

Review of Anticipated Benefits in 1995 Water Regulation Schedule for Water Conservation Area 1

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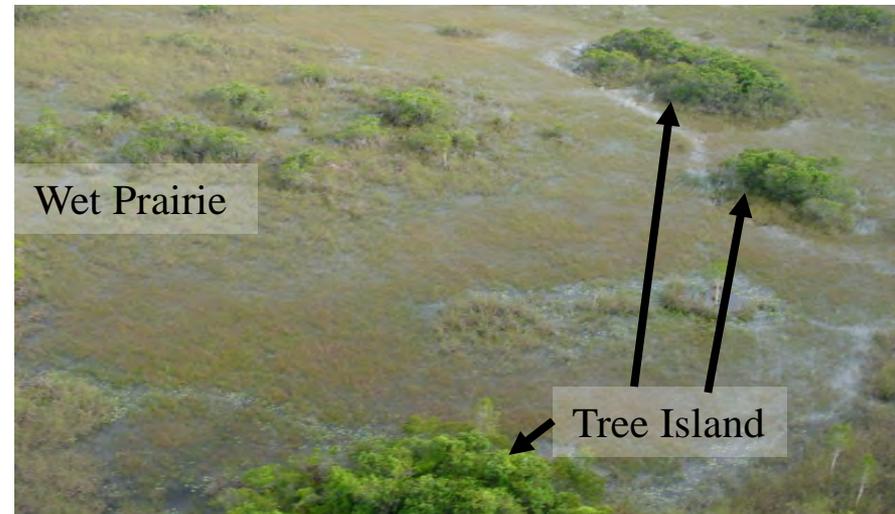
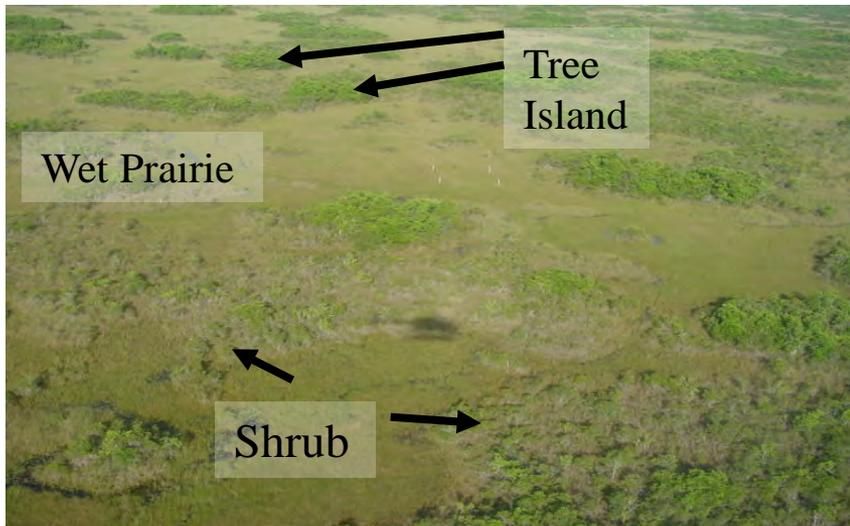
TOC Meeting

Review of Environmental Assessment

- Describe the ecological rationale for the proposed changes as they relate to the stated purposes
- Describe the hydrological and ecological measures that could be used and the expectations for them if the anticipated benefits were achieved
- Describe, where possible, what has been achieved

Summary

- The water regulation schedule for WCA-1 was changed in 1995 to make conditions in the Refuge interior wetter- particularly in the north- for the benefit habitat and wildlife



Summary (cont.)

- The change to the 1995 water regulation schedule has resulted in many of the anticipated hydrological benefits
- Generally there are:
 - Higher water levels
 - Longer hydroperiods
 - Lower frequency of dry-outs

Summary (cont.)

- In most cases it has not been confirmed that the hydrological changes have resulted in the desired ecological changes
- It is likely that some ecological benefits have occurred
- However, under recent management, it is still too dry in the north and too wet in the south

Summary (cont.)

- It also is likely that there have been some unintended ecological consequences
 - Deeper depths and longer hydroperiods in the south
 - Reduction in variability in hydroperiod and depths

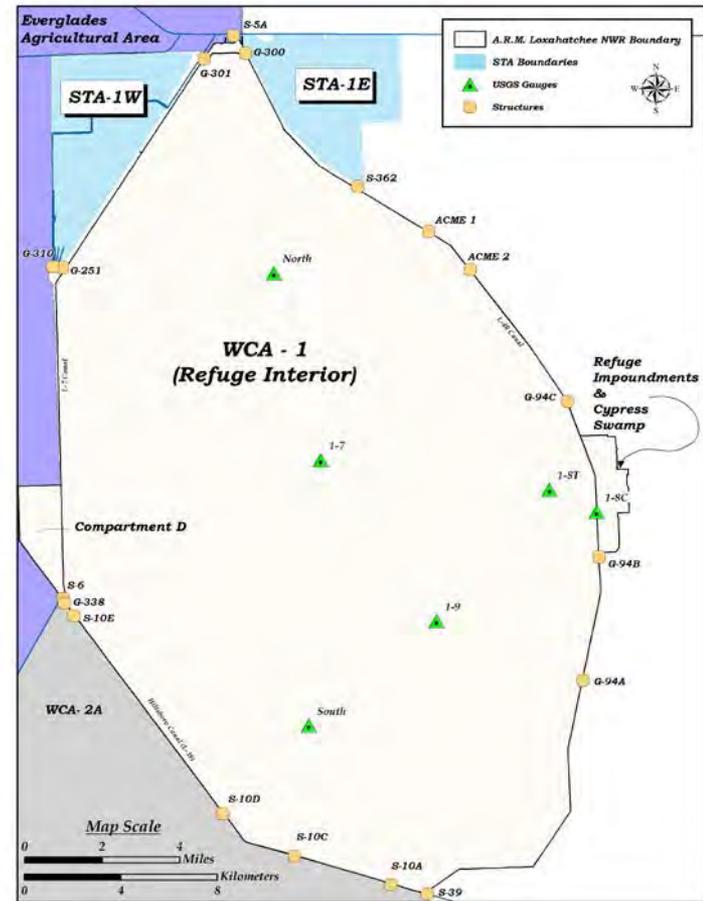


Summary (cont.)

