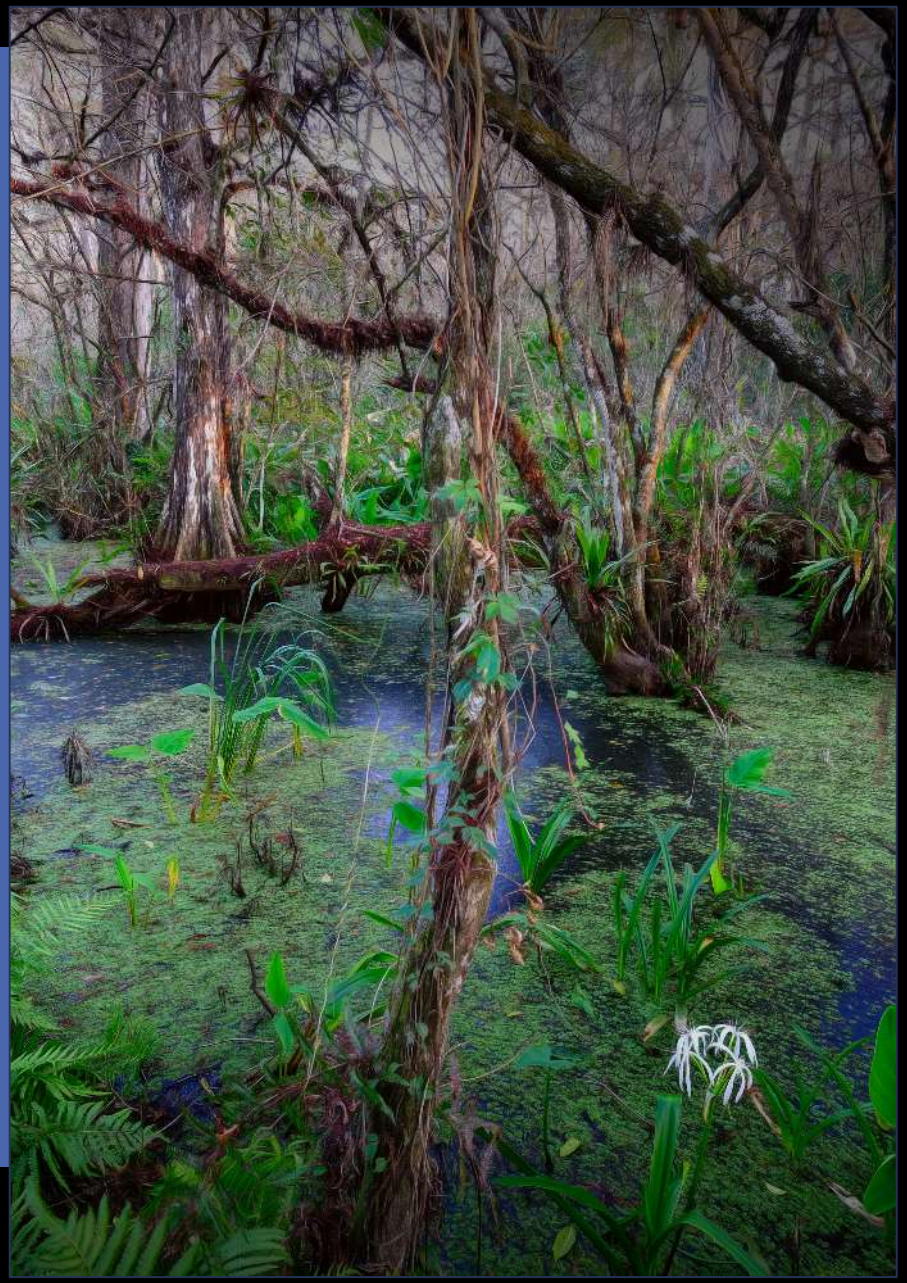

RJ Wiley

Recent hydrologic change in a rainfall-driven Western Everglades swamp

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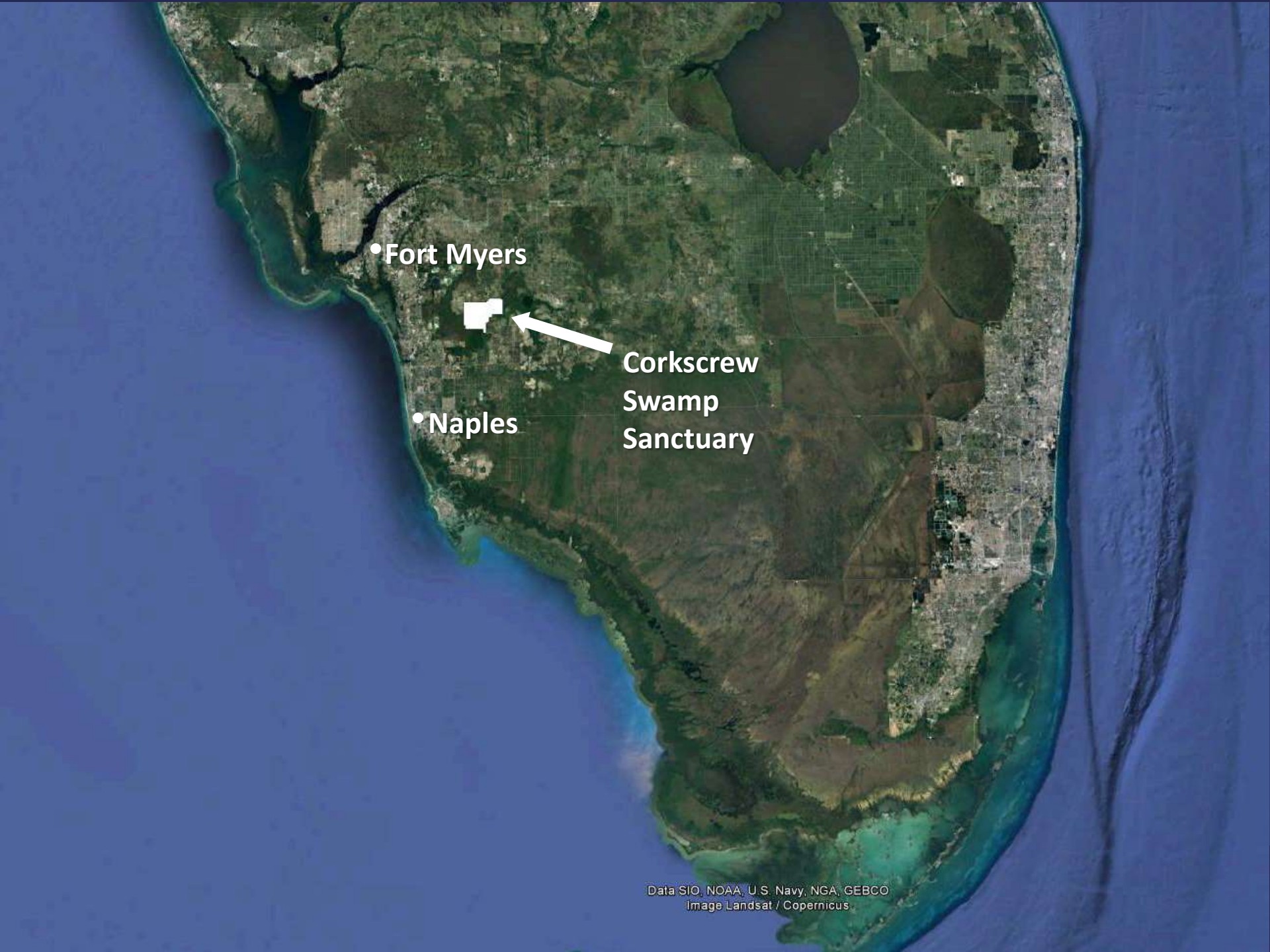
Western Everglades Research Center
Corkscrew Swamp Sanctuary
sclem@audubon.org

Michael J. Duever
Natural Ecosystems
mikeduever@naples.net

Audubon FLORIDA


Fort Myers
Naples
Corkscrew
Swamp
Sanctuary
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Image Landsat / Copernicus

