

Picayune Strand

Creating the Picayune Strand Restoration Project Environmental Monitoring Plan

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Science-based Approach to Monitoring

- Properly designed and implemented ecosystem monitoring plan is a powerful assessment tool
- Project team developed a science-based, sophisticated and extensive monitoring plan to assess whether the project is achieving restoration objectives



Why is the project important and why the need to demonstrate project success?

Magnitude of project—approx. 58,000 acres (almost 90 sq. miles) inside project area, but hydrologic restoration effects will extend beyond project boundaries affecting approx. 200,000 acres, not including salt marsh or estuaries

- Project area and adjacent public lands and estuaries represent a significant portion of the Big Cypress ecosystem



Why is the project important and why the need to demonstrate project success?

- \$450 million investment in Big Cypress ecosystem restoration
- Project provides habitat connectivity between adjacent public lands in the Big Cypress ecosystem
- Value of project for preserving and enhancing Florida panther habitat
- Role of project as providing panther mitigation bank for other CERP projects



Why is the project important and why the need to demonstrate project success?

- Value of project for preserving and enhancing habitat for other endangered species (wood stork) and for other wildlife (wading birds, raptors, migratory birds, reptiles, amphibians, and mammals)
- Relative certainty that hydrologic objectives will be achieved, and ...



Why is the project important and why the need to demonstrate project success?

- Consensus among scientists that exotic and native nuisance plants must be controlled or eliminated to achieve full restoration benefits, leading to ...
- Uncertainty about future availability of funding and level of multi-agency commitment to control invasive, exotic and native nuisance plants



Project Objectives

- Reestablish natural freshwater flows to estuary
- Restore natural hydro-patterns, including sheet flow and flow-ways
- Reestablish natural plant distribution and composition
- Increase surface aquifer recharge
- Restore habitat for listed species



Project Objectives (continued)

- Increase fish and wildlife resources
- Restore ecological connectivity
- Restore natural fire regime
- Provide resource-based recreational opportunities compatible with restoration



Recipe for Restoration Success

- Restore natural hydrology
- Restore natural fire regime
- Control or eliminate exotic and native nuisance plants





Achievement of Project Goals Should Lead to Regeneration of Native Plant and Animal Communities in:

- **Picayune Strand State Forest**
- **Fakahatchee Strand Preserve SP**
- **Collier Seminole SP**
- **Florida Panther NWR**
- **Ten Thousand Islands NWR**



Performance Measures and Restoration Targets

■ Inland Targets

- Natural systems conditions based on reference sites in:
 - Fakahatchee Strand Preserve State Park
 - Florida Panther National Wildlife Refuge

■ Estuarine Targets

- Natural systems conditions based on estuaries downstream of Fakahatchee Strand Preserve State Park



Performance Measures and Restoration Targets

- **Threatened and Endangered Species**
 - Targets designed to demonstrate no adverse effect to T & E species
 - Beneficial effects anticipated for many of the listed species, especially for the Florida panther and wood stork



Performance Measures and Restoration Targets

- **Water Quality**
 - Wetlands will absorb nutrients and improve water quality; however, WQ improvement is not a project objective because WQ is not a significant problem in the watershed
 - Monitoring to demonstrate compliance with water quality standards



