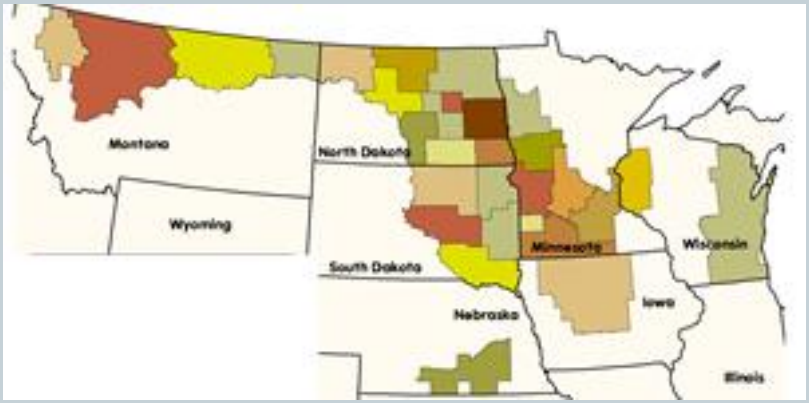
US Fish and Wildlife Service

Working with others to conserve, protect and enhance fish, wildlife, plants and their habitats for the continuing benefit of the American people.

Jeff Drahota
Complex Biologist/Certified
Hydric Soil Scientist
Rainwater Basin
Wetland Management District

WMDs Primary Purpose

Provide optimal migration habitat for waterfowl, shorebirds, and other species that depend on a grassland-wetland ecosystem



1934 Duck Stamp Act
1958 Small Wetlands (WPAs) Act
1962 WMDs

Photos by J Drahota

Outline

- Cottonwood WPA
  - 2017 roundout acquisition of a 264 A wetland footprint facilitates full basin restoration potential
  - Wetland Restoration to Increase Sustainability
- Hydrology Monitoring
  - Surface Water Methods
    - Survey, Elevation Area Capacity, Water Budget
  - Groundwater Methods
    - Well installation
- Status and Recent Results
  - Summary of Recharge Events

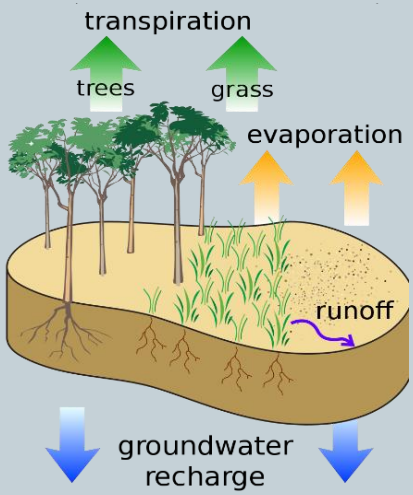
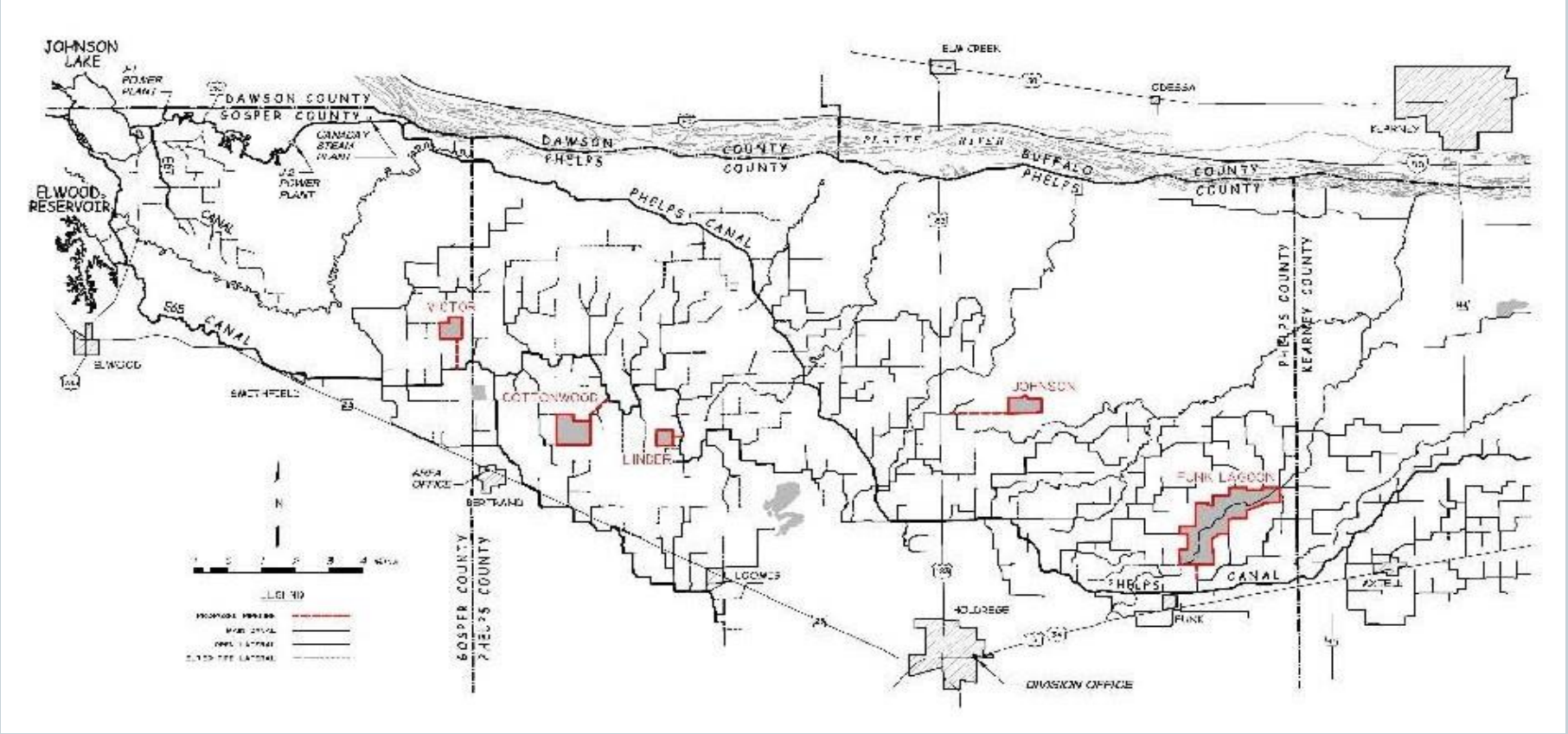


