

Wetland Restoration on Florida Cattle Ranches: NRCS Wetland Reserve Program

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Introduction:

Under the USDA Natural Resource Conservation Service (NRCS) Wetland Reserve Program, AMEC has been tasked to prepare the Wetland Reserve Plan of Operation (WRPO) for several easement tracts in central and south Florida; key components for addressing natural resource concerns affecting Lake Okeechobee and the Everglades ecological restoration goals. The NRCS Wetland Reserve Program is voluntary, offering landowners the opportunity to protect, restore, and enhance wetlands on their property, while the NRCS provides technical and financial support to help landowners with their wetland restoration efforts.

What is a WRPO?

- A conservation plan that identifies how wetland functions and values will be restored, enhanced, protected, maintained and managed.
- Includes all required conservation practices and activities applicable to meeting the restoration goals.
- Begins with a field assessment and extends through construction for wetlands restoration and future monitoring and maintenance activities.

Goals of the WRPO:

- 1) Return the easement, as close to as possible, to historic natural wetland ecological communities and associated uplands that existed prior to agricultural manipulation.
- 2) Restoration of wetland habitat functions for wetland dependent wildlife, migratory birds, threatened and endangered species, and at risk species.
- 3) No adverse impacts to cultural resources, state and federally protected species and their habitat, off-site properties, or other environmental concerns.
- 4) Wetland restoration shall be applied to rehabilitate/reestablish degraded wetlands in a manner that the original historic vegetation community and hydrology are restored to the extent practicable.

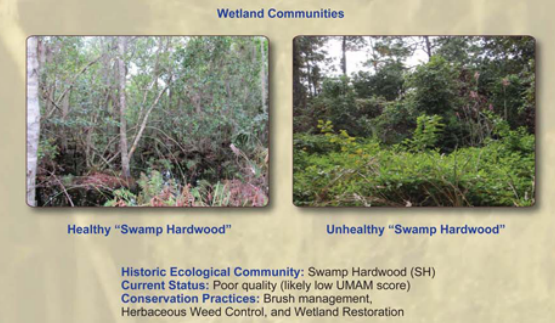


Field Investigation

A combination of factors have led to a conversion of wetlands from their original ecological communities to less desirable current conditions. These factors include:

- Drainage for agricultural production;
- Introduction of intentional or accidental invasive species;
- Overgrazing; and
- Fire suppression.

AMEC scientist and engineers conducted site reconnaissance to collect data on current land use, desirable and undesirable vegetation, hydrology, relative "health" of the ecological communities, threatened and endangered species habitat, stressors (invasive exotic species, cattle impacts, feral hog impacts, altered hydrology, etc.), and existing water control structures. Ecological communities, vegetation and hydrology were evaluated to determine potential for restoration.



Historic Ecological Community: Sand Scrub (SS)
Current Status: Improved pasture
Conservation Practices: Herbaceous Weed Control, Range Planting, Tree & Shrub establishment.

Historic Ecological Community: Swamp Hardwood (SH)
Current Status: Poor quality (likely low UMAM score)
Conservation Practices: Brush management, Herbaceous Weed Control, and Wetland Restoration

Development of WRPO:

Once NRCS conservation easements were established, NRCS and AMEC met with landowners to obtain information on physical, historic, and biological resources on the properties and to identify landowner concerns and issues regarding restoration.

Desktop Investigation

NRCS identified probable "historic" ecological communities for each easement which were primarily based on soil types and historic aerial photographs.

Correlation of Community Occurrence by Soil Series- Examples

Soil Series	Ecological Community
Bakersville	Swamp Hardwood Forest
Basinger	Slough
Chobee	Cypress Swamp Swamp Hardwood Forest Freshwater Marsh and Ponds Wet Hardwood Hammock
Felda	Cypress Swamp Swamp Hardwood Forest Freshwater Marsh and Ponds Slough
Placid	Freshwater Marsh and Ponds
Sanibel	Freshwater Marsh and Ponds
Zolfo	Upland Hardwood Hammock Oak Hammock



Source: USDA Soil Conservation Service (SCS), 1989. 26 Ecological Communities of Florida.



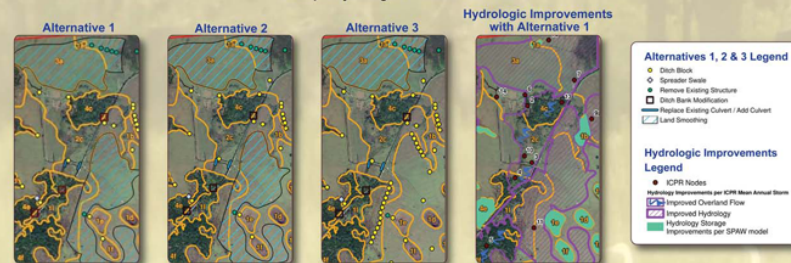
Modeling

The Interconnected Pond Routing (ICPR) model was used to evaluate potential offsite impacts. ICPR simulates stormwater flow through a system of conveyance and storage features based on various design storm events to obtain an analysis of peak discharge runoff and water elevations. NRCS had an additional stated goal that at least 70% of the historic wetlands be restored to their historic ecological community. The Soil, Plant, Atmosphere, and Water (SPA) model was used to evaluate if water re-routed within the site would achieve the desired hydroperiod in each historic wetland polygon. The SPAW model is a water budgeting tool for farm fields, ponds and inundated wetlands.