- Creating “optimal” conditions for the Refuge interior will require creative solutions that take advantage of natural variability

Background

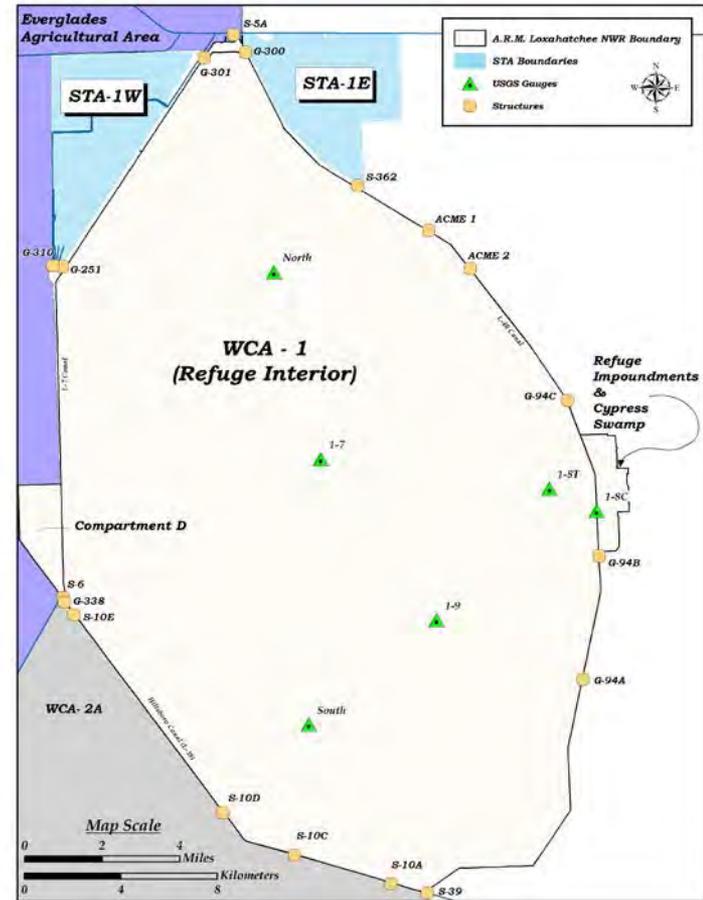
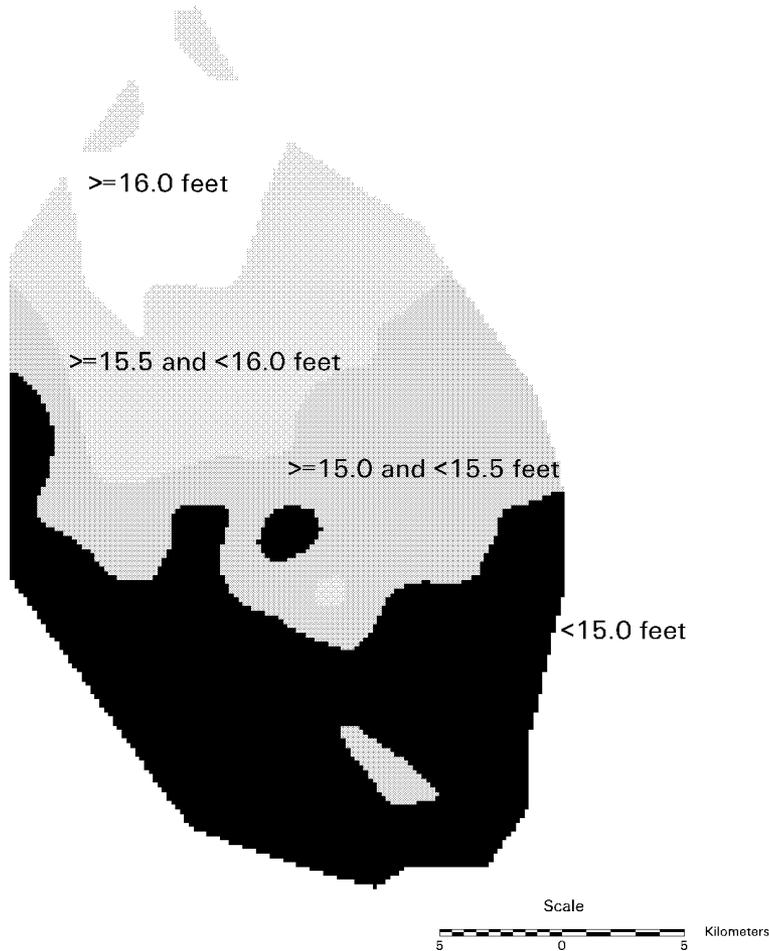
- Water Conservation Area 1 is a part of A.R.M. Loxahatchee NWR
- Established as one of 5 WCAs for flood protection, water supply, wildlife habitat
- Water is managed under a water regulation schedule



