

NORTH PLATTE NRD SURFACE WATER RECHARGE PROJECTS

COW CAMP AND RUSH/ROGERS PROJECTS

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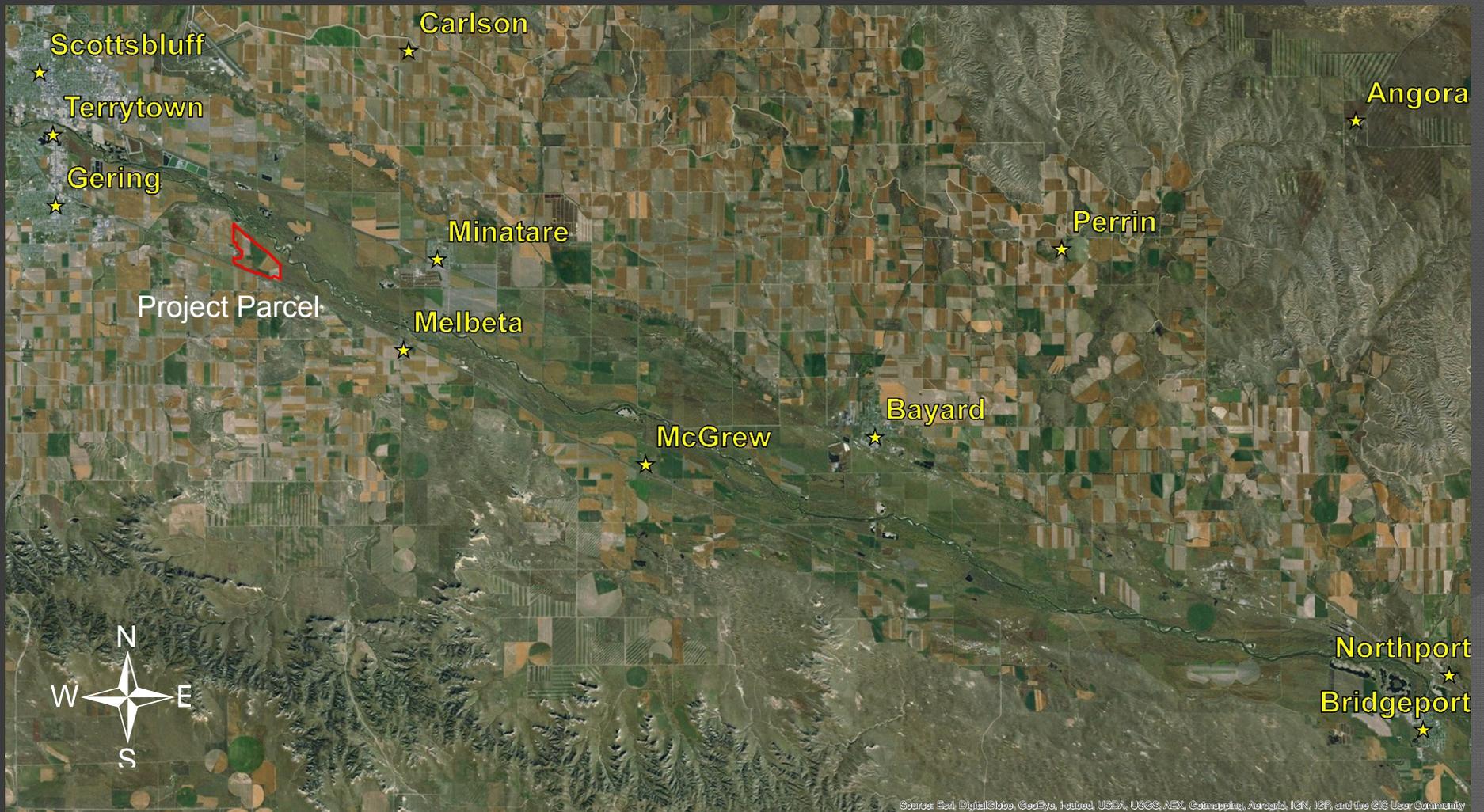