Hydrologic Restoration Alternatives Development

Multiple hydrologic restoration alternatives were developed for each project site.

Example Hydrologic Alteration Alternatives



Alternatives 1, 2 & 3 Legend

- Ditch Block
- Spreader Swale
- Remove Existing Structure
- Ditch Bank Modification
- Restore Existing Culvert / Add Culvert
- Land Smoothing

Hydrologic Improvements Legend

- ICPR Nodes
- Wetting Improvements per SPAW Model
- Improved Overland Flow
- Improved Hydrology
- Hydrology Storage Improvements per SPAW Model

Alternatives 1 and 2 are very similar except Alternative 2 includes additional Ditch Blocks

Alternatives 2 and 3 are very similar except Alternative 3 utilizes Ditch Blocks instead of Land Smoothing to increase sheet flow in some areas.

SPAW Modeling Results for 3 Alternatives for Example Wetland Polygon

Community	Existing	Alternative 1	Alternative 2	Alternative 3	Ideal for the Ecological Community Type	
Freshwater Marsh 1b	Total Area (acre)	2.68	4.86	4.86	3.46	NA
	Area Inundated >6 m (acre)	2.35	4.21	4.21	3.08	NA
	Total Days Inundated	280	364	364	355	>200
	Average Wet Season WL (ft)	0.15	0.64	0.64	0.35	0-3
Freshwater Marsh 1f	Total Area (acre)	3.76	4.19	4.19	4.19	NA
	Area Inundated >6 m (acre)	2.54	3.54	3.54	2.67	NA
	Total Days Inundated	254	336	336	270	>200
	Average Wet Season WL (ft)	0.41	0.79	0.79	0.51	0-3
Swamp Hardwood Forest 4e	Total Area (acre)	2.72	8.11	8.11	8.11	NA
	Area Inundated >6 m (acre)	0.00	3.99	3.99	3.99	NA
	Total Days Inundated	167	275	275	275	>200
	Average Wet Season WL (ft)	0.19	0.74	0.74	0.74	0-3

Alternatives 1 and 2 provide the same overall benefit compared to Alternative 3.

Land smoothing proposed in Alternatives 1 and 2 was more effective at restoring natural hydrology than the proposed ditch blocks in Alternative 3. In addition, land smoothing is more cost effective.



Final WRPO:

Restoration Measures

The phased restoration plan of the historic wetland communities involved identifying initial conservation measures as well as long-term management practices. These establish clear, achievable success criteria and a timeline. A NRCS-modified Uniform Mitigation Assessment Method (UMAM) is utilized to determine success.

Example Restoration Success Criteria and Schedule

Ecological Communities to be Restored	UMAM Score	Response Time to Achieve Successful Restoration
Freshwater Marsh	> 0.8	1 - 2 years
Wet Prairie & Cuthroat Seep	> 0.7	2 - 3 years
Swamp Hardwood Forest	> 0.7	8-10 years

Recommended Conservation Practices

NRCS's Conservation Practice Standards include:

- Brush management
- Dike
- Water Spreading
- Critical Area Planting
- Tree/Shrub Establishment
- Early Successional Habitat Development/Management
- Herbaceous Weed Control
- Firebreak
- Spoil Spreading
- Wetland Restoration
- Wetland Wildlife Habitat Management
- Land Clearing
- Land Smoothing
- Stream Crossing
- Obstruction Removal
- Wetland Enhancement
- Prescribed Burning
- Range Planting
- Structures for Water Control
- Prescribed Grazing

Challenges

- WRP easements are isolated properties within a formerly connected mosaic of communities. Offsite hydrologic impacts are not permitted, this requirement constrains the amount of on-site restoration that can occur.
- Landscapes have been extremely altered through ditching and draining. Restoring historic topography is not always possible due to conflicts with present-day conditions (e.g. historic structures, infrastructure that the landowners want preserved, presence of populations of protected species, etc.).
- Removal of invasive exotic plant species prior to hydrologic improvements, unfortunately, some invasive species will benefit from improved hydrology.
- Design around Landowner preferences.
- Data limitations. Survey data, protected species distribution and invasive exotic species distribution.
- Flat areas require detailed analysis for basin delineation for modeling.
- Unseasonably wet or dry years may affect success of restoration (vegetative recruitment, planting and seeding success).

Closing:

The goal of the NRCS Wetlands Reserve Program is to achieve the greatest wetland functions and values, along with optimal wildlife habitat. The restoration of wetland functions and values places special emphasis on habitat for wetland dependent wildlife, migratory birds and protected plant and animal species. The WRPO provides the necessary management guidelines to sustain the restoration effort. Over the past two years, AMEC and NRCS have worked together on developing WRPOs in south-central Florida for over 30,000 acres of land on existing cattle ranches. Preliminary analysis indicates that when implemented, the projects will result in as much as a 500% increase in wetland acreage on these properties.

References

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