CORKSCREW SWAMP SANCTUARY & BLAIR CENTER Audubon

- 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

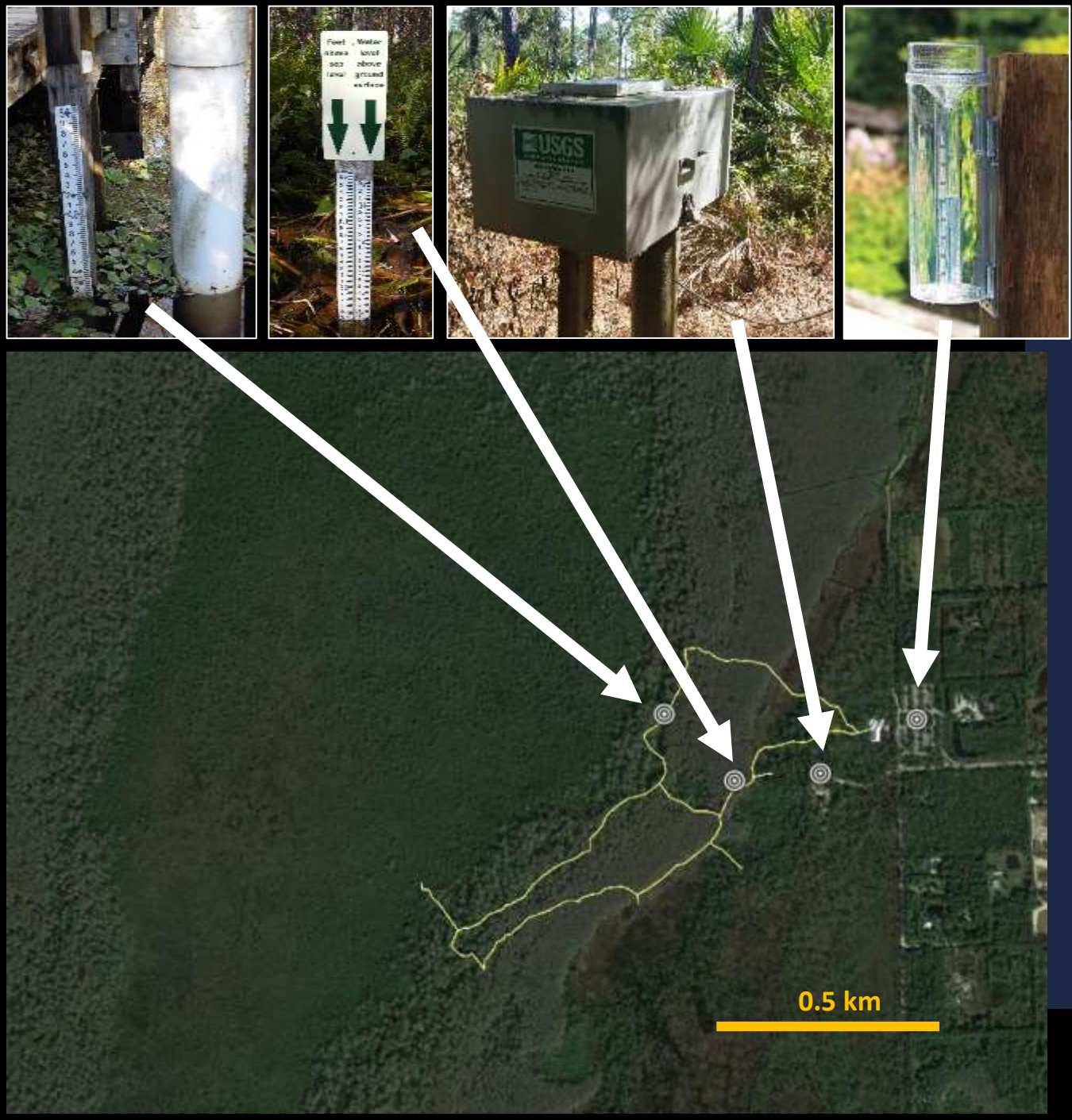
Established in 1954

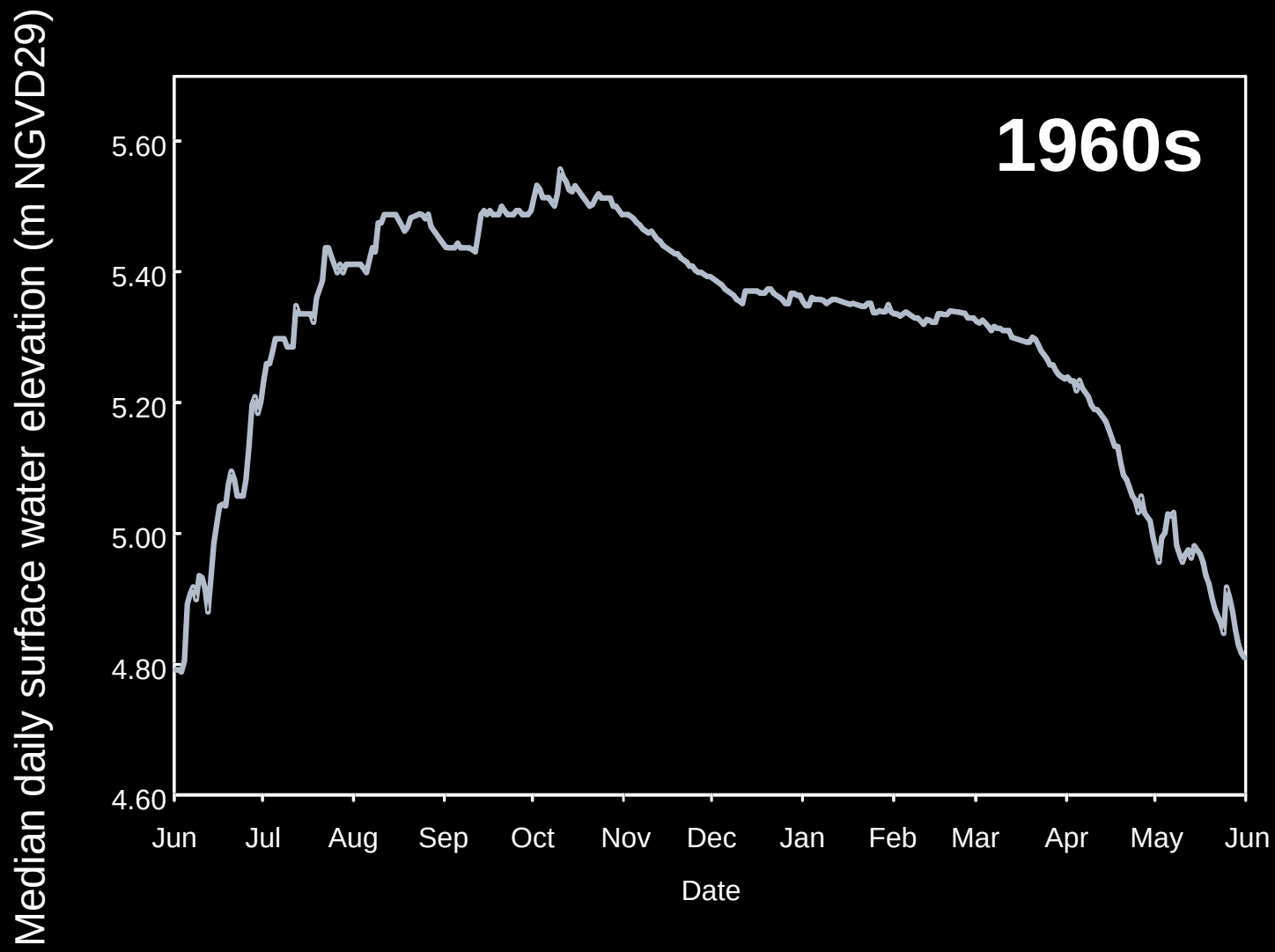
ect the natural resources of
screw Swamp Sanctuary,
ounding watershed and the
n Everglades and influence
restoration; for the benefit of
r wildlife and people; through
agement, science, education,
on and public policy advocacy.