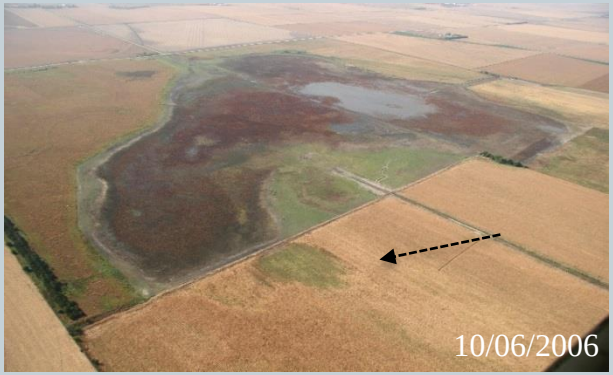
Photo by J Drahota

Western Recharge Project Location Map



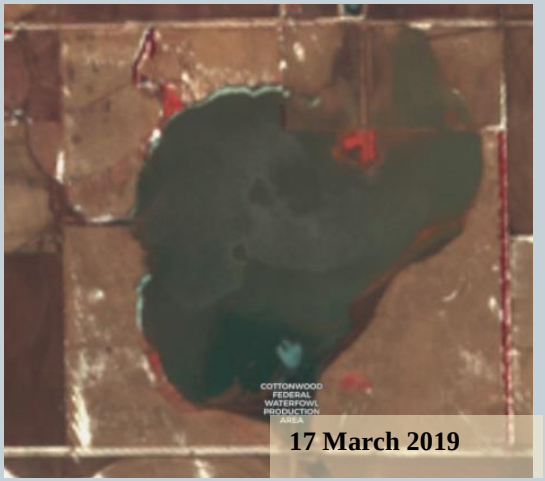
CNPPID

Cottonwood – Reduction in Ponded Area



Photos by J. Drahota

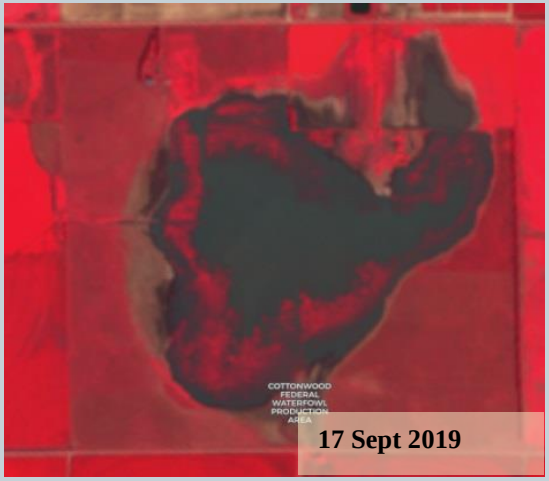
Cottonwood WPA Seasonal Variations



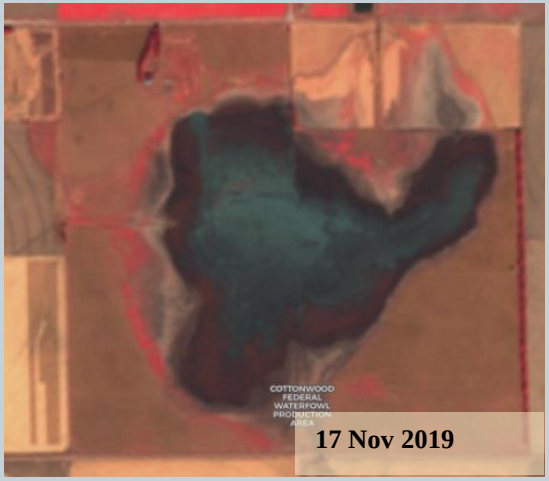
17 March 2019

13 May 2019

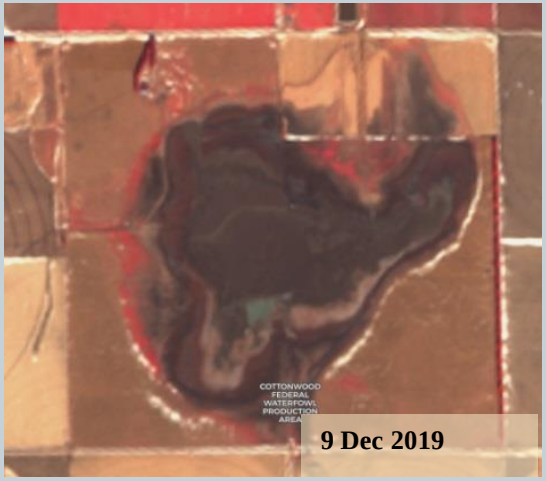
17 July 2019



17 Sept 2019



17 Nov 2019



9 Dec 2019

N

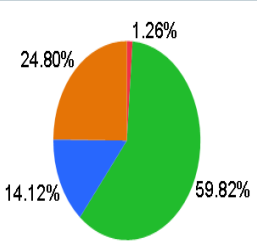
Photos from Sentinel Hub

Rainwater Basin Wetlands - Imperiled

- **Imperiled** (1,164 wetlands, Verheijen et al. 2018)
  - 67% of the wetlands no longer pond (JV AHS)