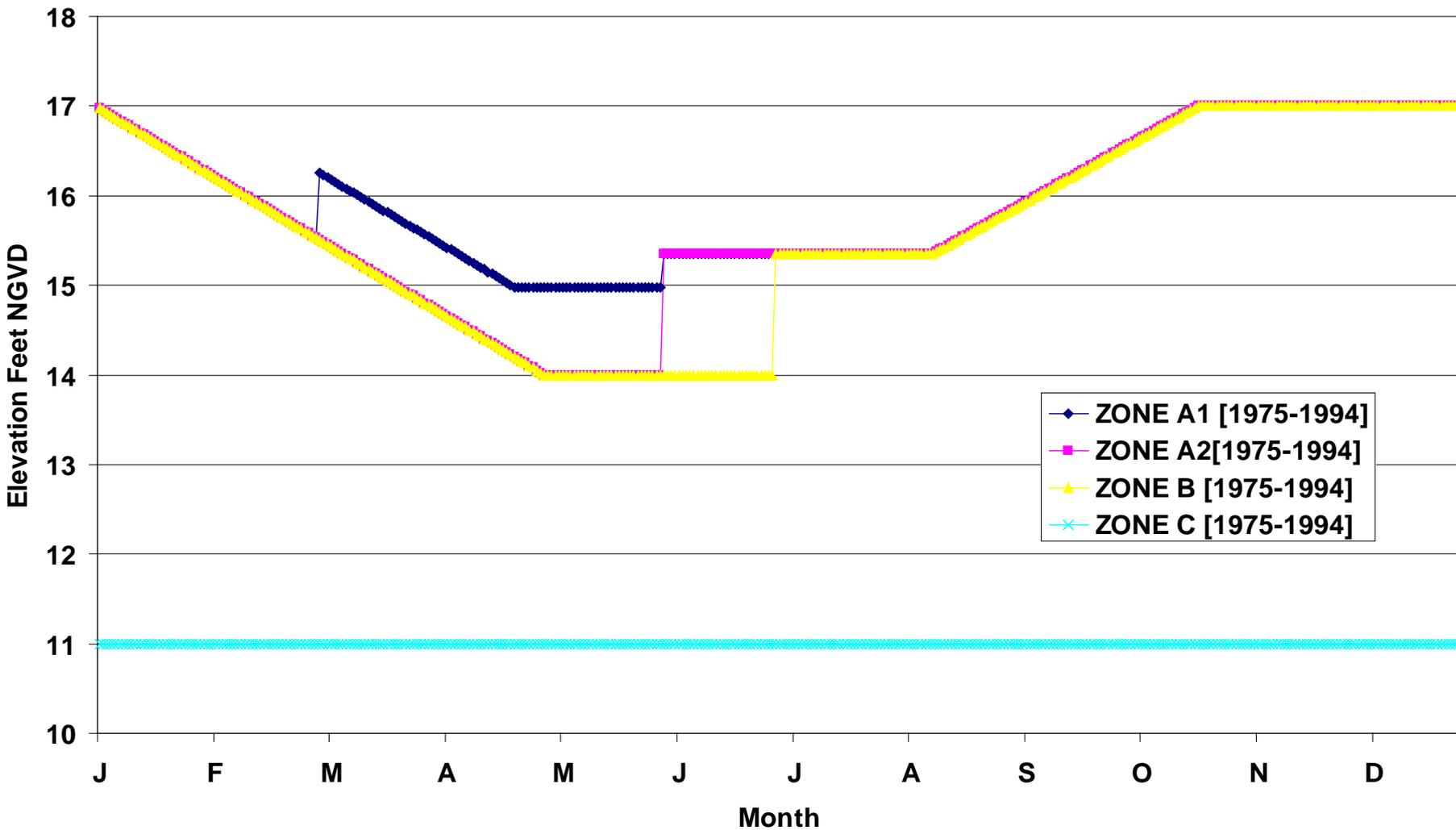
Background (cont.)

- There have been four water regulation schedules for WCA-1
- The current water regulation schedule has been in effect since 1995
- Changes to the water regulation schedule have been made at the request of FWS to improve conditions for wildlife

