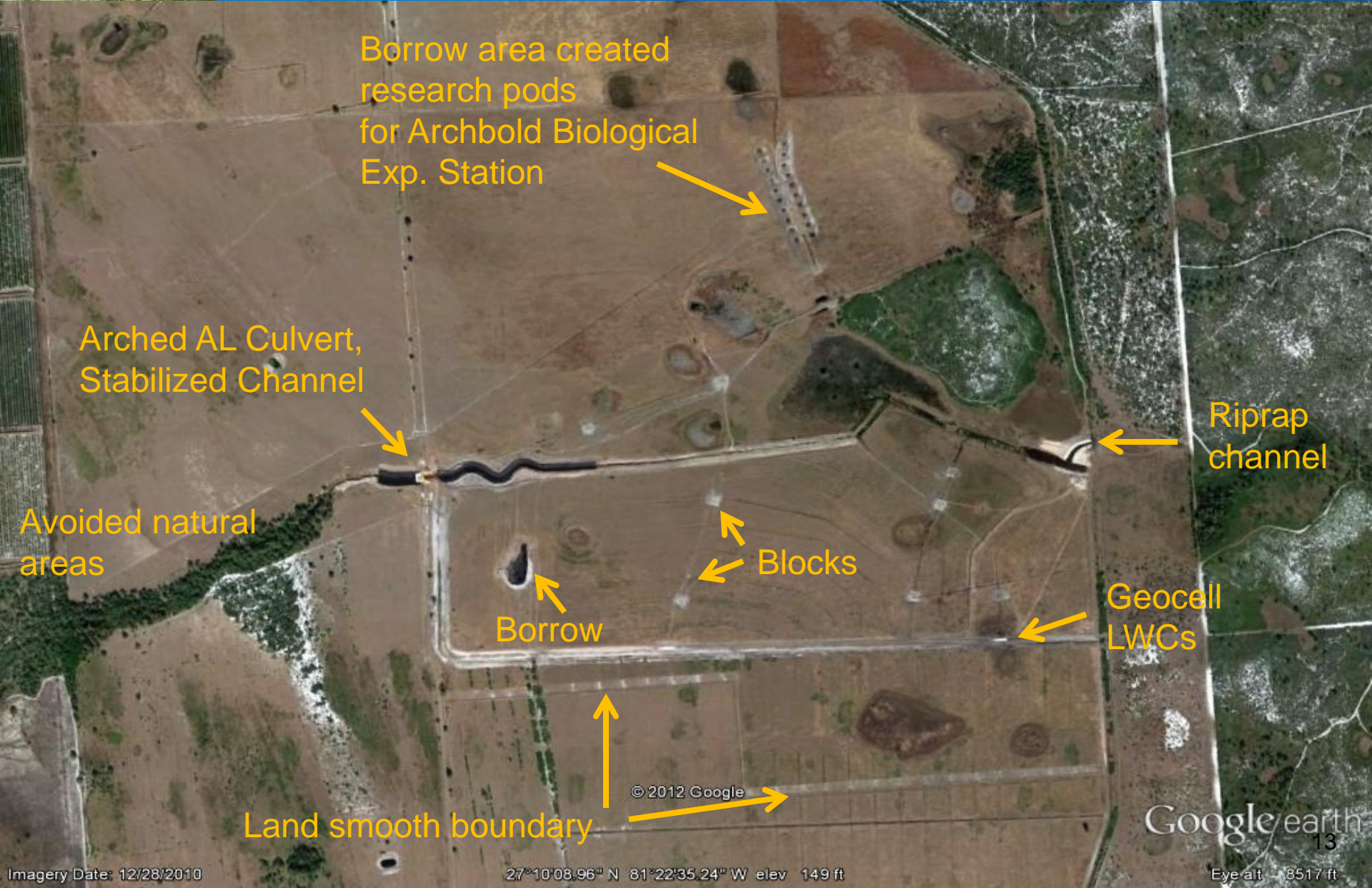
- Ditch Blocks (only fill whole ditch occasionally)
- Land Smoothing/Leveling Roads
- Dikes to retain water (limit offsite impacts)
- Low Water Crossings (LWCs)
- Water Control Structures (WCSs), Culverts, and Spillways
 - Most WCSs are concrete because of permanent easement