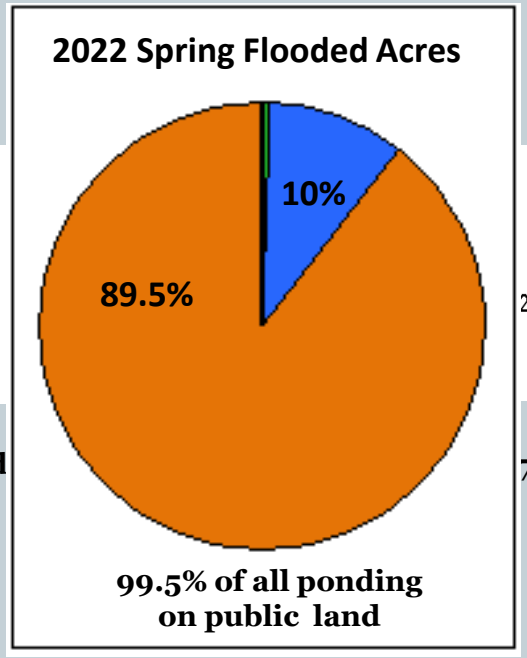
DU Priv* WMA WPA

N=1,604 areas
16,470 A ponded

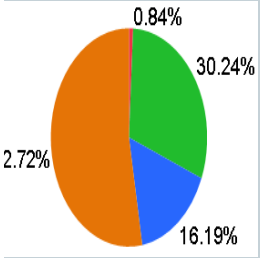


3/23 years,
40% public land

Wet



N=139 areas
2,068 A ponded



16/23 years,
70% public land

Dry

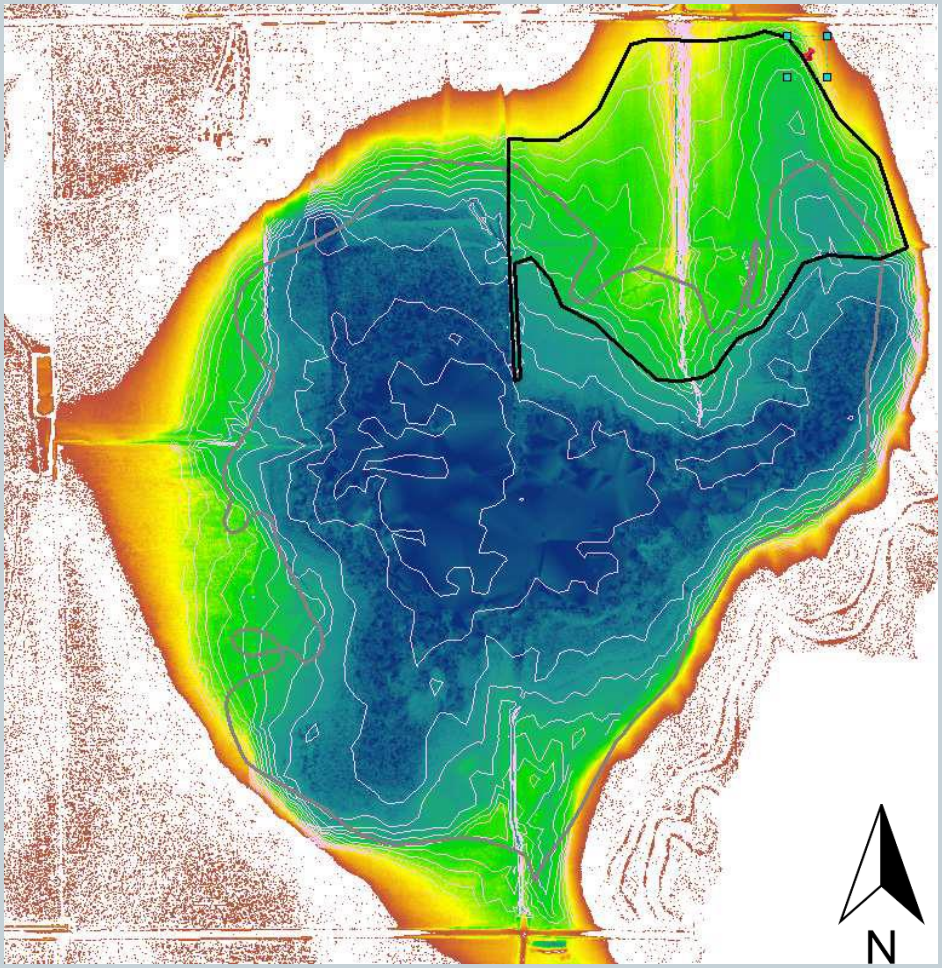
Photos by J. Drahota

Cottonwood Wetland Goals

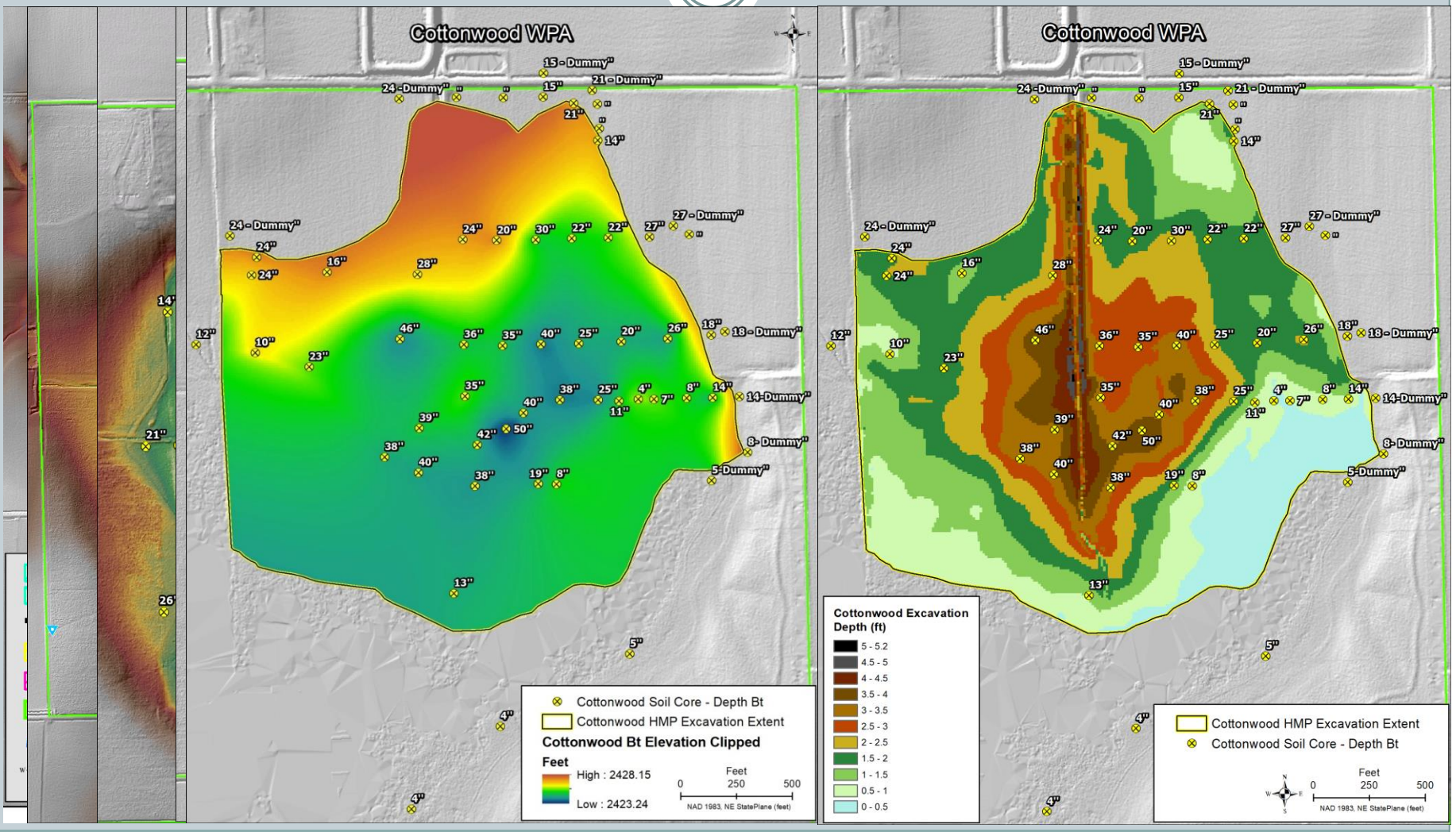
5-year Priorities for the RWB WMD:

- Manage habitat for waterbirds.
- Only 28% of footprint ponds during spring migration.
- <15% undesirable/invasive species in wetland communities.
- Evaluate degradation and determine the best strategies to increase ponding frequency and ponded area

<u>Refuge Realignment Goal</u>:
Ecological sustainability and improve management efficiency.