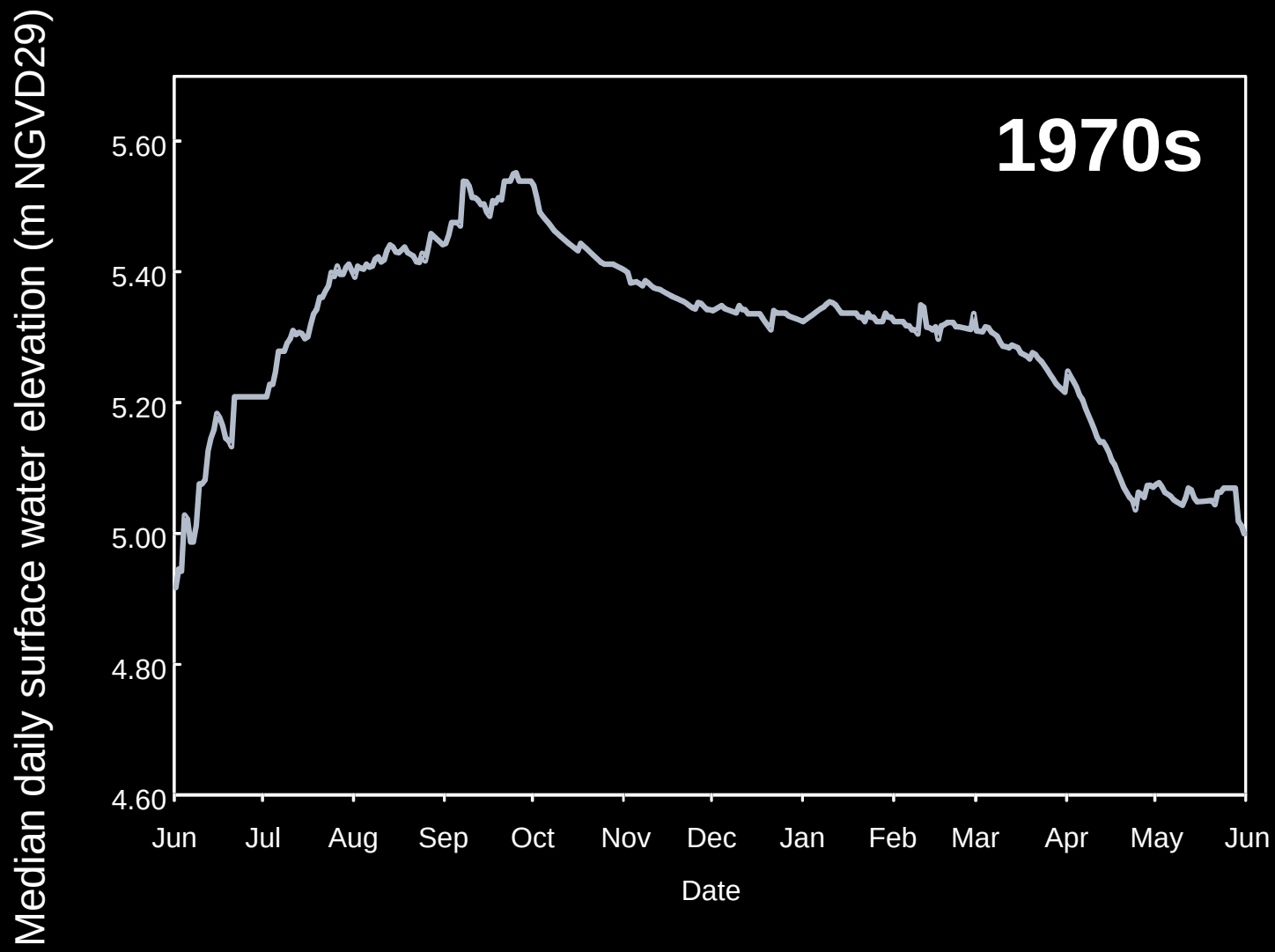
RAINFALL
1959-

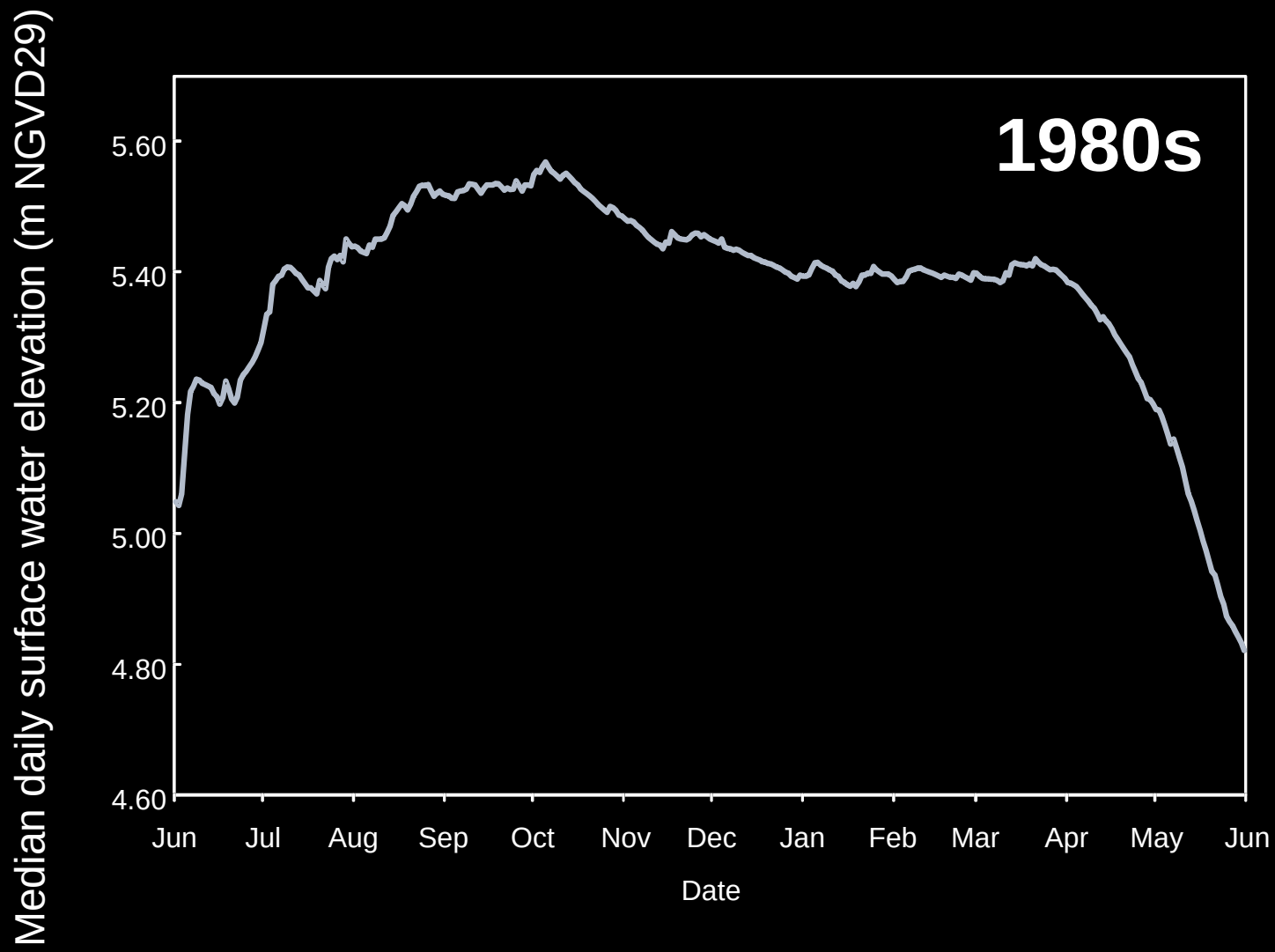
SURFACE WATER
Staff Gauges
1959-

GROUNDWATER
Well (C-492)
1973-




1960s
Median daily surface water elevation (m NGVD29)
5.60
5.40
5.20
5.00
4.80
4.60
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
Jun
Date


1970s
Median daily surface water elevation (m NGVD29)
5.60
5.40
5.20
5.00
4.80
4.60
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
Jun
Date