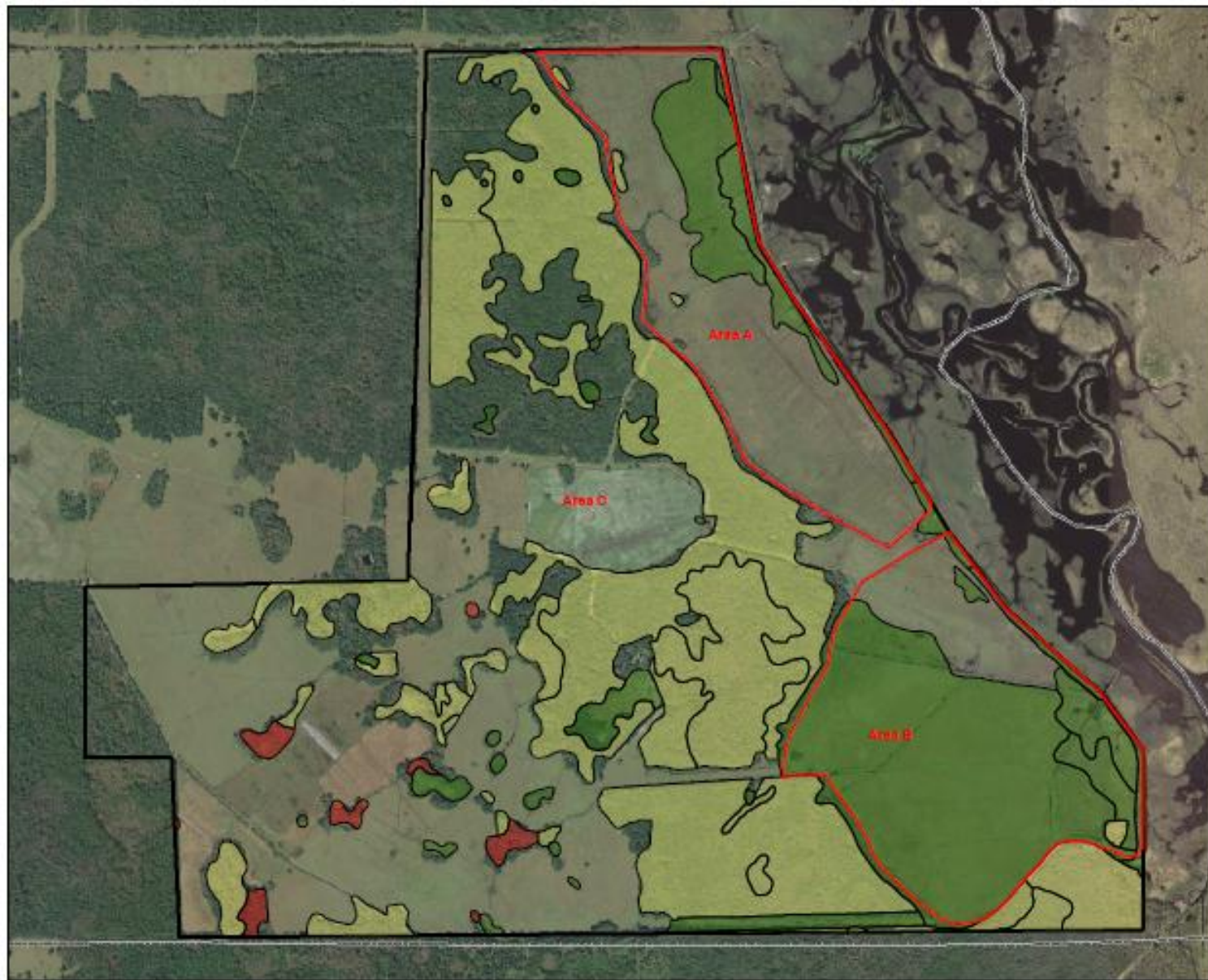
Photo Credit: NRCS



Constructed Example, Mary's Creek



Constructed Example, Turkey Creek WRP



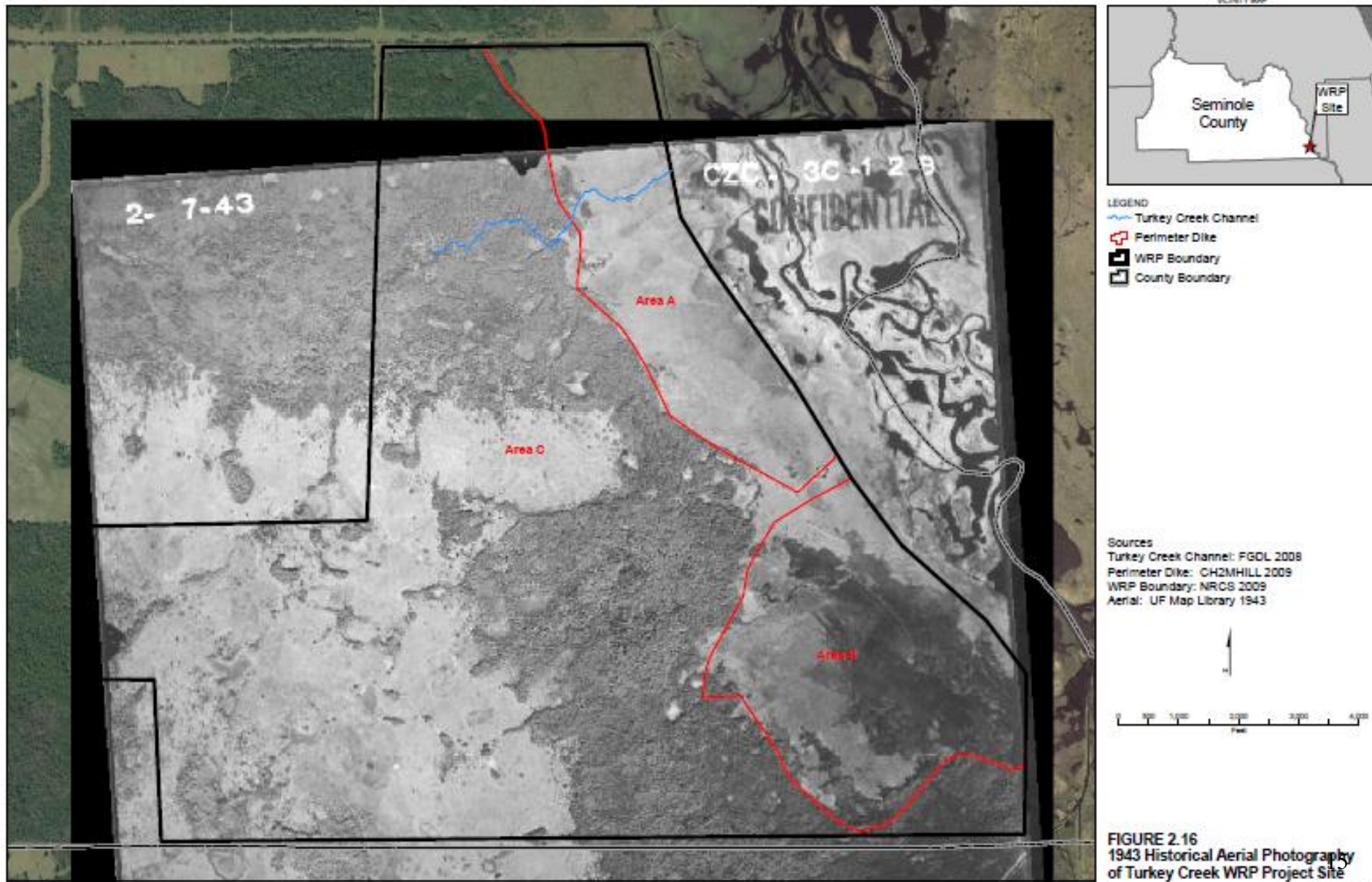
- LEGEND
- Perimeter Dike
 - National Wetlands Inventory
 - FAB/PEM (Freshwater Marsh)
 - PFO (Forested Wetlands)
 - PSS (Shrubby Wetlands)
 - WRP Boundary
 - County Boundary