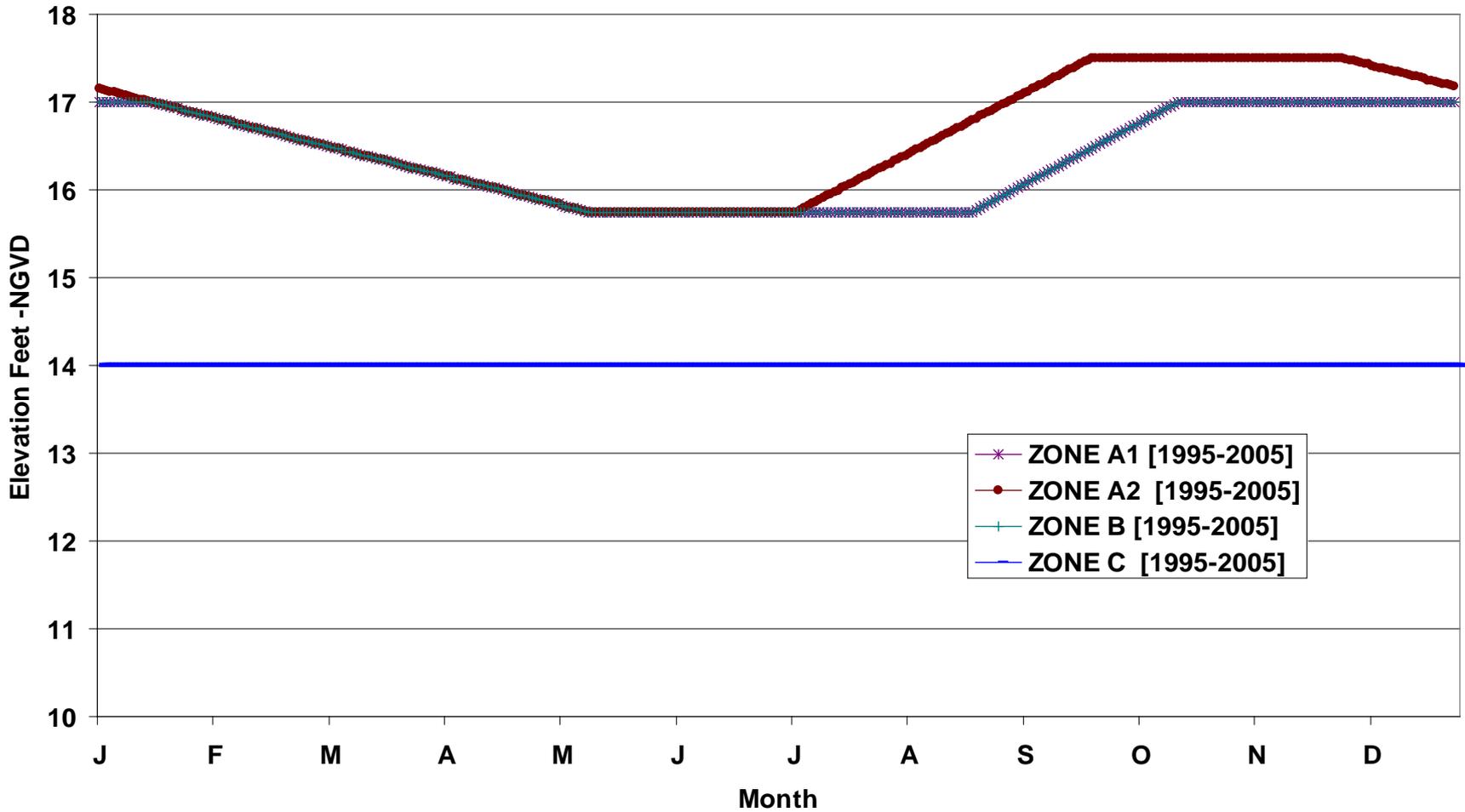
Elevation and Water Level Gauges



1975-1994 WCA-1 Water Regulation Schedule



1995-present WCA-1 Water Regulation Schedule



Summary of Changes From 1975 to 1995 Water Regulation Schedule for WCA-1

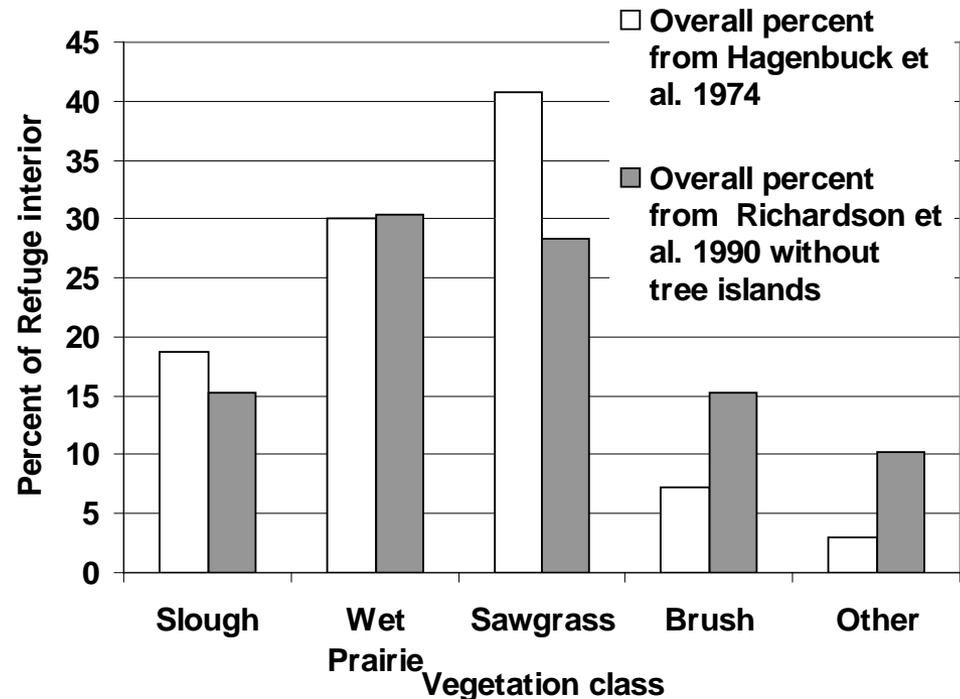
- Raised floor from 11 to 14 feet NGVD
- Raised the top of Zone B from 15.35 to 15.75 feet
- Raised the bottom of Zone A from 17.0 to 17.5 feet and from 15.75 up to 17.5 feet from early July to mid-September
- Added provisions for preceding inflows under certain conditions of water supply delivery