1980s
Median daily surface water elevation (m NGVD29)
5.60
5.40
5.20
5.00
4.80
4.60
Jun
Jul
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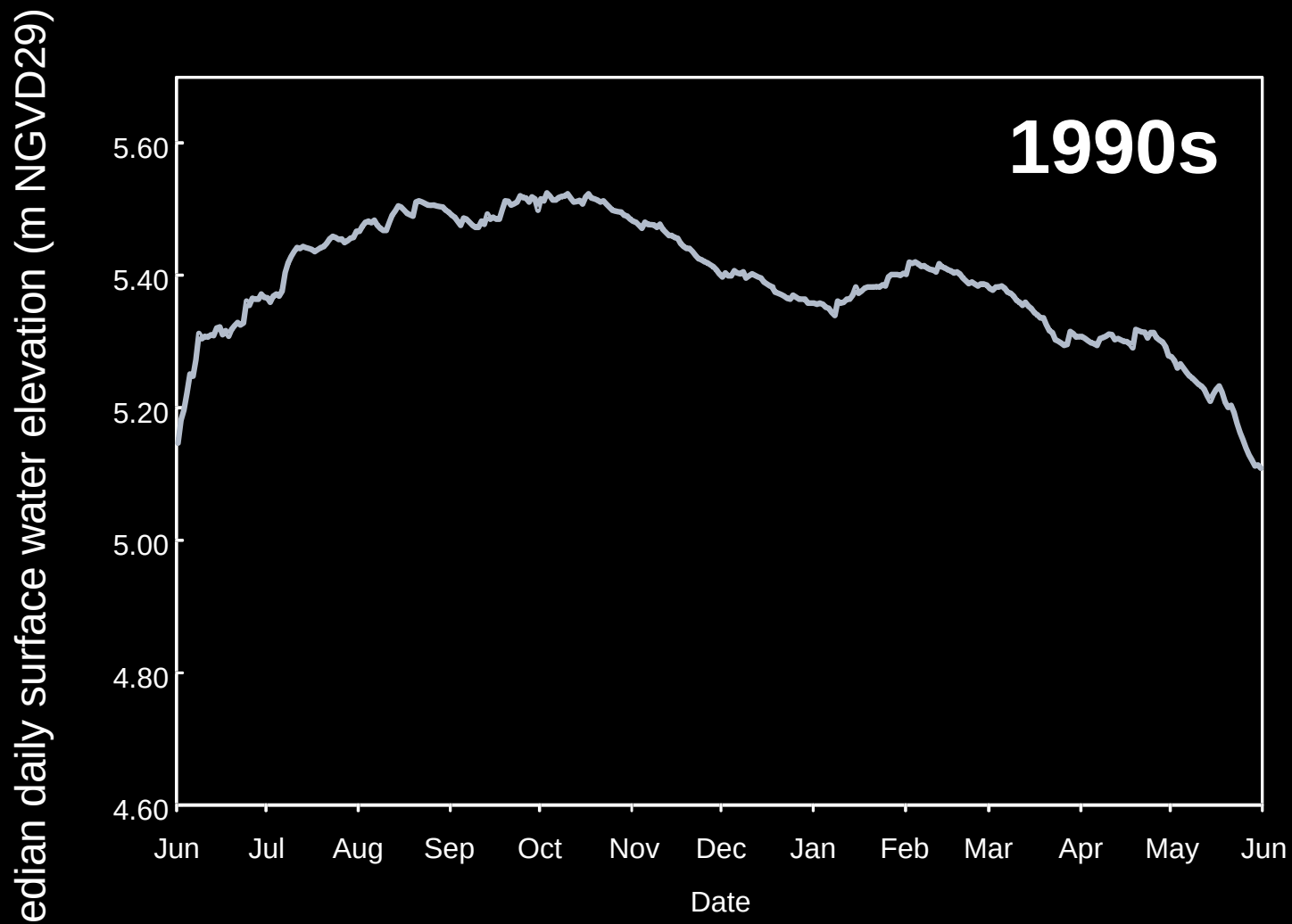
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5.60
5.40
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4.60
Jun
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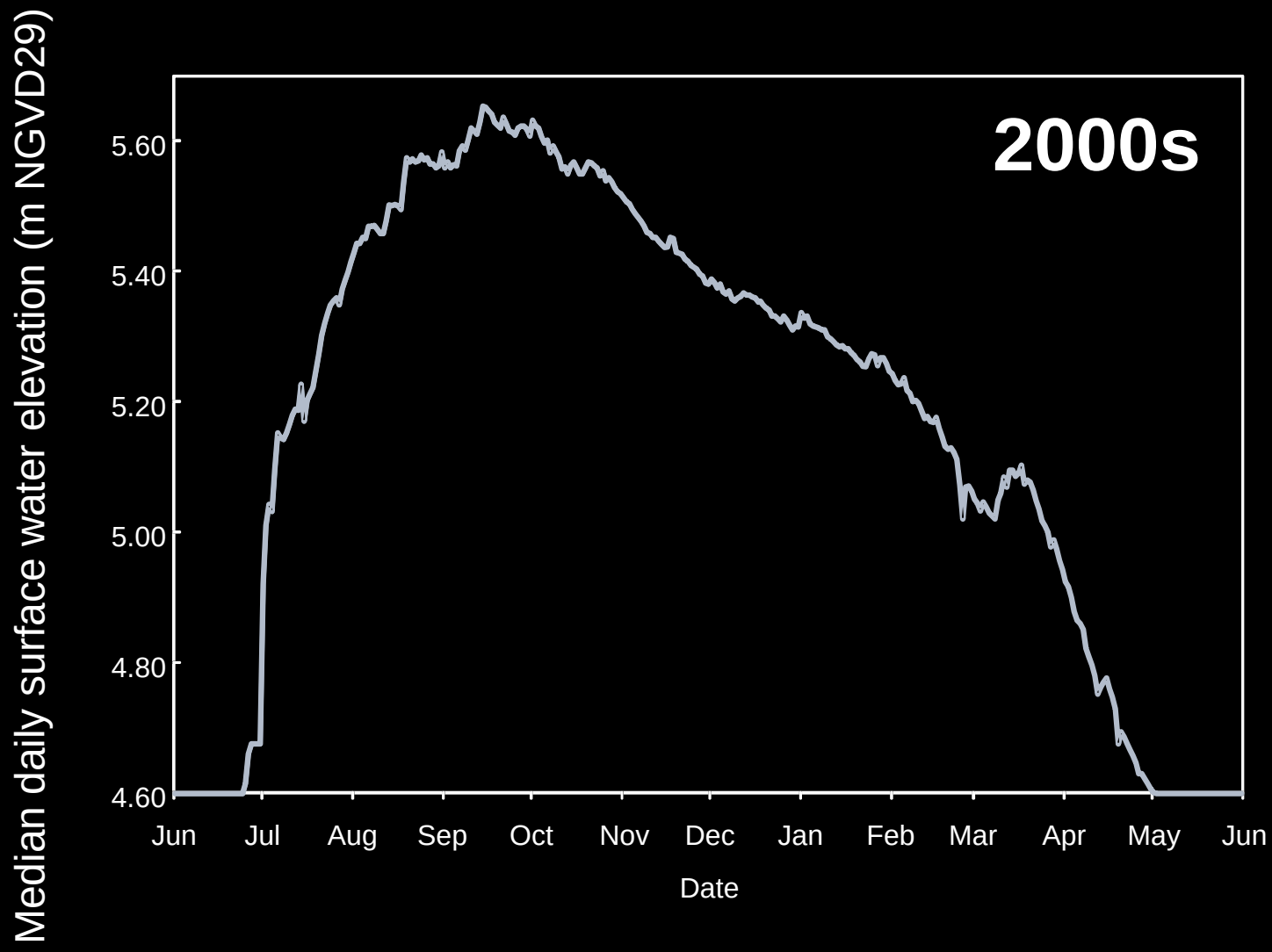
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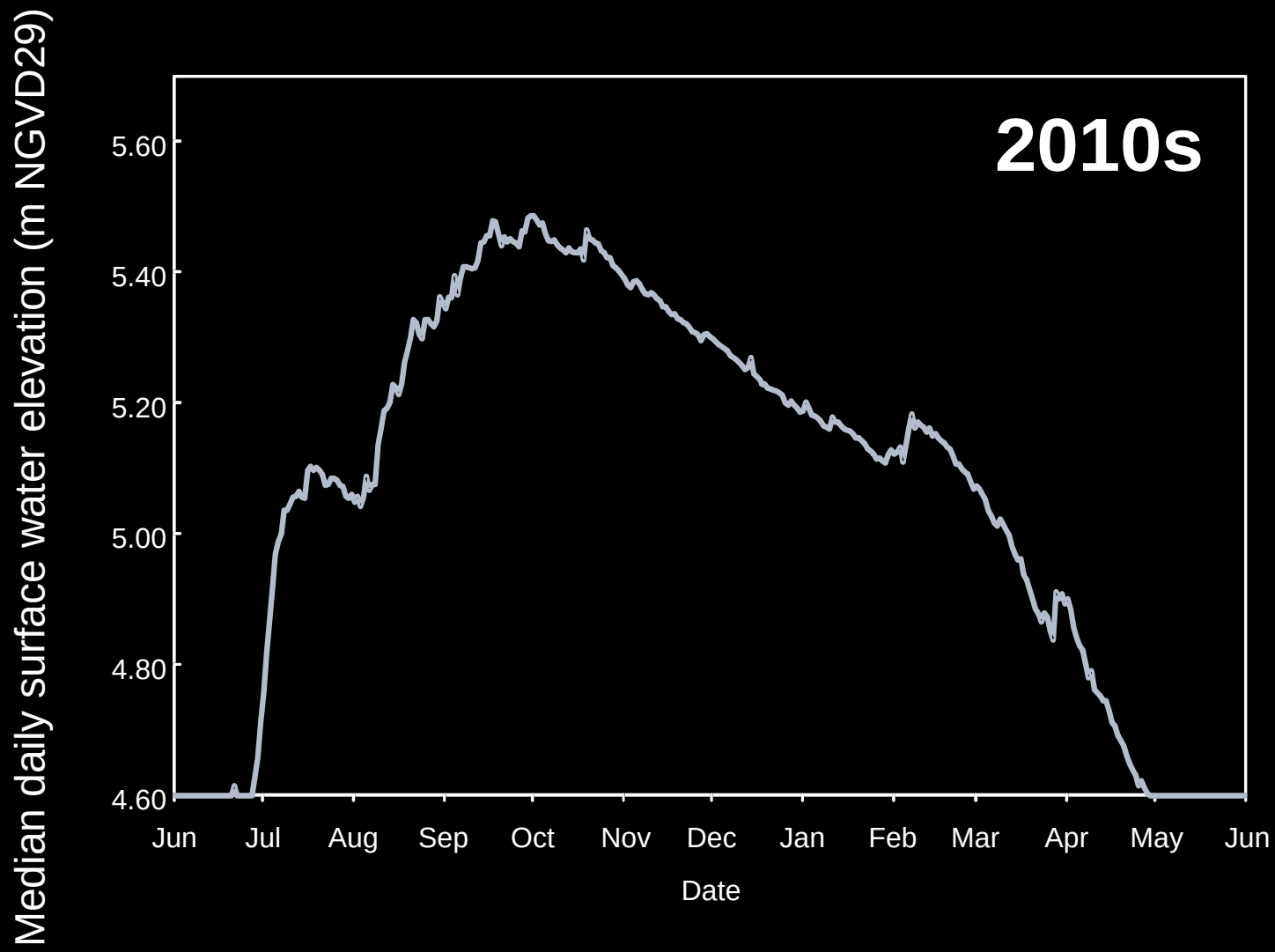
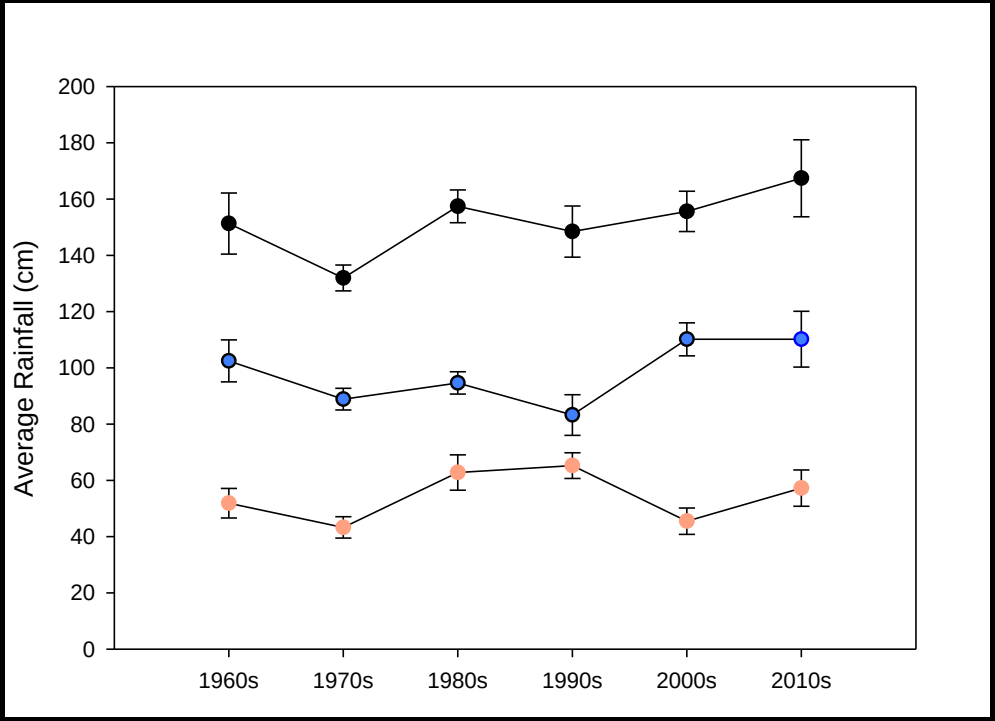
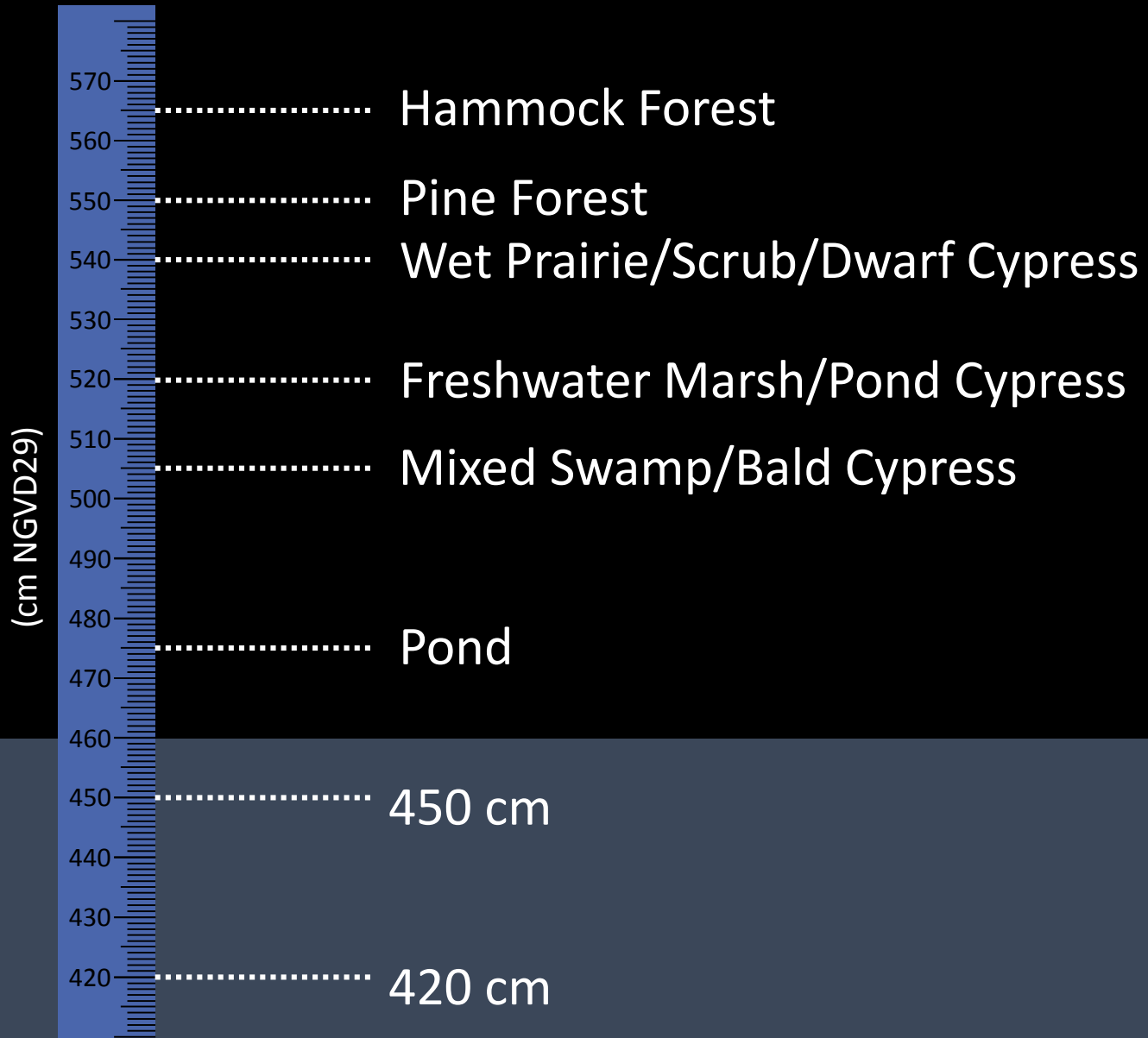