Sources
NWI: USFWS 2006
Perimeter Dike: CH2M HILL 2009
WRP Boundary: NRCs 2009



FIGURE 2.13
NWI Map of Turkey Creek WRP
Project Site

Constructed Example, Turkey Creek WRP



Constructed Example, Turkey Creek WRP



Removed
dikes isolating
flood plain,
kept a portion
for horse trail
(with LWCs)

Block ditches
draining isolated
wetlands, leveled
roads

© 2012 Google

Google earth

16

Turkey Creek's Pre-project Floodplain was Isolated and Pumped Dry



Turkey Creek is Beginning to Return; Floodplain to Reclaim Itself w/ Seasonal Floods





Summary of Hydrologic Restoration Project Effort and Construction Cost

- Typical effort (after enrollment in WRP):
 - Surveying (topo); Investigations: Cultural Resource, T&E Species, and Invasive Exotic Plant Species; Preliminary Plan; and Coordination with Owners and Tribes (NRCS conducts these)
 - Engineering Design and Permitting (A&E or NRCS)
 - Construction Inspection and Certification (NRCS)
- Hydrologic Restoration Construction Cost Ranged from \$64K to \$1.33M; or \$50/ac to \$3,010/ac (median \$500/ac [\$1,230/ha])
 - Limited exotic species removal included in above \$/ac
 - Exotic species removal can cost up to nearly the same as the hydrologic restoration at some sites.
 - Construction inspection services by NRCS
- Follow-up O&M and Inspection Required



Florida WRP is Highly Successful

- Florida has a large historic loss of wetlands to agriculture
 - WRP is restoring conservation wetlands
- Creating improved wetland communities, particularly:
 - Wet Marsh
 - Seepage Slopes
 - Wet Prairies
- Faster rate of implementation through A&E contracting
 - CH2M HILL designed over 22,000 acres at 22 locations since 2005



CONSTRUCTION DOCUMENTS
FOR
TURKEY CREEK
WETLAND RESTORATION PROJECT
SEMINOLE COUNTY

PREPARED FOR
NATURAL RESOURCES CONSERVATION SERVICE
WETLANDS RESERVE PROGRAM

LOCATION IN FLORIDA

PROJECT DESCRIPTION

WETLAND RESTORATION PROJECT
TURKEY CREEK WETLANDS RESTORATION PROJECT
SEMINOLE COUNTY, FLORIDA

DWG NO.	SUBMIT TITLE
01	GENERAL NOTES, CONDITIONS, CONTRACT, AND LEGEND
02	PROPOSED WETLANDS
03	EXISTING WETLANDS
04	PROPOSED WETLANDS
05	EXISTING WETLANDS
06	PROPOSED WETLANDS
07	PROPOSED WETLANDS
08	WETLANDS
09	WETLANDS
10	WETLANDS

LOCATION MAP

CH2MHILL
3011 LAKE PALMWAY, SUITE 100
ORLANDO, FL 32817
AN OFFICE OF BURNS & MCDERMOTT

PREPARED FOR:
USDA NRCS
United States Department of Agriculture
National Resources Conservation Service

Questions