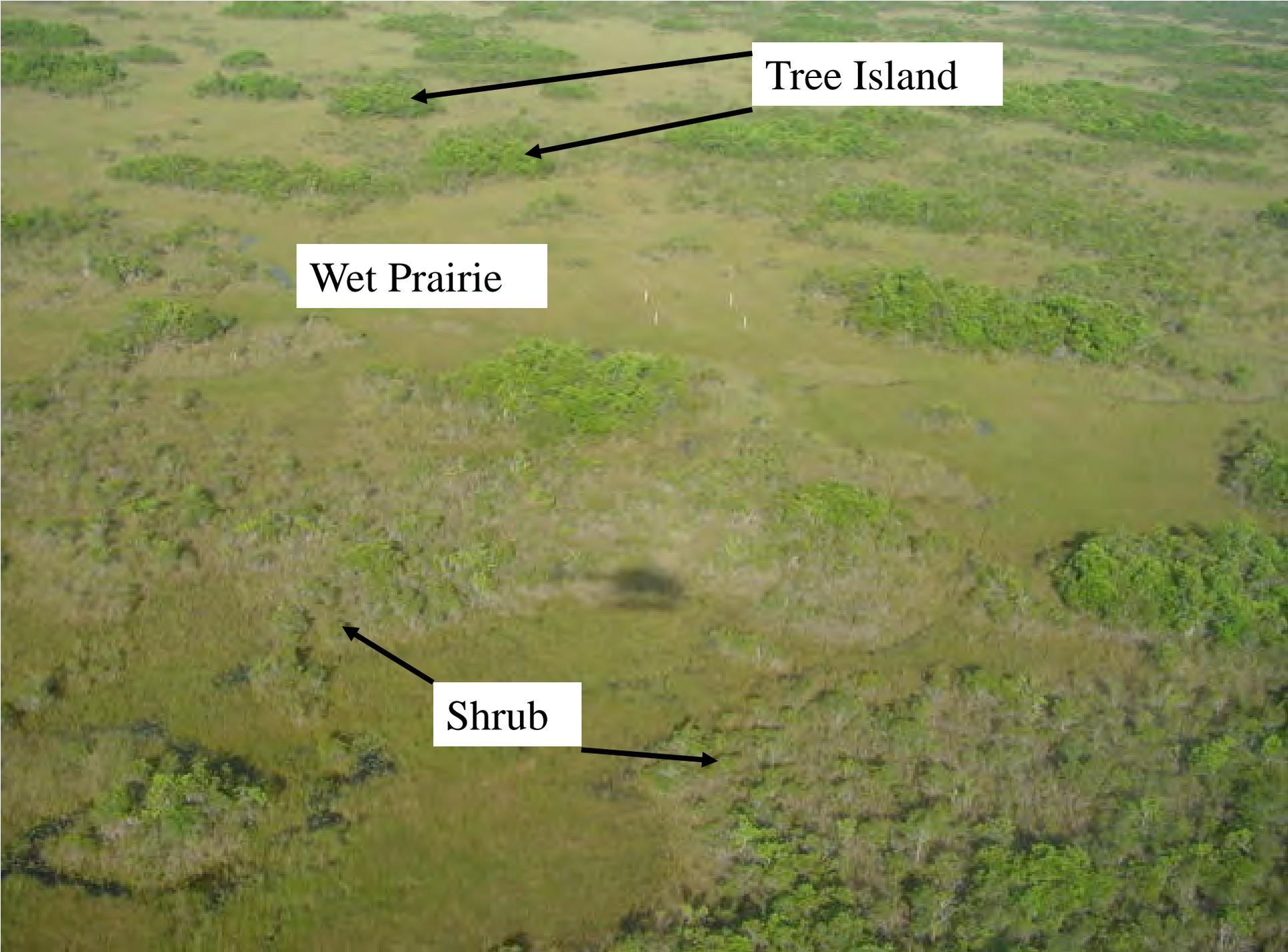
Anticipated Benefits of 1995 Water Regulation Schedule for WCA-1

1. Allow higher water levels during wet years in the northern portion of the Refuge
2. Increase the hydroperiod of interior marshes of the Refuge such that dry-out does not occur on an annual basis
3. Increase the proportion of the interior marsh of the Refuge that serves as nursery areas for aquatic organisms
4. Improve the timing of winter stage drawdown in the Refuge to benefit wading bird
5. Restore conditions in the Refuge similar to those found when the areas was used by snail kites for nesting
6. Allow for the storage of a greater quantity of water within the C&SF system during wet and normal rainfall years

1. Allow higher water levels during wet years in the northern portion of the Refuge

- Reverse the trend of invasion of sawgrass by brush and conversion of wet prairie to sawgrass