Cow Camp Project Overview

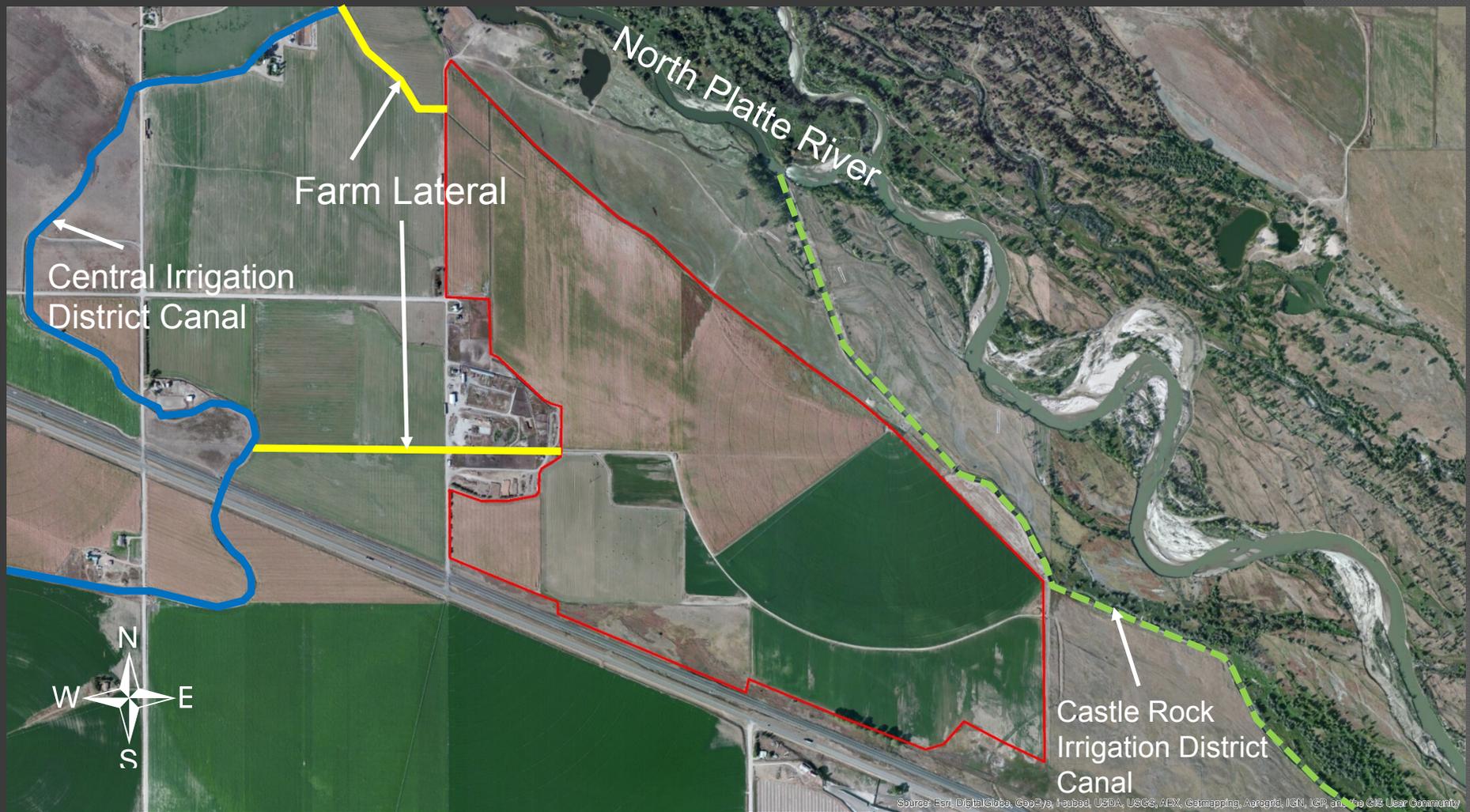
- Leased 350.7 acres at \$325/acre/year
- Annual lease cost of \$113,977.50
- 5 year lease with option to renew at end of lease



Cow Camp Project Location



Cow Camp Project Farm



Source: Esri, DigitalGlobe, GeoEye, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, and the GIS User Community



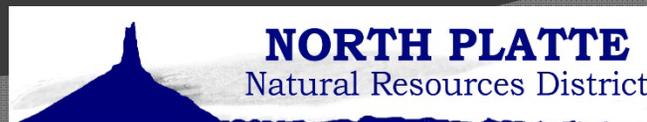
Cow Camp Historic Farm Statistics

- ◎ 386 Acres of Water Rights under the Central Irrigation District
- ◎ Total of Approximately 327 Historic Irrigated Acres
 - 198 acres of flood irrigation
 - 129 acres of sprinkler irrigation
 - Mostly corn and alfalfa rotation
 - Farmed continuously for the entire study period
 - Good yields and records



Cow Camp Historic Consumptive Use Analysis

- ◎ Determine Historic Irrigated Crop Water Use
 - Use this water as credits toward NPNRD obligations
 - Water will be recharged and/or directly returned to the North Platte River
- ◎ Determine Historic Canal Loss and Irrigation Inefficiency Return Flows
 - These will be preserved to protect downstream water rights