Restoration Planning Process



Water Conveyance – Cottonwood

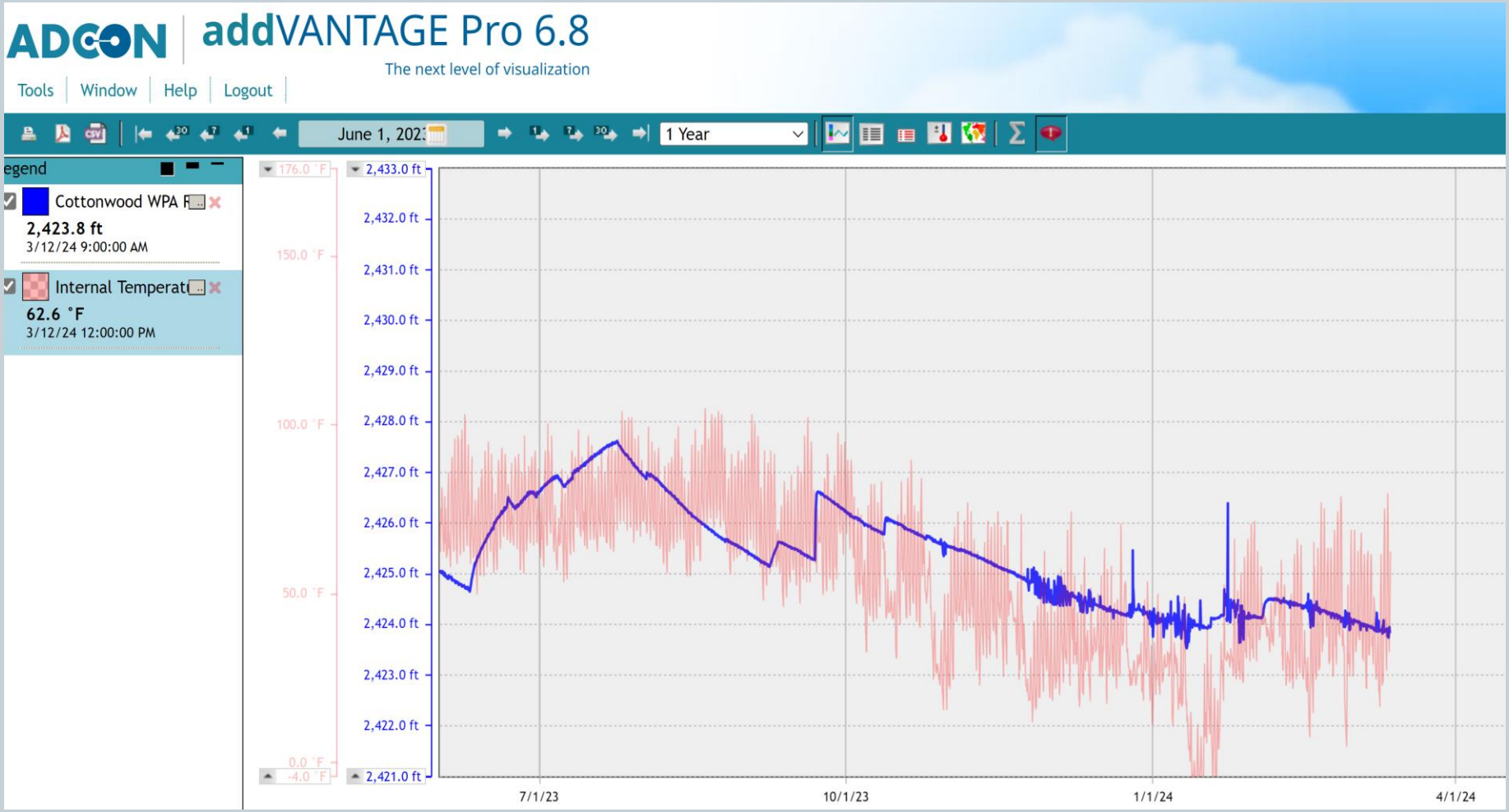




2018 2021 2023


Photos by J. Drahota

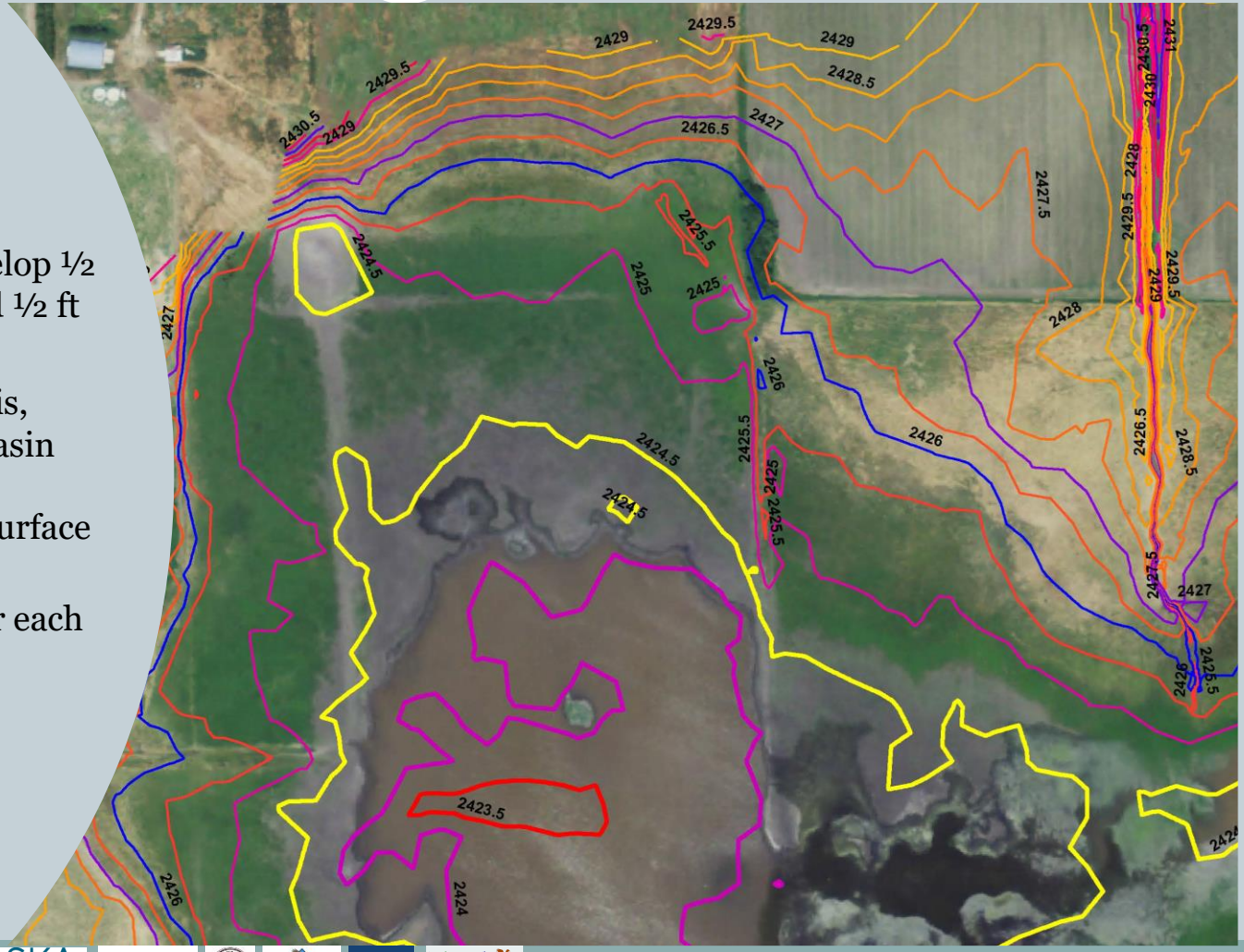
Surface Water Data Collection



Duane Woodward

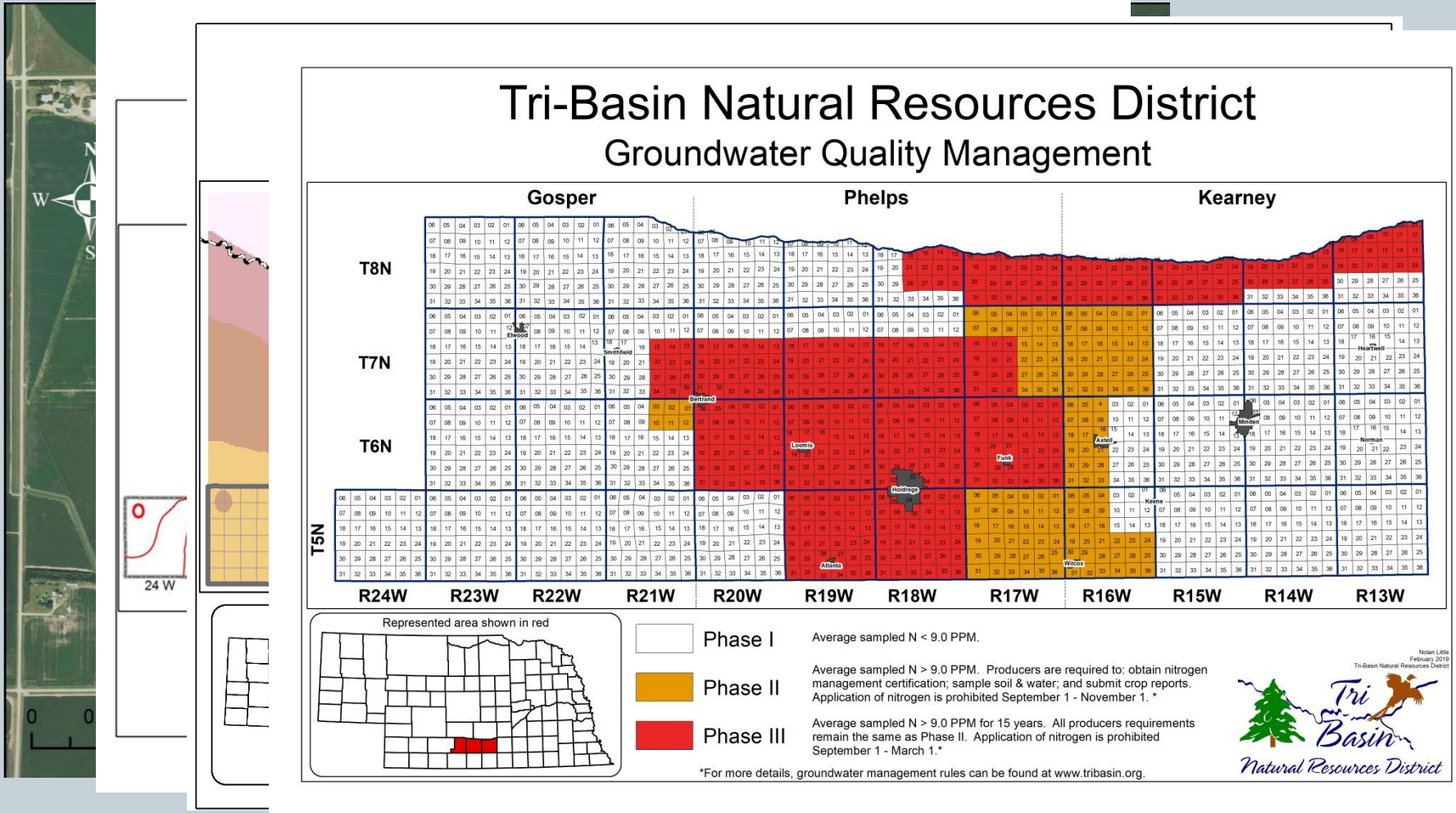
Develop Elevation Area Capacity Curves

- Use topo survey to develop ½ ft contour shapefile and ½ ft Raster dataset