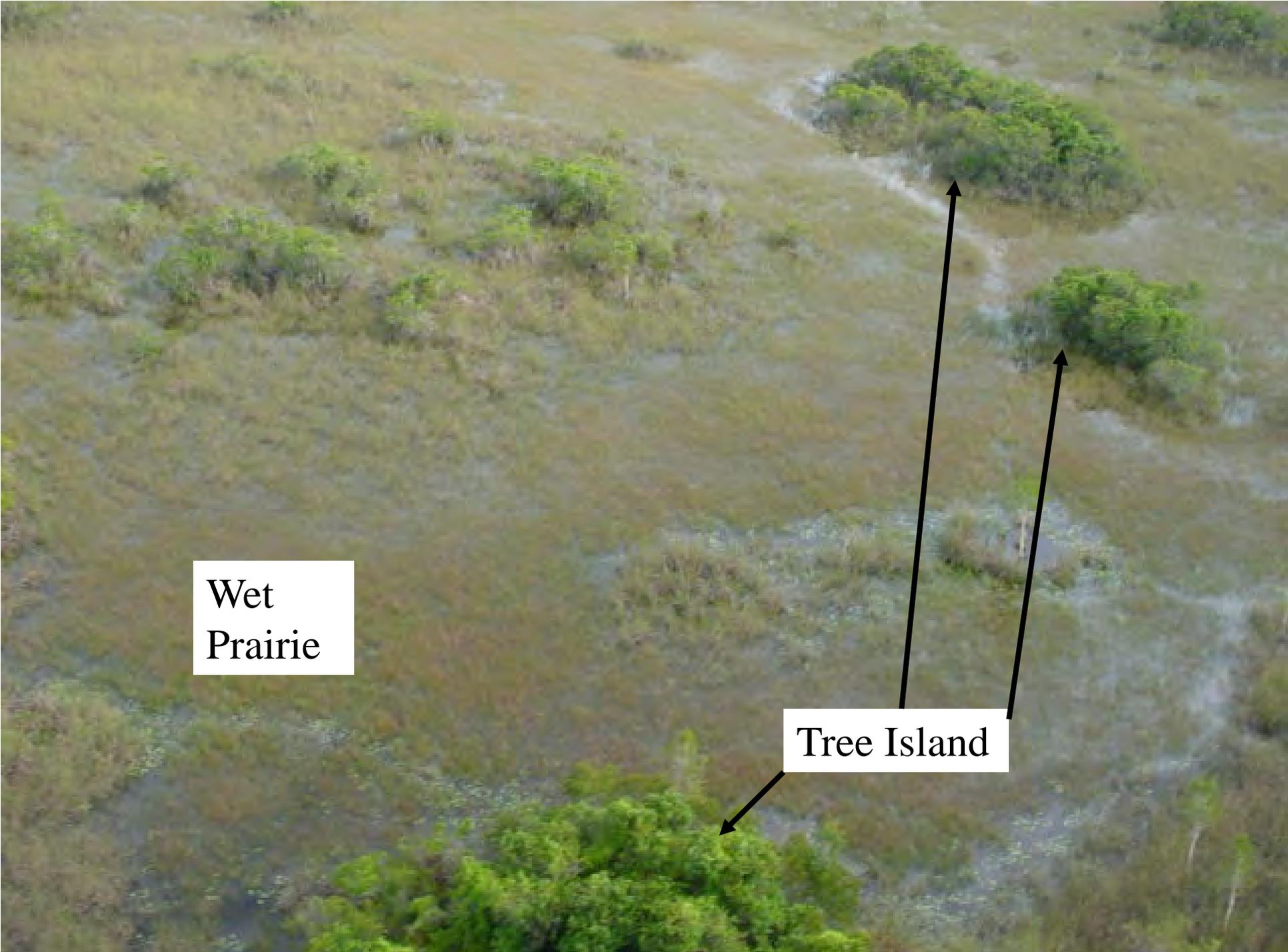


An aerial photograph of a wetland landscape. The terrain is a mix of green and brownish-green. There are several distinct patches of dense, dark green vegetation. A label 'Tree Island' is positioned in the upper right, with two black arrows pointing to two of these dark green patches. A label 'Wet Prairie' is in the middle left, pointing to a large, relatively flat area of lighter green and brownish vegetation. A label 'Shrub' is in the lower middle, with two black arrows pointing to two smaller patches of dark green vegetation. The overall scene is a mosaic of different plant communities.

Tree Island

Wet Prairie

Shrub

An aerial photograph of a wet prairie landscape. The terrain is a mix of green grasses and brownish water. Several distinct, rounded islands of trees and shrubs are scattered across the landscape. Two white text boxes with black arrows are overlaid on the image. One box on the left is labeled 'Wet Prairie' and points to the surrounding grassy areas. Another box on the right is labeled 'Tree Island' and has three arrows pointing to different tree islands.

Wet
Prairie

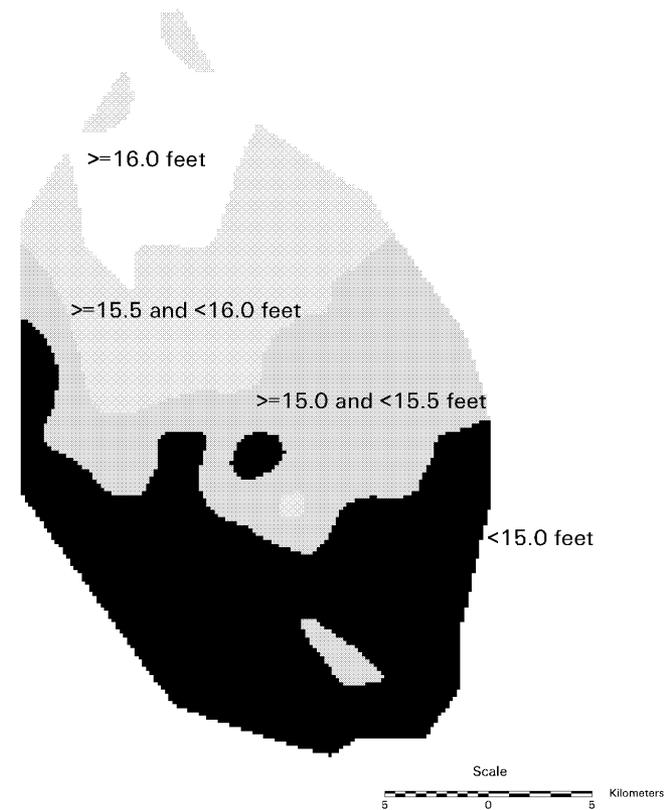
Tree Island



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1. (cont.) Allow higher water levels during wet years in the northern portion of the Refuge

- Bring 20,000 ac of marsh in the northern quarter of the Refuge back into productive marsh condition
- Avoid yearly dry-outs



2. Increase the hydroperiod of interior marshes of the Refuge such that dry-out does not occur on an annual basis

- Have larger populations of aquatic organisms
- Increase protection against drought by having greater year round water storage
- Avoid yearly dry-outs

3. Increase the proportion of the interior marsh of the Refuge that serves as nursery areas for aquatic organisms

- Increase aquatic productivity



4. Improve the timing of winter stage drawdown in the Refuge to benefit wading birds

- Provide foraging and nesting conditions for wading birds from January-June
- Slower spring recession rate would benefit wood storks and other wading birds