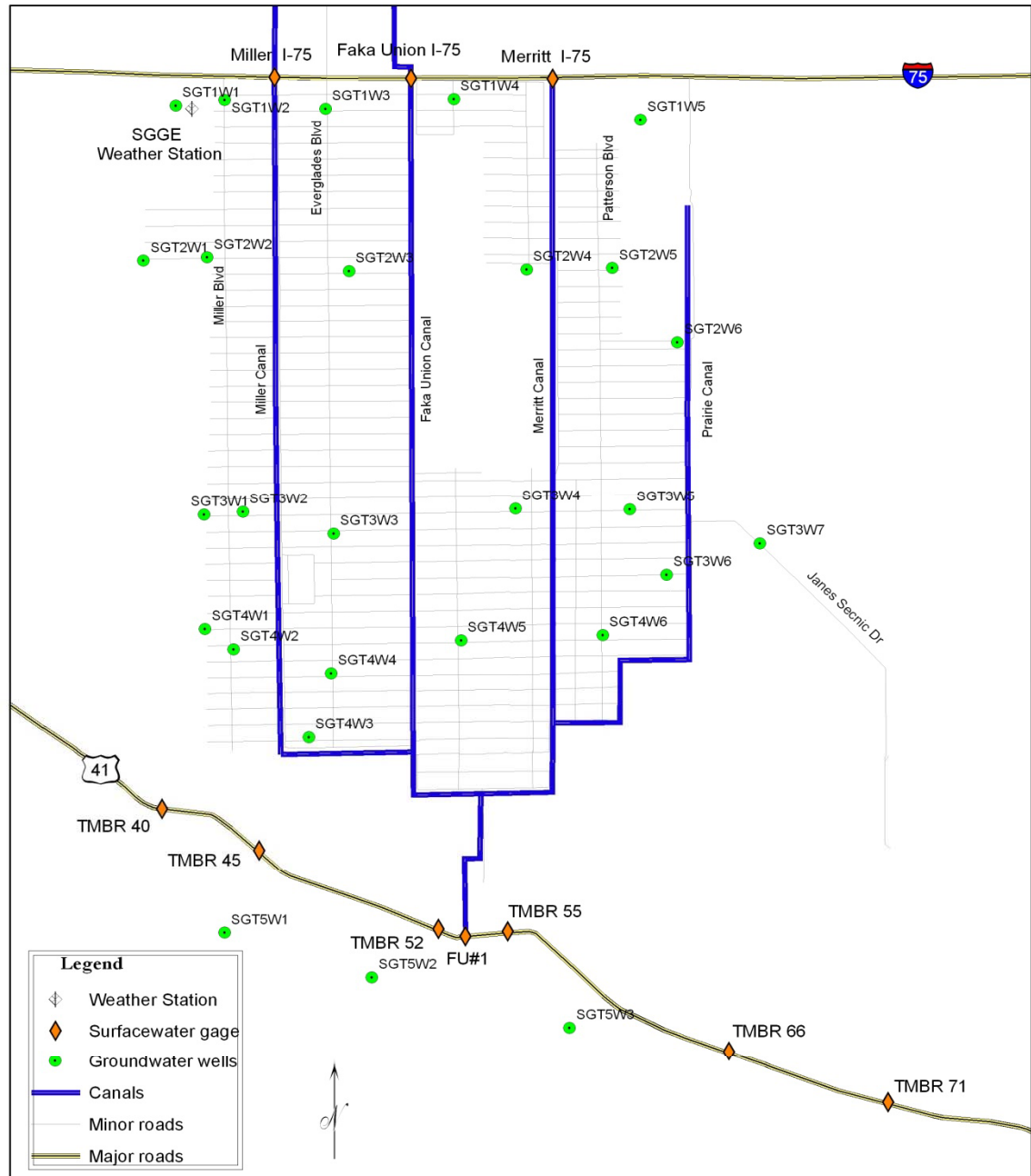
Monitoring Components

- **Hydrologic and Meteorological**
 - Hydrologic and meteorological data collected continuously by a grid of 27 water level monitoring wells
 - Data is analyzed on an annual basis
 - Targets are based on type of plant community and include hydroperiod and depth of inundation



Map of Hydrologic Monitoring Wells

Southern Golden Gate Estates Surface and Groundwater Monitoring Sites



Hydrologic Regimes for Plant Communities

Picayune Plant Communities	Hydroperiod (months)	Water Level (in) Wet	Water Level (in) Dry (1,10)
Mesic Flatwood, Mesic Hammock	≤ 1	≤ 2	-46, -76
Hydric Flatwood, Hydric Hammock	1 – 2	2 – 6	-30, -60
Wet Prairie, Dwarf Cypress	2 – 6	6 – 12	-24, -54
Freshwater Marsh	6 – 10	12 – 24	-6, -46
Cypress	6 – 8	12 – 18	-16, -46
Mixed Hardwood Swamp Forest	8 – 10	18 – 24	-6, -36
Open Water	> 10	≥ 24	$< 24, -6$
Tidal Marsh, Mangrove, Beach	Tidal	Tidal	Tidal



Vegetation Community Structure Monitoring

- Target: Plant community species composition and abundance comparable to reference sites in Florida Panther National Wildlife Refuge and Fakahatchee Strand Preserve State Park
- Plant communities are a long-term indicator of restoration success



Vegetation Community Structure Monitoring

- Plant Communities evaluated:
 - Hardwood hammocks
 - Pine Flatwoods (hydric and mesic)
 - Wet Prairie
 - Cypress
 - Mixed hardwood cypress swamp
 - Freshwater marsh
 - Saltwater marsh









Vegetation Community Structure Monitoring

- Vegetation Transects: Two vegetation transects were established at each of the 27 hydrological monitoring well sites; total of 54 transects
- Reference Transects: Nine transects were established at the reference sites; three transects per plant community