- Use ArcGIS 3D analysis, compute Surface and basin volume for each 0.1 ft elevation (Functional Surface – Surface Volume)
- Copy text file output for each elevation increment in spreadsheet



Duane Woodward

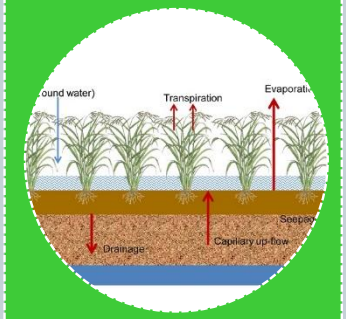
Groundwater Flow and Quality



Computing Water Budget

Basin water budget is a daily computation of inflows, outflows, and change in storage.

Inflows include Water delivery from canal and rainfall plus runoff into the basin



Outflows include estimated water surface evaporation and seepage from the wetted basin

Daily water surface elevations are used with the EAC curves to compute the change in storage and ponded area each day.

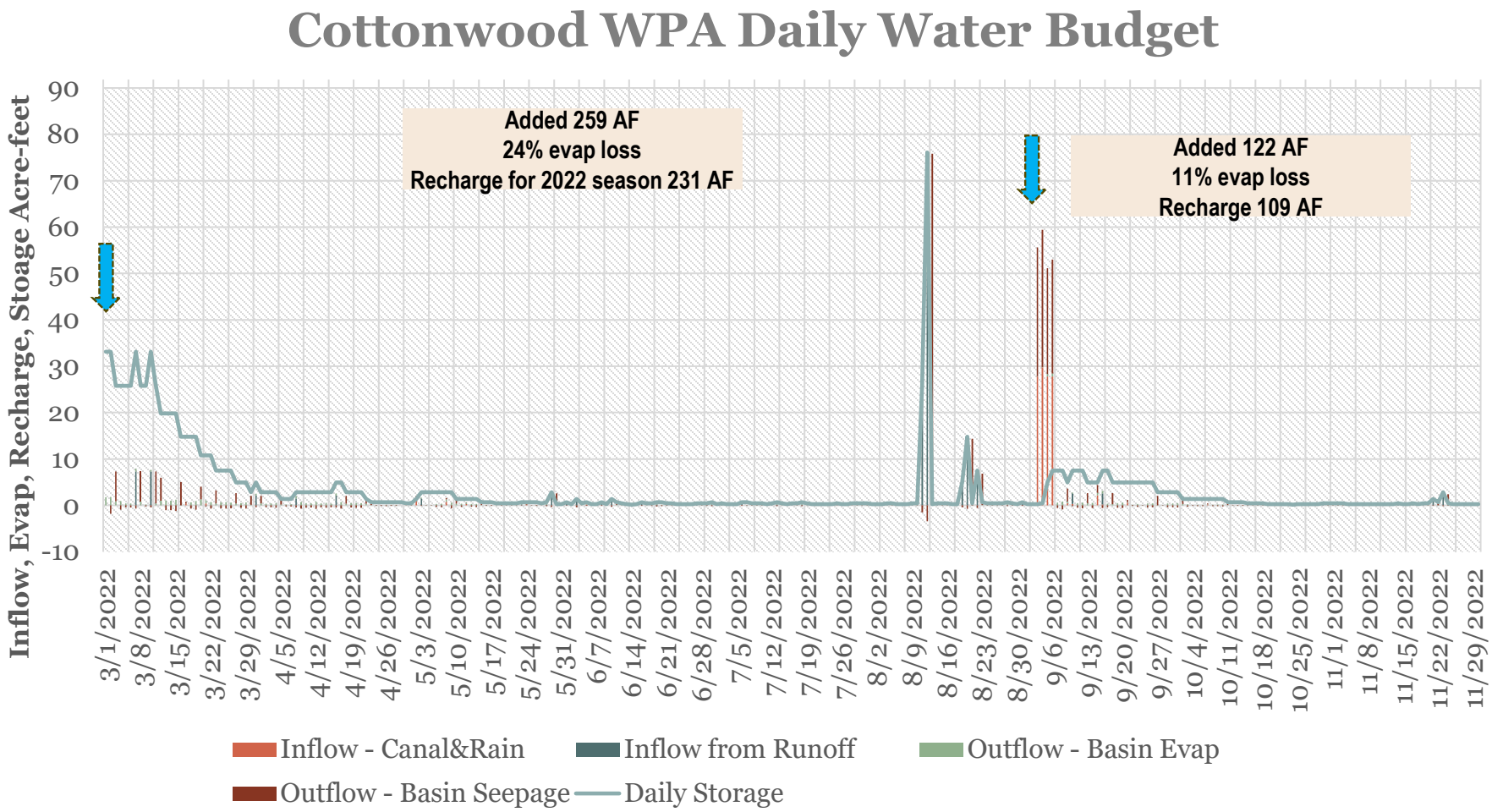
Results in graphs.