5. Restore conditions in the Refuge similar to those found when the areas was used by snail kites for nesting

- Provide habitat suitable for snail kite nesting



6. Allow for the storage of a greater quantity of water within the C&SF system during wet and normal rainfall years

- Avoid yearly dry-outs

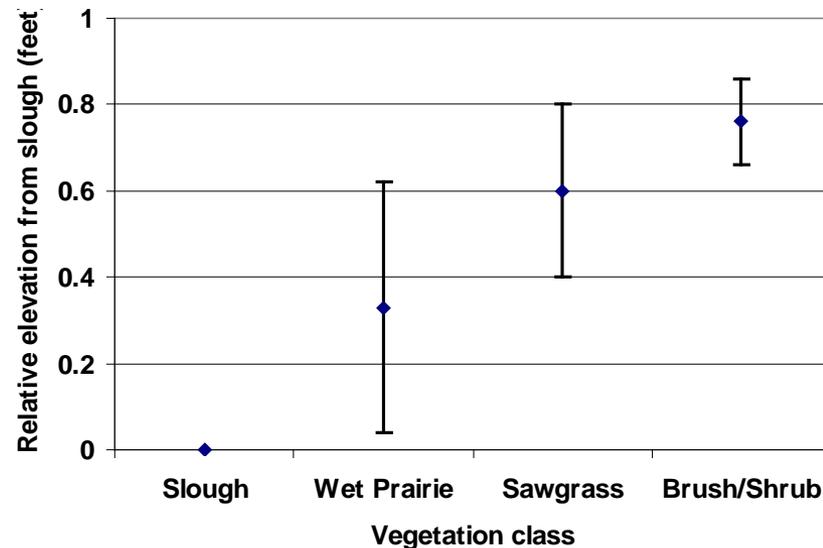


Hydrological Measures

- Average monthly stage at 1-7 and 1-8C
- Percentage of April-June period when water depth was >0.325 feet
- Average yearly hydroperiod at 1-7 (15.0), 15.5, and 16.0 feet
- Average spring (March-June) hydroperiod at 1-7, 15.5, and 16.0 feet

Hydrological Measures (cont.)

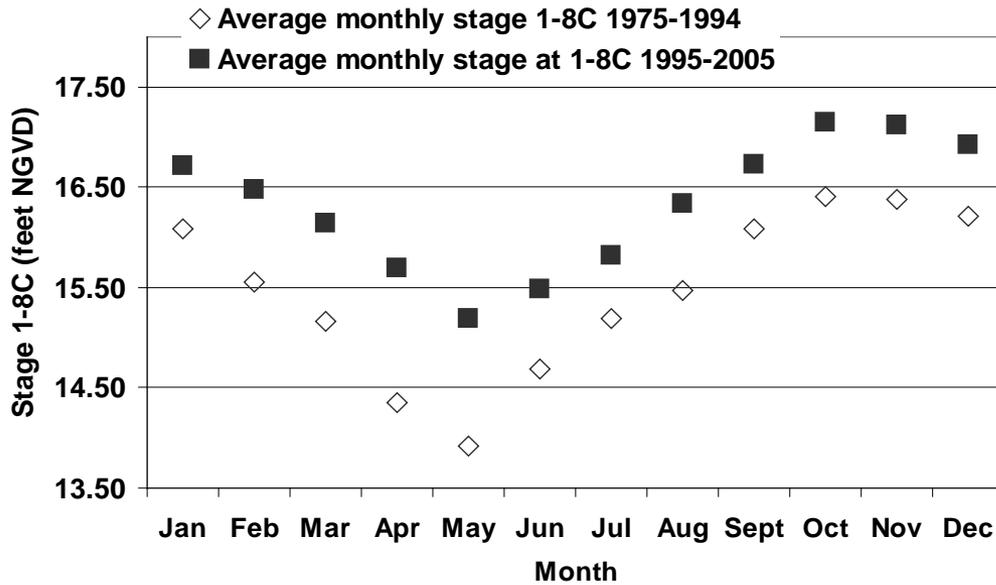
- Number of years when stage went below ground (dry-out) at 1-7, 15.5, and 16.0 feet
- Number of years between dry-outs
- Percentage of years when there was at least 3 years between dry-outs



Hydrological Measures (cont.)

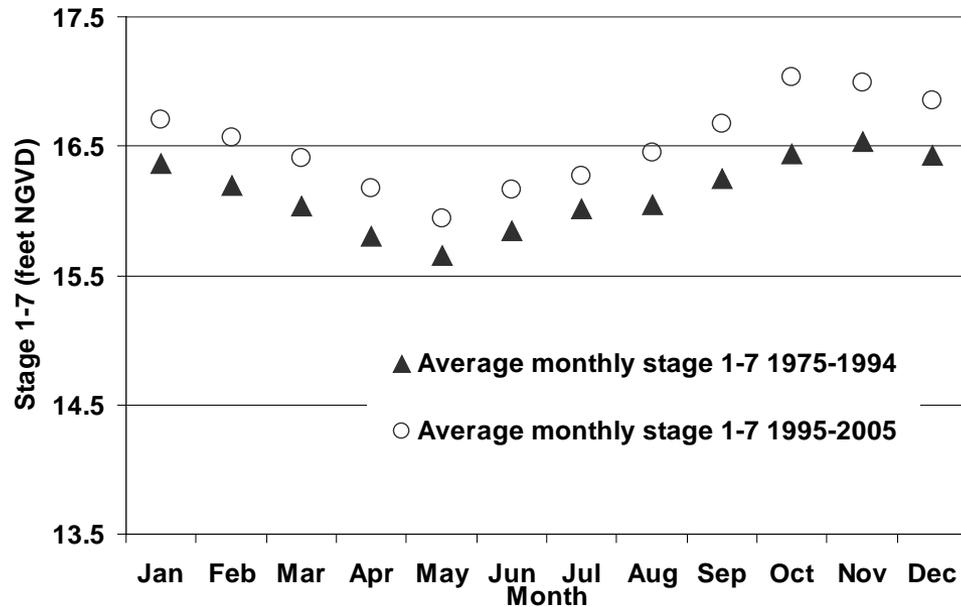
- Timing of initiation of spring recession
- Spring recession rate