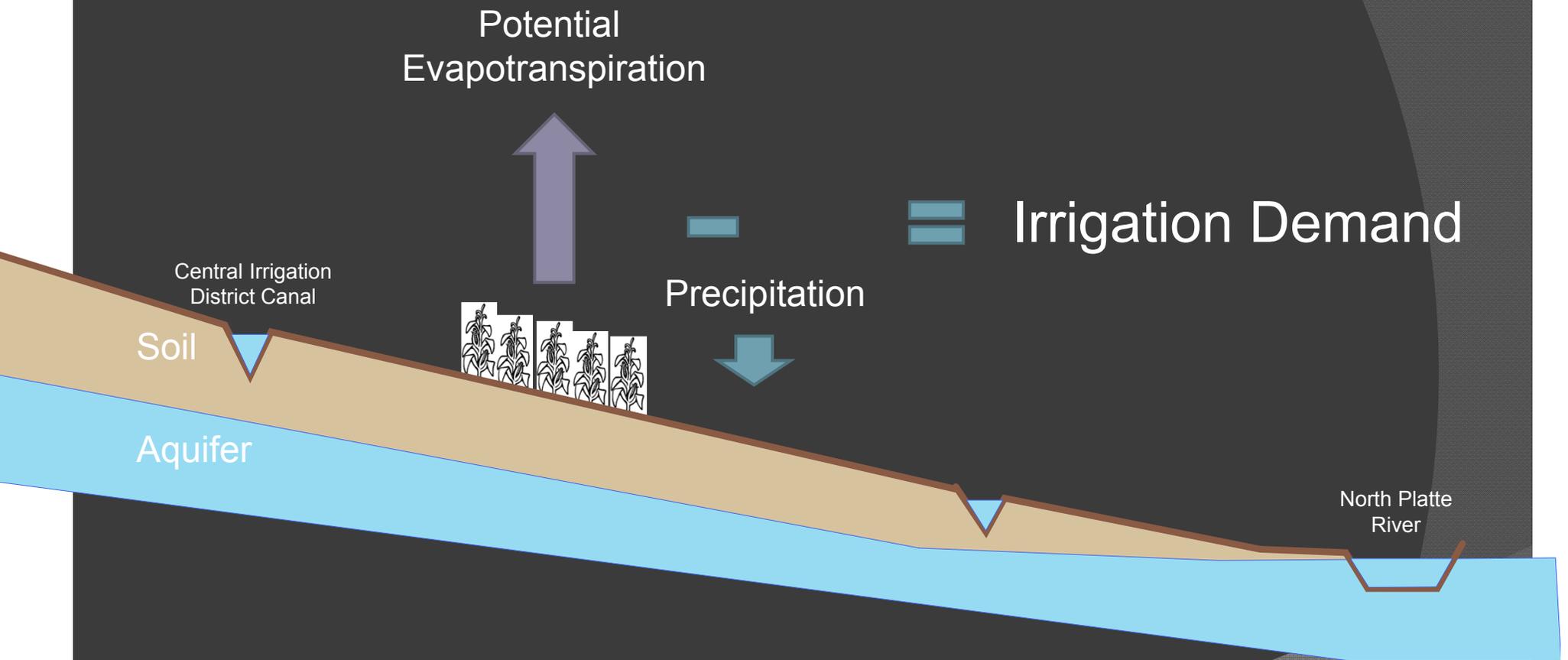
Data Acquired for Historic CU Analysis

Records Gathered for Analysis

- FSA Records (USDA FSA)
- Canal Diversion Records (Nebraska DNR)
- Soils Information (NRCS)
- Elevation Information (USGS)
- Weather Information (Scottsbluff Airport Weather Information on NOAA)
- On Farm Information (Farm Interviews)
- Canal Loss and Lateral Information (Irrigation District Interview)