Vegetation Strata

- **Canopy**
 - Trees with dbh greater than 4 inches
- **Sub-canopy**
 - Trees with dbh between 1 and 4 inches
- **Shrub layer**
 - Trees or shrubs with dbh less than 1 inch
- **Ground Cover**
 - Herbaceous species; forbs, grasses, sedges, rushes, ferns





Vegetation Community Structure Monitoring

- **Baseline Monitoring:**
 - All four strata in a plant community were monitored at the 54 project transects and 9 reference sites
- **Post-Construction Monitoring:**
 - Repeat baseline monitoring
 - Transects will be monitored every other year for first ten years, then once every five years to year 2032, then every nine years to year 2050, or until restoration trend is established



Inland Aquatic Fauna Monitoring

- **Target: Similarity to reference sites in Fakahatchee Strand Preserve SP and Florida Panther NWR**
 - Performance Measures include composition and abundance of:
 - aquatic macroinvertebrates
 - forage fish
 - amphibians



Inland Aquatic Fauna Monitoring

- **Baseline Monitoring:**
 - Aquatic macroinvertebrates, amphibians and fish population assessments were performed at 9 reference sites and near 27 monitoring wells in the project area
- **Post-construction Monitoring:**
 - Aquatic macroinvertebrates, amphibians and fish population assessments will be repeated in the project area and at the reference sites every other year through the year 2022



Inland Aquatic Fauna Monitoring

- Serves as reliable, short term indicator of restoration success and restored hydrology



Estuarine Monitoring

- **Target**: The conditions in Fakahatchee Bay serve as the restoration target
 - The condition of benthic substrates and seagrass beds is assessed
 - Species monitored for estuarine health include:
 - Oysters
 - Oyster reef crabs
 - Nekton





Estuarine Monitoring

- Each category of estuarine monitoring has specific performance measures
- Baseline data was collected in Fakahatchee Bay and in the Ten Thousand Islands estuaries and bays downstream of the project
- Post-Construction: Monitor the same areas every other year for ten years



Threatened & Endangered Species Monitoring

- Monitoring effort focuses on three species:
 - Florida panther
 - Wood stork
 - West Indian (Florida) manatee



Panther Monitoring

- **Target**: Assess trends in spatial distribution and abundance of the primary prey (white-tailed deer) and the panther to determine if populations are stable or increasing
- **Baseline Monitoring**: Over a 16-month period, infrared-triggered remote camera surveys captured a snapshot of pre-construction use of the project area



Panther Monitoring

- **Post-construction Monitoring:**
Repeat infrared-triggered remote camera surveys over a two-year period every five years until the year 2050, or until a restoration trend is established



Wood Stork and Wading Bird Monitoring

- Target: Assess trends in spatial distribution and abundance to determine if foraging use is increasing
- Baseline Monitoring: Aerial surveys provided estimates of wading bird densities
- Post-Construction Monitoring: Repeat aerial surveys for a minimum of three years or until a restoration trend is established



Manatee Monitoring

- Target: No adverse effect on manatee
- Baseline Monitoring: Collection of salinity, temperature and flow data at the Port of the Islands harbor and in the Ten Thousand Islands estuaries is ongoing
- Post-Construction Monitoring: Repeat data collection and analysis a minimum of 3 years or until a restoration trend is established



Water Quality Monitoring

- **Target**: Monitor to ensure compliance with water quality standards; CERP Guidance Memorandum 23 applies, WQ performance measures not required
- **Baseline**: Monitor for mercury and other toxics to comply with CERP Guidance Memorandum 42



Water Quality Monitoring



- **Construction:**

- Monitor to meet FDEP CERPRA permit requirements, primarily

- **Post-construction:**

- Surface Water Monitoring; inflow upstream of pump stations and outflow at three locations along Tamiami Trail
- Fish tissue sampling for mercury



Ecosystem Restoration Monitoring Policy

- **Project appears to have positively influenced Corps ecosystem restoration monitoring policy**
 - Implementation Guidance for Section 2039 of WRDA 2007 appears to be a response, in part, to PSRP and other CERP projects
 - Recognition by policy makers that 5 years of post-construction monitoring may be insufficient for a large-scale, ecosystem restoration project



Monitoring Policy

- Current policy allows for post-construction monitoring plan to be cost-shared between the Corps and local sponsor for up to 10 years
- Cypress and pine flatwood plant communities may require longer than 10 years to regenerate and show positive restoration trend
- PSRP monitoring plan extends to year 2050 or until a restoration trend is established for a particular target or performance measure





Questions?