- Average yearly water storage

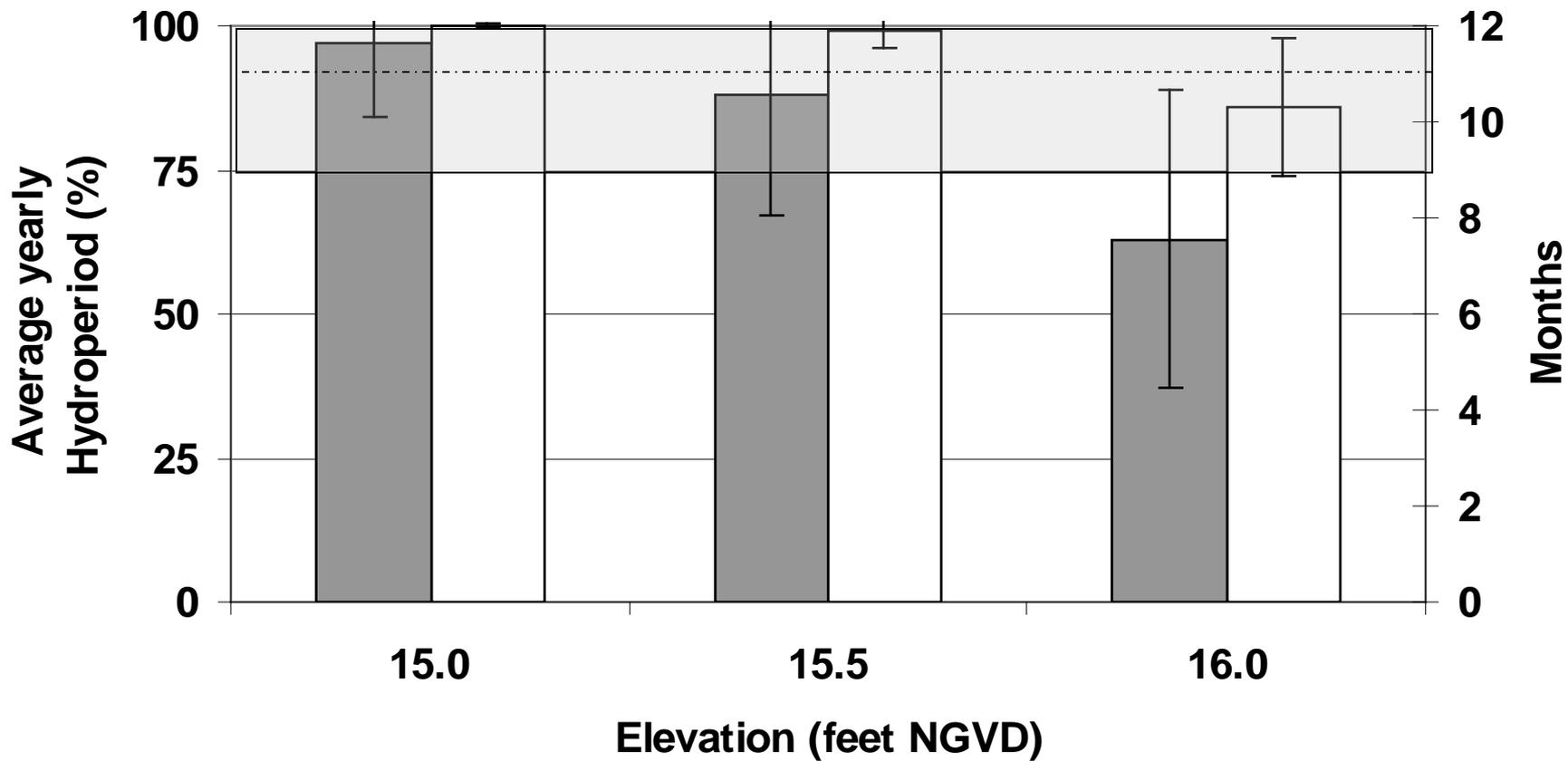


Average monthly stage
 difference 0.85 feet. Range
 0.63 to 1.34 feet

Average monthly stage
 difference 0.38 feet.
 Range 0.26 to 0.60 feet.



■ Mean 1975-1995 □ Mean 1995-2005



Elevation (feet NGVD)	Percentage of years 1975-1994 when there was at least three years between dry outs	Percentage of years 1995-2005 when there was at least three years between dry outs	Ecologically different?
15.0	45%	64%	Yes
15.5	20%	55%	Yes
16.0	0%	0%	No

Ecological Measures

- Acres of sawgrass, brush, and wet prairie in 1975, 1995, 2005
- Acres of each vegetation type converted to a different vegetation type
- Density and distribution of aquatic organisms (fish and apple snails)
- Number and spatial extent of wading birds foraging in the Refuge from January-June

Ecological Measures (cont.)

- Number of wading bird nests
- Number of successful wading bird nests
- Frequency of “good” nesting years for wading birds
- Frequency of snail kite nesting
- Number of successful snail kite nests per year

Hydrological Change Likely to Result in Ecological Change?

Hydrological Measure	Anticipated Benefit	Ecological Indicator	Overall	15.0 ft	15.5 ft	16.0 ft
Average Monthly Stage	1, 5	Vegetation		Y	Y	M
# years when stage went below ground	1, 2, 5	Vegetation, fish, snail kites		N	Y	N
Average yearly hydroperiod	2, 5	Vegetation, snail kites		N	M	Y
Average spring (Mar-Jun) hydroperiod	2, 5	Vegetation, snail kites		N	M	Y
# years between dry-outs	3, 5, 6	Vegetation, fish, snail kites		Y	Y	N
% years with at least 3 years between dry-outs	3	Fish		Y	Y	N
% of time in Apr-Jun depth >0.325 ft	3, 5	Apple snails, snail kites		M	Y	N
Timing of spring recession	4	Wading birds	Y			
Recession rate	4	Wading birds	?			

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Recommendations

- Take advantage of new water level gauges in North and South
- Work within the current schedule in an adaptive management approach (e.g., set up ways to explicitly learn while managing)
- Establish ecological monitoring to follow changes
- Set up timelines for evaluation and modification of operations

Key internal influences on water management

- T&E species and habitat (snail kite and wood stork)
- Tree islands
- Wading birds
- Apple snails
- Alligators
- Exotics
- Fire



Summary (cont.)

- Creating “optimal” conditions for the Refuge interior will require creative solutions that take advantage of natural variability