Furrytalk.com, Bing stock images, study.com

Results – Area Capacity

Photo by Nolan Little, Tri-Basin

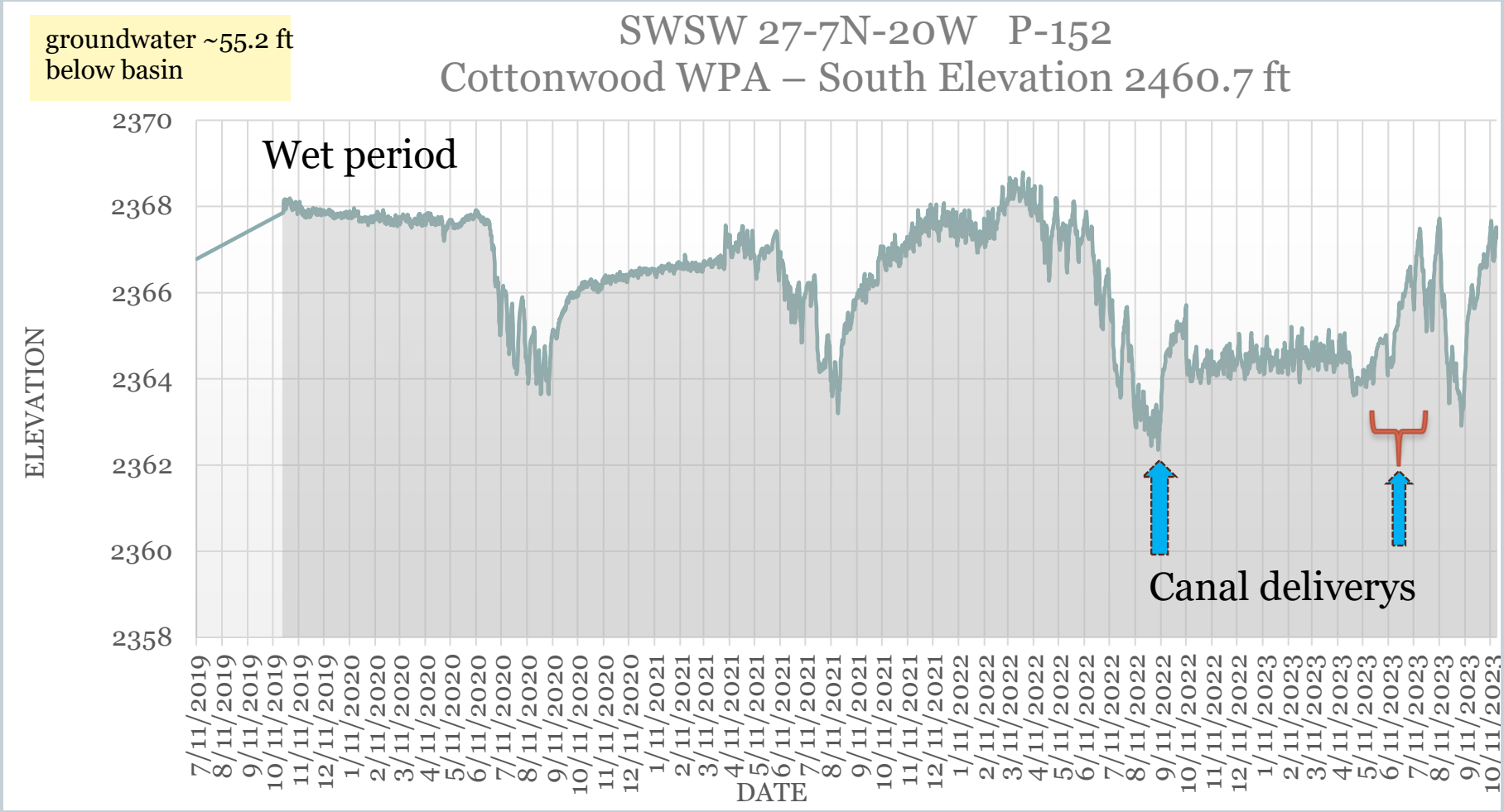
Results – Daily Water Budget



Duane Woodward

Results - Cottonwood Groundwater Recharge

groundwater ~55.2 ft below basin



Nolan Little

We Thank Our Partners

NEBRASKA
DEPT. OF NATURAL RESOURCES

Tri Basin
Natural Resources District

CENTRAL
Nebraska Public Power and Irrigation District

DUCKS UNLIMITED

RAINWATER BASIN
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NEBRASKA
1873 - 2023

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U.S. DEPARTMENT OF THE INTERIOR
U.S. Fish and Wildlife Service
NATIONAL WILDLIFE REFUGE SYSTEM

Photos by J. Drahota and Doug Steinke

Questions

If you want to make small changes, change how you do things, if you want to make big changes, change how you see things

Photos by J. Drahota