Historic CU Analysis Method Irrigation Demand Calculation

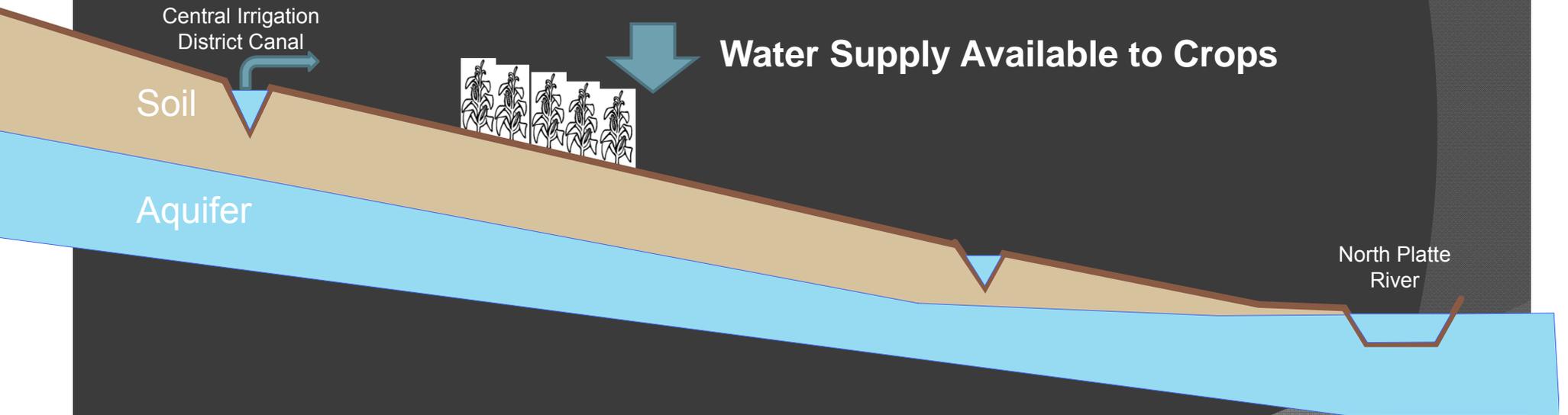


Historic CU Analysis Method

Crop Water Supply Calculation

$$\text{Total Ditch Supply from River} - \text{Average Canal Loss (40\%)} \times \frac{326 \text{ Farm Acres}}{1,706 \text{ Total ID Acres}} =$$

$$\text{Farm Turnout Supply} \times \text{Average Irrigation Efficiency (77\%)} =$$