2010s
Median daily surface water elevation (m NGVD29)
5.60
5.40
5.20
5.00
4.80
4.60
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
Jun
Date

CHANGE IN RAINFALL & PEAK WATER LEVELS

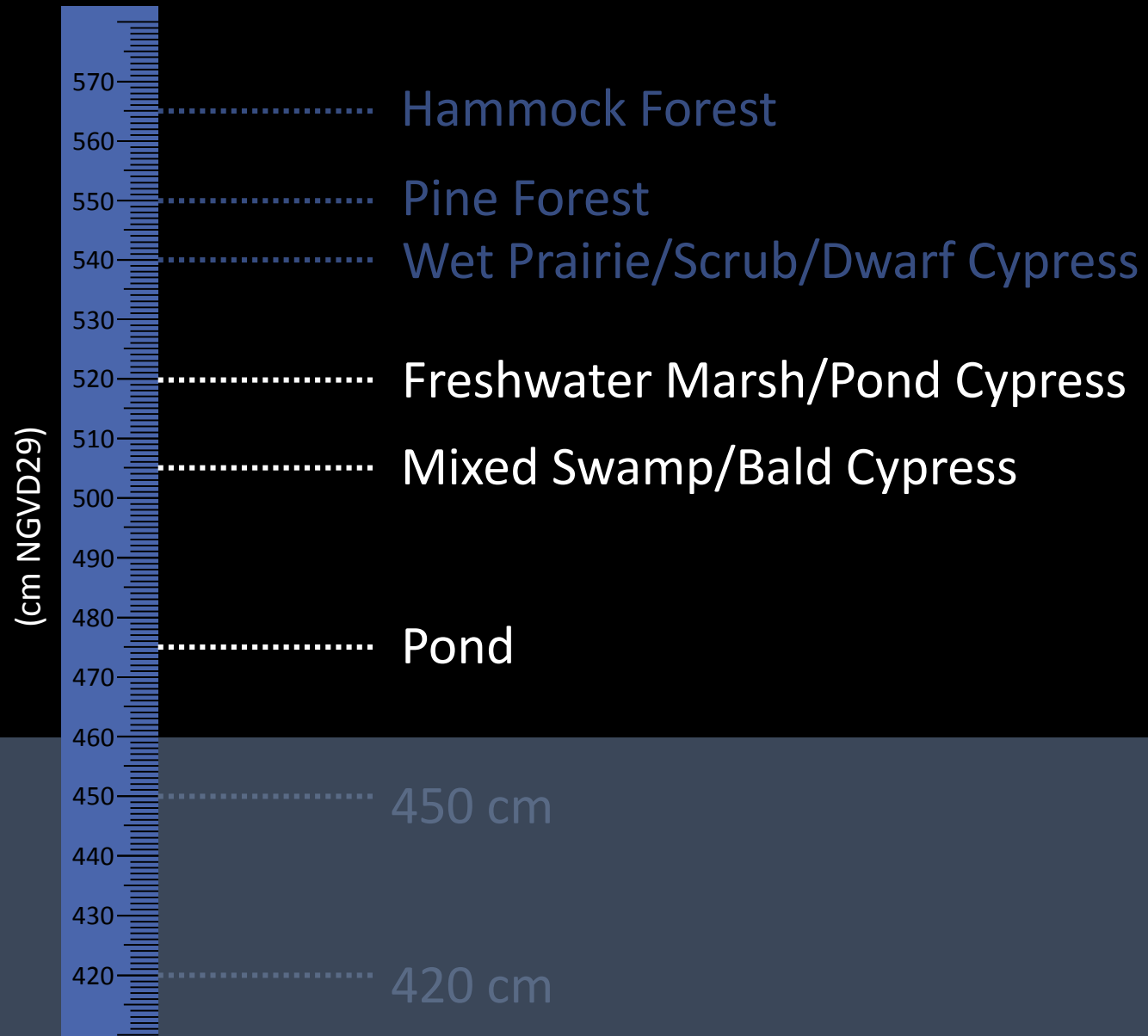
- No decadal variation in annual, wet season, dry season or monthly rainfall totals
- No change in magnitude (5.62 m NGVD29) or date (September 18) of annual wet season peak water level



