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

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

Client: USDA Natural Resources Conservation Service

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CH2M HILL Water Resources/Environmental Management Technology Services

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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
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

For more details, see:
http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/programs/farmbill/?&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!
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)
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

Hydroperiod Simulation by USDA SPAW Model
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

Dike

Ditch
Before and Targeted Post-Hydrologic Restoration Conditions

**Target:**
Next field over

**After:**
No ditches
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
Construct Example, Mary’s Creek

- Borrow area created research pods for Archbold Biological Exp. Station
- Arched AL Culvert, Stabilized Channel
- Riprap channel
- Geocell LWCs
- Avoided natural areas
- Blocks
- Borrow
- Land smooth boundary

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Constructed Example, Turkey Creek WRP
Constructed Example, Turkey Creek WRP
Block ditches draining isolated wetlands, leveled roads

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

Constructed Example, Turkey Creek WRP
Turkey Creek’s Pre-project Floodplain was Isolated and Pumped Dry

Before, creek is cut off from floodplain
Turkey Creek is Beginning to Return; Floodplain to Reclaim Itself w/ Seasonal Floods
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
Questions