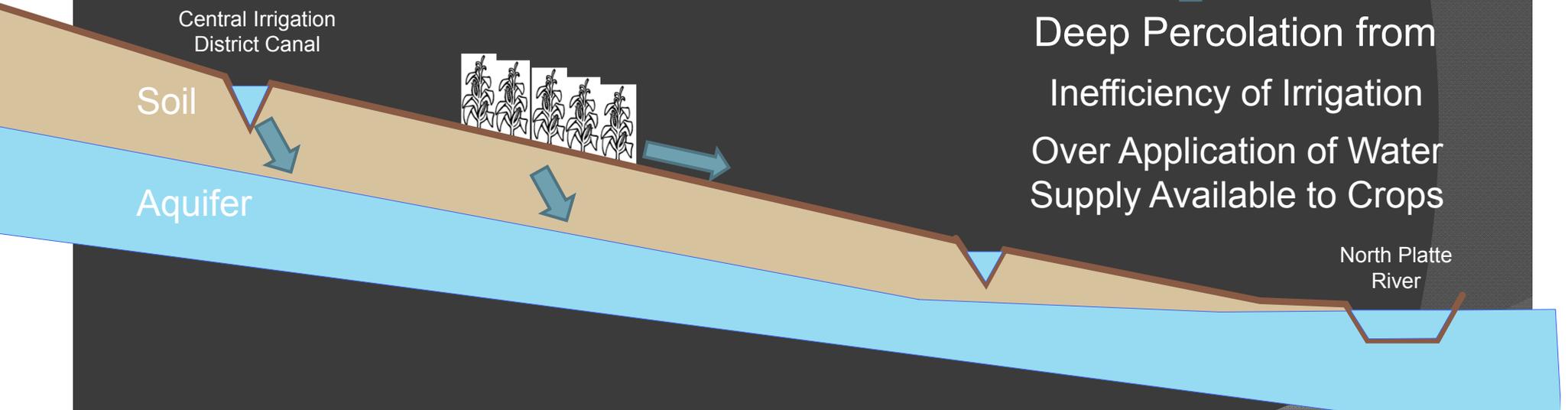
Historic CU Analysis Method

Total Return Flow Calculation

**Total Return
Flows**

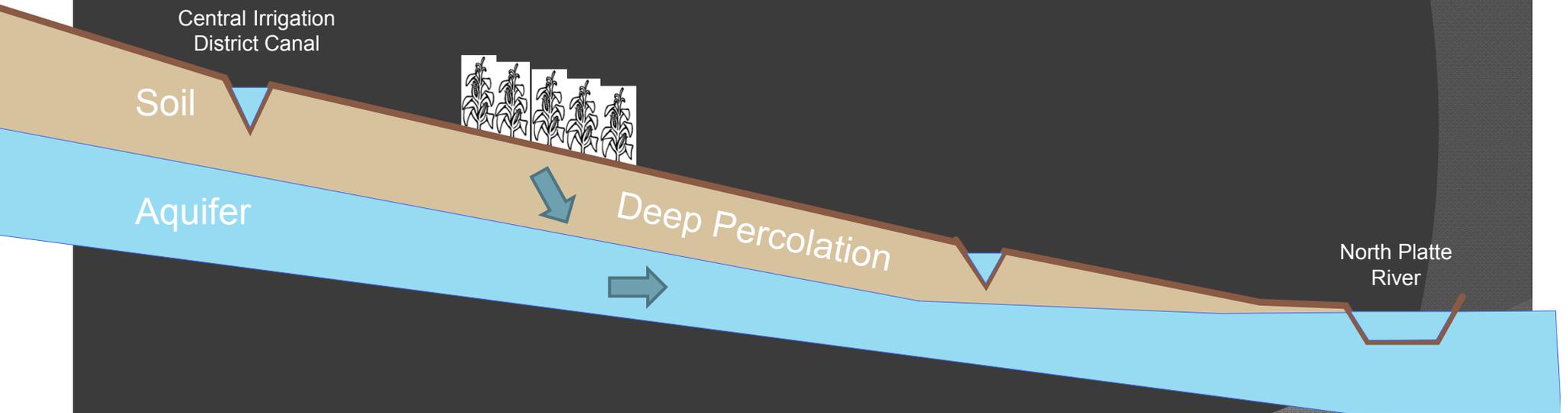
= Canal Losses **+** Tail Water from Farm Fields
(Returns to river same month diverted)

+
Deep Percolation from
Inefficiency of Irrigation
Over Application of Water
Supply Available to Crops