Hydroperiod: Maximum number of contiguous days habitat was inundated each hydrologic year (max=365)




No decadal change in hydroperiod
(cm NGVD29)
570
560
550
540
530
520
510
500
490
480
470
460
450
440
430
420
Hammock Forest
HP=10 d
Pine Forest
HP=61 d
Wet Prairie/Scrub/Dwarf Cypress
HP=133 d
Freshwater Marsh/Pond Cypress
Mixed Swamp/Bald Cypress
Pond
450 cm
420 cm


(cm NGVD29)
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Hammock Forest
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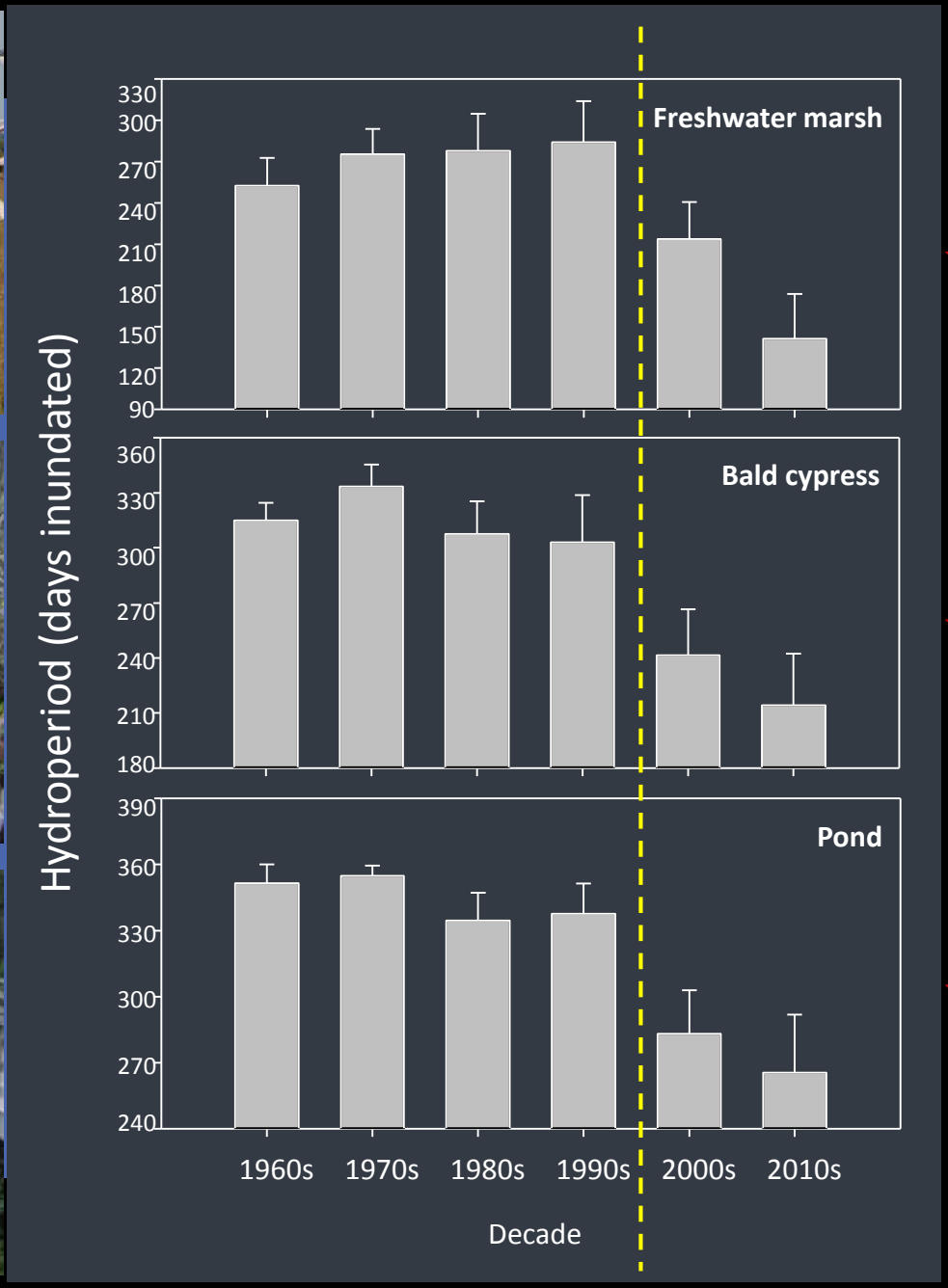
Wet Prairie/Scrub/Dwarf Cypress
Freshwater Marsh/Pond Cypress
Mixed Swamp/Bald Cypress
Pond
450 cm
420 cm

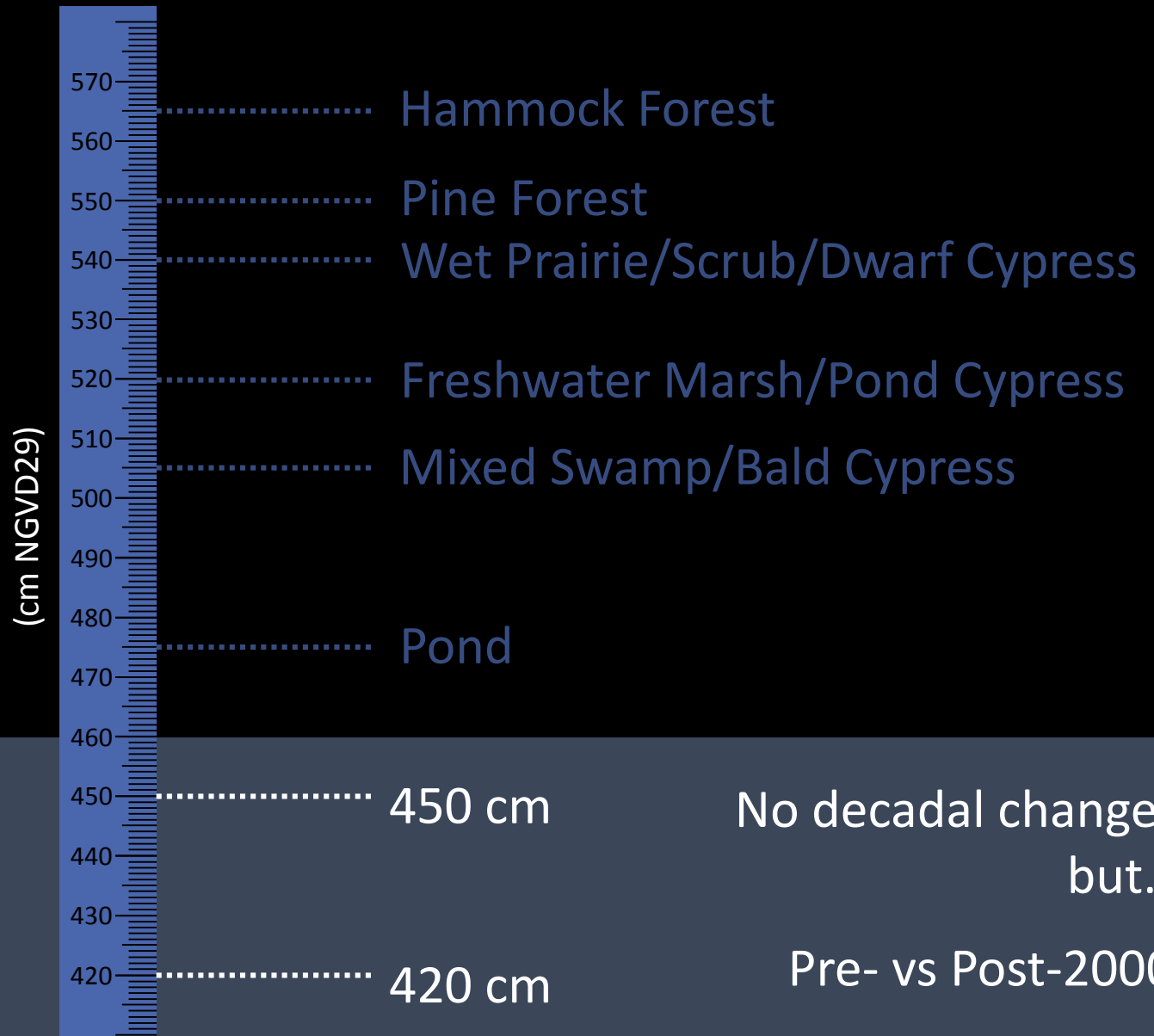


1960s to 2010s:

47.1%
(4.2 mo.)

