Recent hydrologic change in a rainfall-driven Western Everglades swamp

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• Rainfall driven (near top of watershed)
• Mosaic of hardwood hammock, pine flatwoods, marsh, wet prairie, pond & bald cypress habitats
• Largest remaining intact bald cypress forest
• Site of historically largest Wood Stork colony in N. America
RAINFALL
1959-

SURFACE WATER
Staff Gauges
1959-

GROUNDWATER
Well (C-492)
1973-
Median daily surface water elevation (m NGVD29)

Date

Jun Oct Sep Aug Jul Jun Jan Dec Feb Mar Apr May Jun

1970s
Median daily surface water elevation (m NGVD29)
Median daily surface water elevation (m NGVD29)

Date

2010s
CHANGE IN RAINFALL & PEAK WATER LEVELS

- No decadal variation in annual, wet season, dry season or monthly rainfall totals
- No change in magnitude (5.62 m NGVD29) or date (September 18) of annual wet season peak water level
Hydroperiod: Maximum number of contiguous days habitat was inundated each hydrologic year (max=365)
<table>
<thead>
<tr>
<th>Elevation (cm NGVD29)</th>
<th>Vegetation Type</th>
<th>Hydroperiod (d)</th>
</tr>
</thead>
<tbody>
<tr>
<td>570</td>
<td>Hammock Forest</td>
<td>HP=10</td>
</tr>
<tr>
<td>560</td>
<td>Pine Forest</td>
<td>HP=61</td>
</tr>
<tr>
<td>550</td>
<td>Wet Prairie/Scrub/Dwarf Cypress</td>
<td>HP=133</td>
</tr>
<tr>
<td>540</td>
<td>Freshwater Marsh/Pond Cypress</td>
<td></td>
</tr>
<tr>
<td>530</td>
<td>Mixed Swamp/Bald Cypress</td>
<td></td>
</tr>
<tr>
<td>520</td>
<td>Pond</td>
<td></td>
</tr>
</tbody>
</table>

No decadal change in hydroperiod.
1960s to 2010s:
- **Freshwater marsh**
  - 33.7% (3.5 mo.)
- **Bald cypress**
  - 47.1% (4.2 mo.)
- **Pond**
  - 22.8% (2.5 mo.)
Pre- vs Post-2000 is significant

No decadal change in hydroperiod, but...
CHANGE IN DRY SEASON RECESSION RATES

Average water level recession rate (mm/d)

WY1960-WY1999

WY2000-WY2015

> 2X
TIMING OF CHANGES

Reduced hydroperiod years (↓ rainfall):
- 1989-1990
- 2001-2002

Dry 4.5x longer despite ‘typical’ rainfall:
- 2006-present

Slightly shorter hp (↑ rainfall):
- 2003-2006

‘Baseline’
- 1960-1988
- 1990-2000
TIMING OF CHANGES

Cumulative days dry in bald cypress (water level ≤ 5.05 m NGVD29)

Hydrologic Year

TIMING OF CHANGES

No Wood Stork nesting at Corkscrew

Cumulative days dry in bald cypress (water level ≤ 5.05 m NGVD29)

No nesting 13% of years

No nesting 78% of years

Hydrologic Year


No Wood Stork nesting at Corkscrew
Landscape Changes Potentially Impacting Hydrology

- Increase in agriculture (esp. citrus) and associated water management activities
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• Increased efficiency of canals

• Increased residential & municipal water use (well fields)

• All of the above
Conclusions

- Hydrology has markedly changed at Corkscrew Swamp Sanctuary
- Recent wet season hydrology is similar to what has been seen throughout our POR
- Dry season water levels are falling faster than they did historically, resulting in significantly shorter hydroperiods
- Changes are most apparent beginning in 2006, but more subtle changes may be apparent beginning in the late 1980s
- Additional work is needed to determine geographic extent, to pinpoint cause/effect, and to determine effects on native vegetation and wildlife
- Long-term monitoring of natural areas should not be overlooked/underfunded
Special Thanks--

- 60 years of Corkscrew Swamp Sanctuary staff & volunteers
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