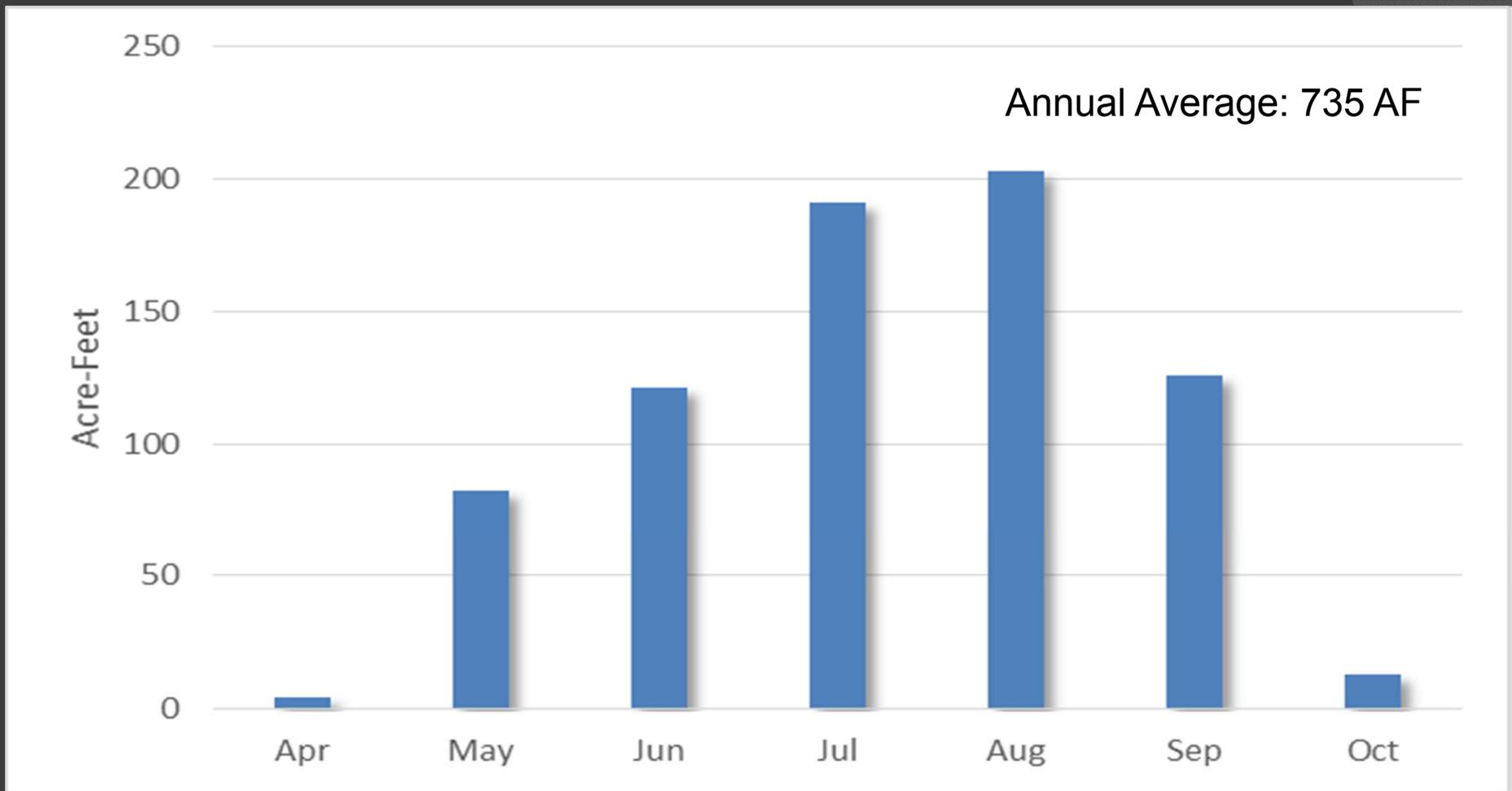
Historic CU Analysis Method

Deep Percolation Return Flow to the North Platte River



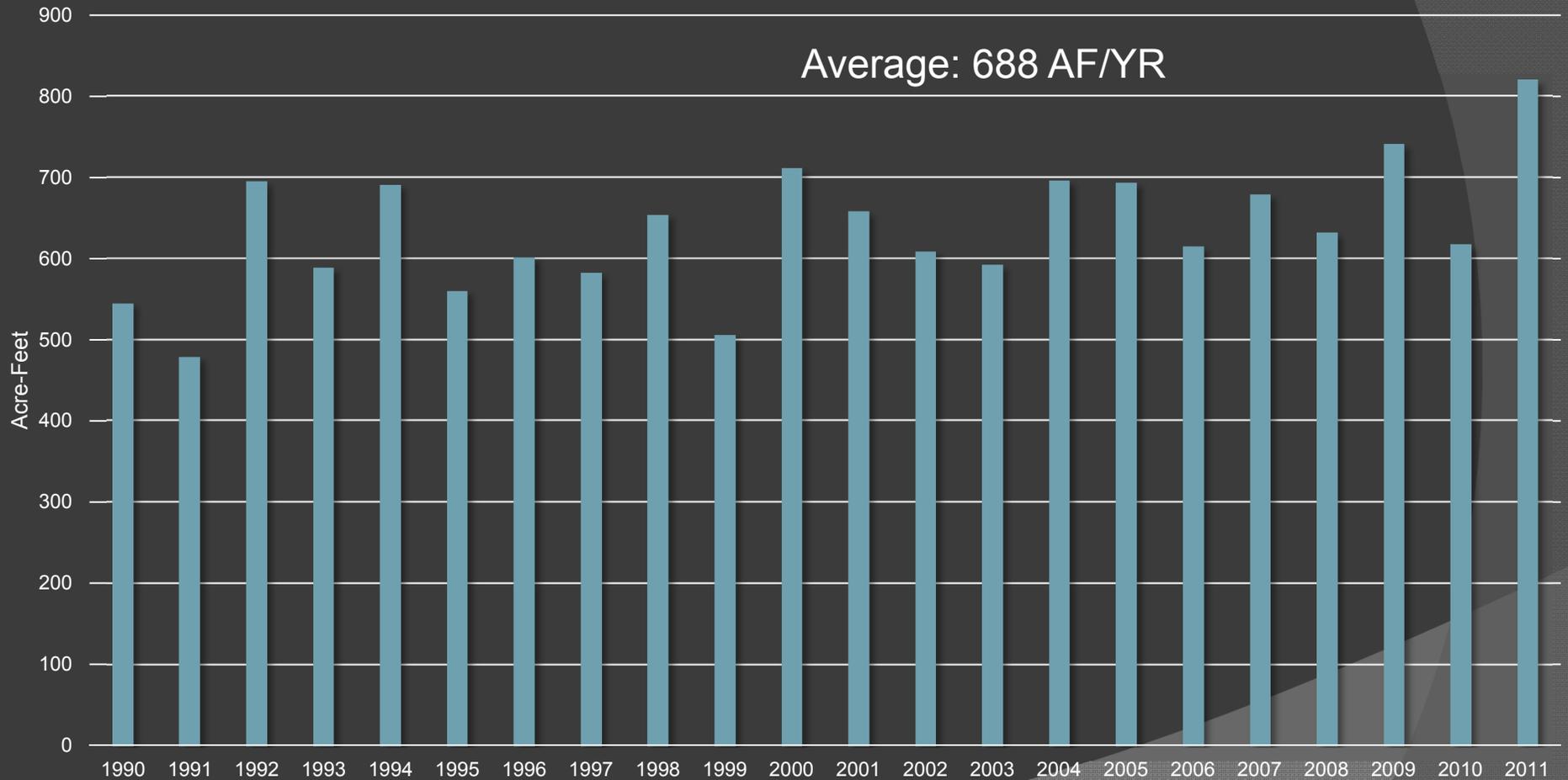
Historic Consumptive Use Analysis

○ Average Monthly Diversion to Project Farm



Cow Camp Historic Consumptive Use Analysis

Annual Total Consumptive Use for Credit



Results Summary of Cow Camp Historic CU Analysis (Per Acre)