33.7%
(3.5 mo.)

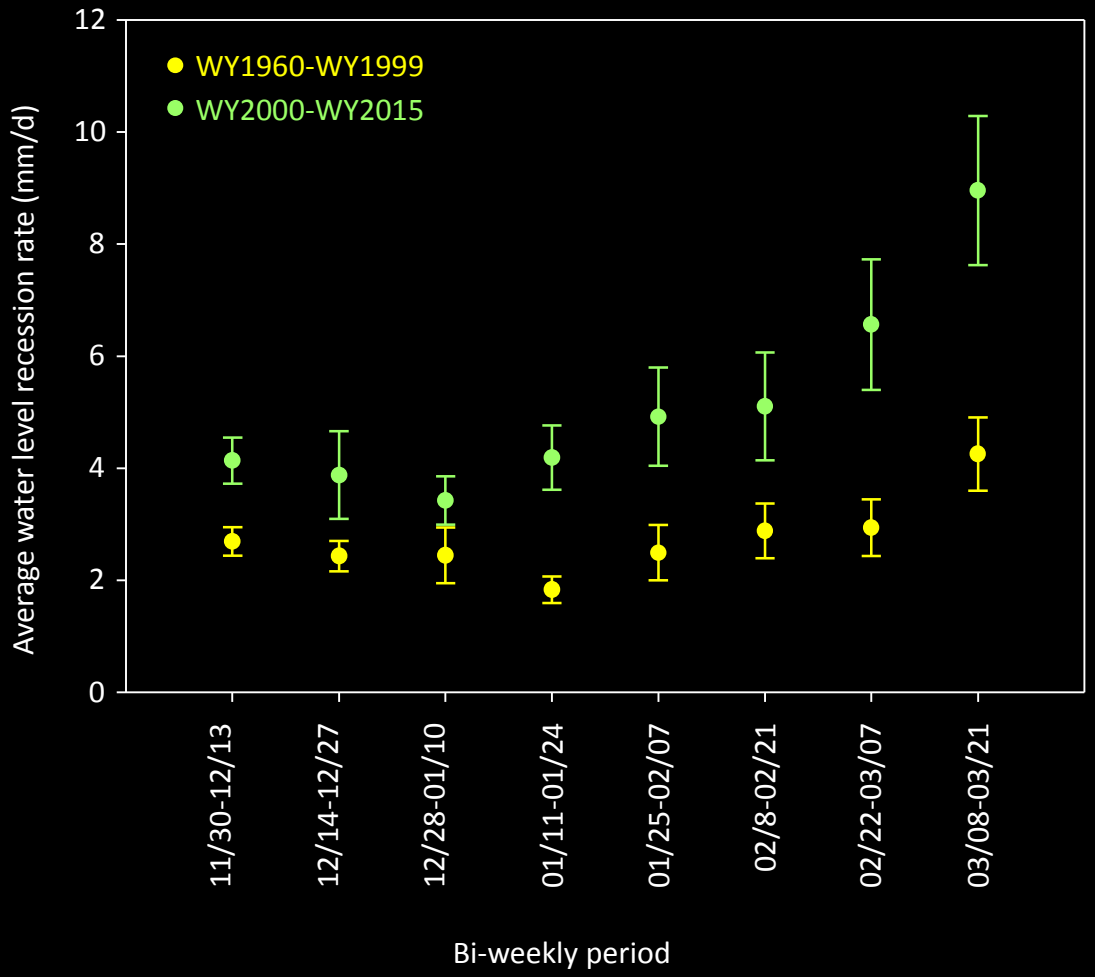
22.8%
(2.5 mo.)



No decadal change in hydroperiod, but…

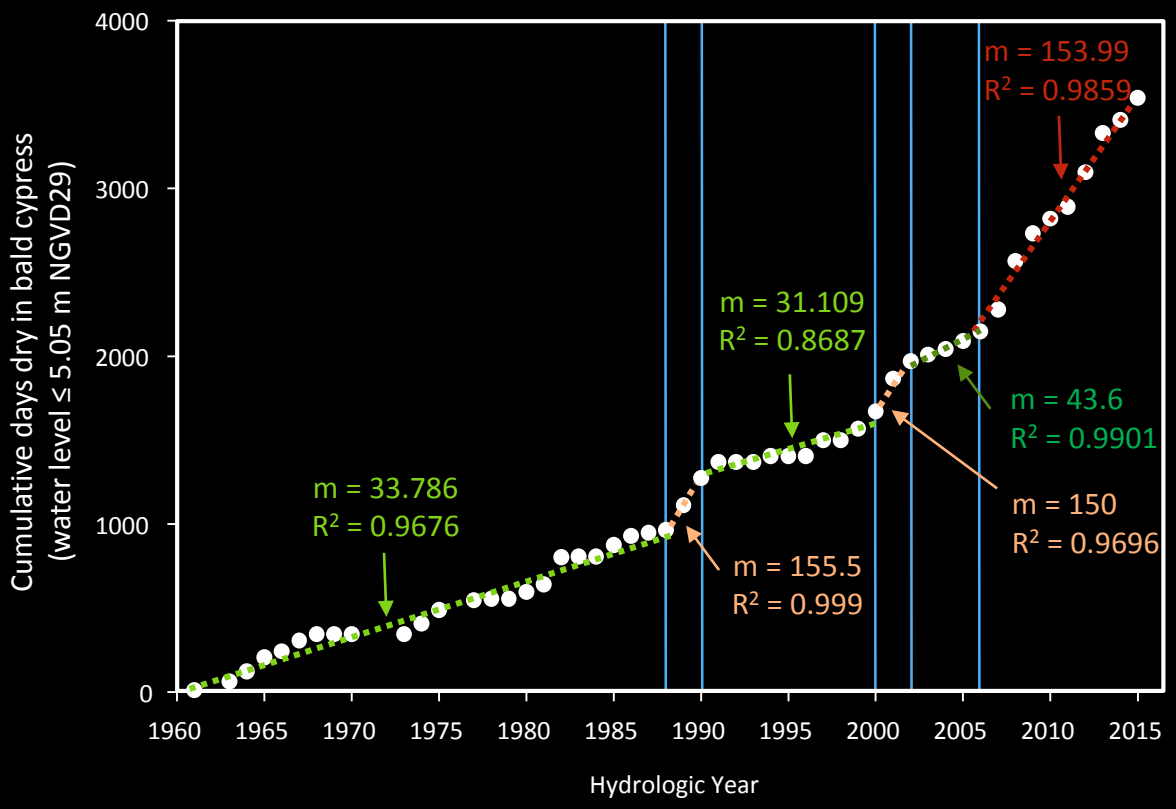
Pre- vs Post-2000 is significant

CHANGE IN DRY SEASON RECESSION RATES



> 2X

TIMING OF CHANGES



'Baseline'

- 1960-1988
- 1990-2000

Slightly shorter hp (↑ rainfall):

