LIKELY CAUSES OF DRAMATICALLY LOWER DRY SEASON WATER TABLES AT CORKSCREW SWAMP SANCTUARY IN SOUTHWEST FLORIDA

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Corkscrew Swamp Sanctuary

13,000 Acre National Audubon Society Sanctuary

Largest Remaining Old Growth Bald Cypress Swamp

Historically the Largest Wood Stork Breeding Colony in North America
Hydrologic Monitoring Began in 1959

Surface Water Staff Gauge

Rain Gauge
Timing of Changes When Swamp Forest Was Dry

Baseline Years
1960-1988
1991-2000
2003-2006

Drought Years
1989-1990
2001-2002

Drainage Impacts
2006-Present
(No Drought Years)
Frequency of Dry Downs in Deepest Natural Ponds at Corkscrew

1960s to 1990s
Dry down 1 of every 5 years

2000s to Present
Dry down 4 of every 5 years
Changes in the Corkscrew Swamp Watershed

Drainage

Agriculture Upstream

Area Normally Inundated >6 Mon/Yr

Area Shown

5 Miles
Total Acreage of Cropland in Collier County

U.S. Bureau of the Census
Census of Agriculture 1954-2012
Changes in the Corkscrew Swamp Watershed

Drainage

Agriculture Upstream

Residential Downstream

Area Normally Inundated >6 Mon/Yr

Corkscrew Swamp Sanctuary

5 Miles

Area Shown
Suburban Development
Downstream of Corkscrew Swamp
Residential Canals
Downstream of Corkscrew Swamp

Drain Large Amounts of Surface Water During Wet Season

Continue to Steadily Drain Shallow Groundwater Through 7 Month Dry Season

Lower West Coast Water Supply Plan Update 2017
Changes in the Corkscrew Swamp Watershed

Drainage
Agriculture Upstream
Residential Downstream
Aquifer Withdrawals
Urban Development along Southwest Florida Gulf Coast
Corkscrew Swamp Sanctuary
Population in Corkscrew Swamp Watershed Counties

U. S. Census Bureau 2010

Accounted for 31% of Total Water Use SW Florida in 2014
(Lower West Coast Water Supply Plan Update 2017)

Population

Lee County

Collier County

0 100,000 200,000 300,000 400,000 500,000 600,000 700,000
Agriculture in Southwest Florida
64% of Total Water Use in SW Florida in 2014
(Lower West Coast Water Supply Plan Update 2017)
Total Acreage of Cropland in Collier County

U.S. Bureau of the Census
Census of Agriculture 1954-2012
Changes in Corkscrew Swamp Watershed

Drainage
Agriculture Upstream
Residential Downstream
Aquifer Withdrawals
Increased ET
Increased Temperatures
New Plant Communities

Area Normally Inundated >6 Mon/Yr
Willow Shrub 1995

Rooting Depth 3-4 ft
Willow Shrub Being Invaded by Cypress and Hardwoods 2011

Rooting Depth 3-5 ft
Hurricane IRMA Pine Damage Study

Pine Flatwoods
1078 Pines ≥ 1.5"

Wetlands
Logged Pine Flatwoods - 1976

Rooting Depth 1 -1.5 ft
Hardwoods Invading Pine Flatwoods - 2019

Rooting Depth 3-5 ft
Increased Leaf Area
Major Influences on Drastically Reduced Dry Season Water Levels and Shortened Hydroperiods at Corkscrew Swamp

- Upstream Drainage of Agricultural Lands
- Downstream Drainage of Residential Lands
- Pumping from Surficial Aquifers
- Increasing Evapotranspiration
  - Increasing Temperatures
  - Increasing Areas of More Deeply-Rooted Woody Vegetation
Addressing Problems?

- Monitoring was Late in Discovering Problems
- Interacting Factors Influencing Hydrology
- Large Commitments in Watershed Infrastructure
- Working on Developing a Hydrologic Model to Sort out Relative Importance of Different Factors