- 2003-2006

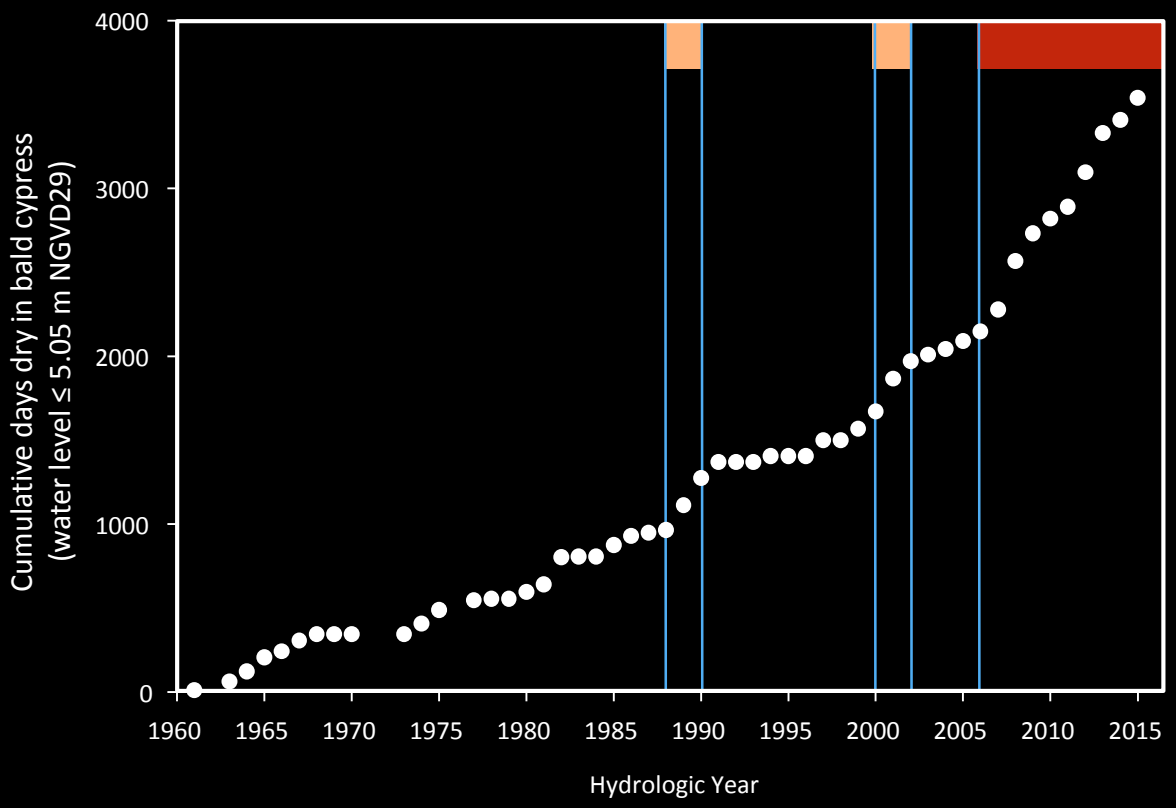
Reduced hydroperiod years (↓ rainfall):

- 1989-1990
- 2001-2002

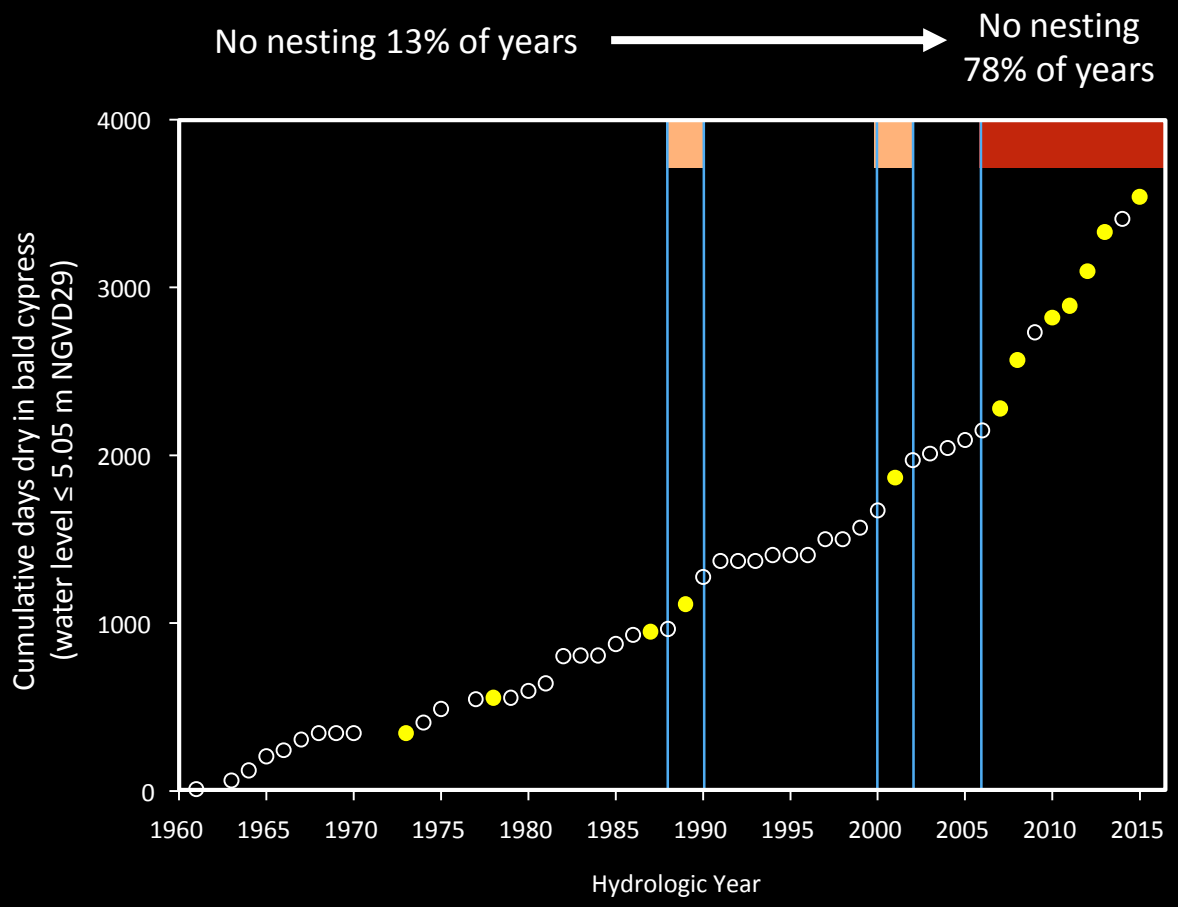
Dry 4.5x longer despite 'typical' rainfall:

- 2006-present

TIMING OF CHANGES



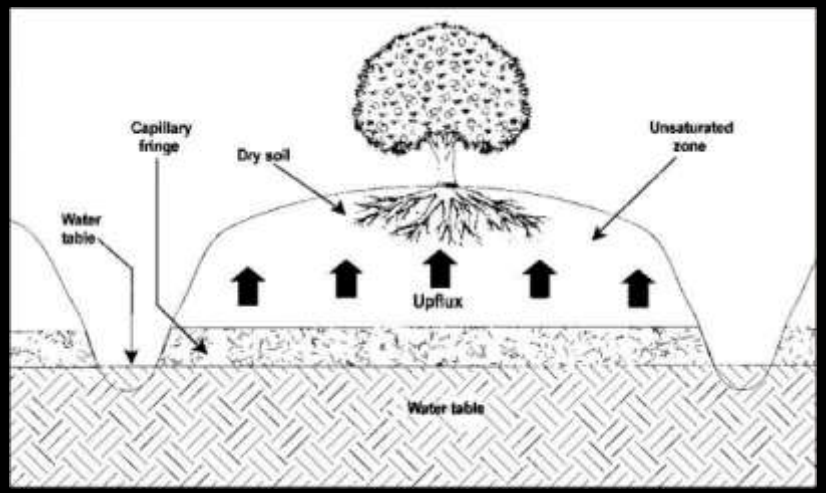
TIMING OF CHANGES



No Wood Stork nesting at Corkscrew

Landscape Changes Potentially Impacting Hydrology

- Increase in agriculture (esp. citrus) and associated water management activities

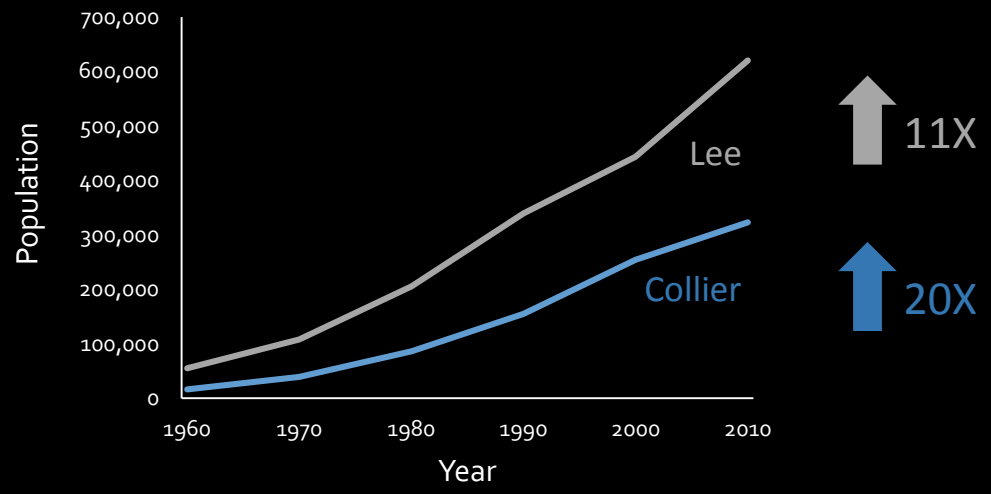


Landscape Changes Potentially Impacting Hydrology

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

Landscape Changes Potentially Impacting Hydrology

- Increase in agriculture (esp. citrus) and associated water management activities
- Increased efficiency of canals
- Increased residential & municipal water use (well fields)



Landscape Changes Potentially Impacting Hydrology

- Increase in agriculture (esp. citrus) and associated water management activities
- 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
- Corkscrew Science Advisory Committee (JJ Lorenz, WF Loftus, B Cornell, J Lauritsen)
- Various family foundations and other donors