2.2 AF
Available to Crops

~1.9 AF of Average Annual
Potential Credit

2.2 AF FTO

Soil

Central Irrigation
District Canal

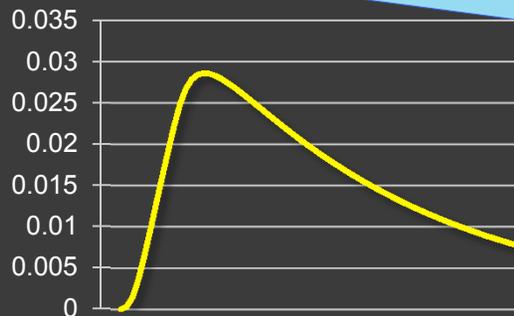
Aquifer



0.06 AF Surface Return Flow

0.23 AF DP Return Flow

North Platte
River



Return Flow Pattern

Use Ground Water Model
to Determine Return Flow
Pattern

All Values based on Average of 1990 through 2011



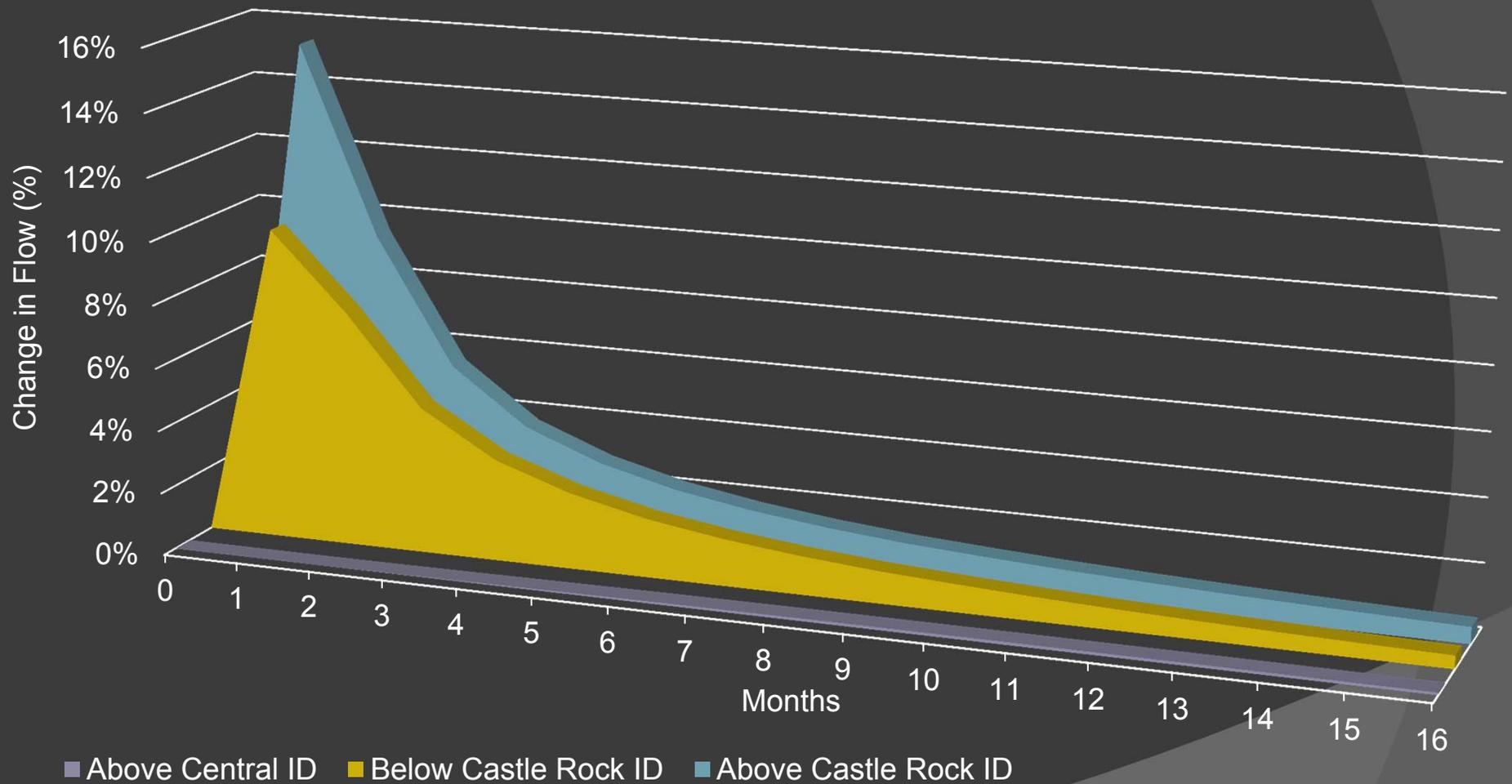
Cow Camp Aquifer Tests



- Test two existing irrigation wells
 - Determine aquifer properties
 - Locally refine ground water model with site specific information



Ground Water Timing to the North Platte River



Cost Benefit Analysis for Cow Camp Project

- 350.7 acres leased
- \$325/acre/year
- 688 acre-feet/year average potential credit
 - 3,440 acre-feet of water credit over the 5 year lease
- \$166 per acre-foot of average annual potential credit for the 5 year lease

Note: All costs do not include legal, engineering, construction, and accounting fees.



Cow Camp Options for Delivery of Credit to the North Platte River

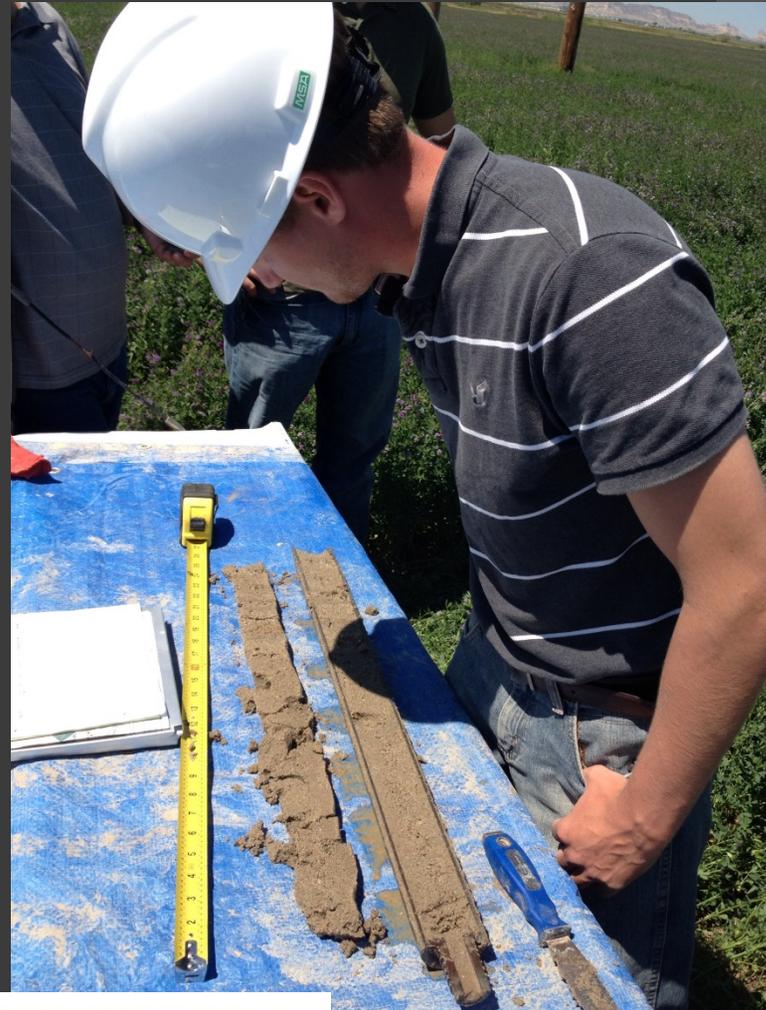
- Recharge of water into recharge pits for later discharge to the North Platte River

AND/OR

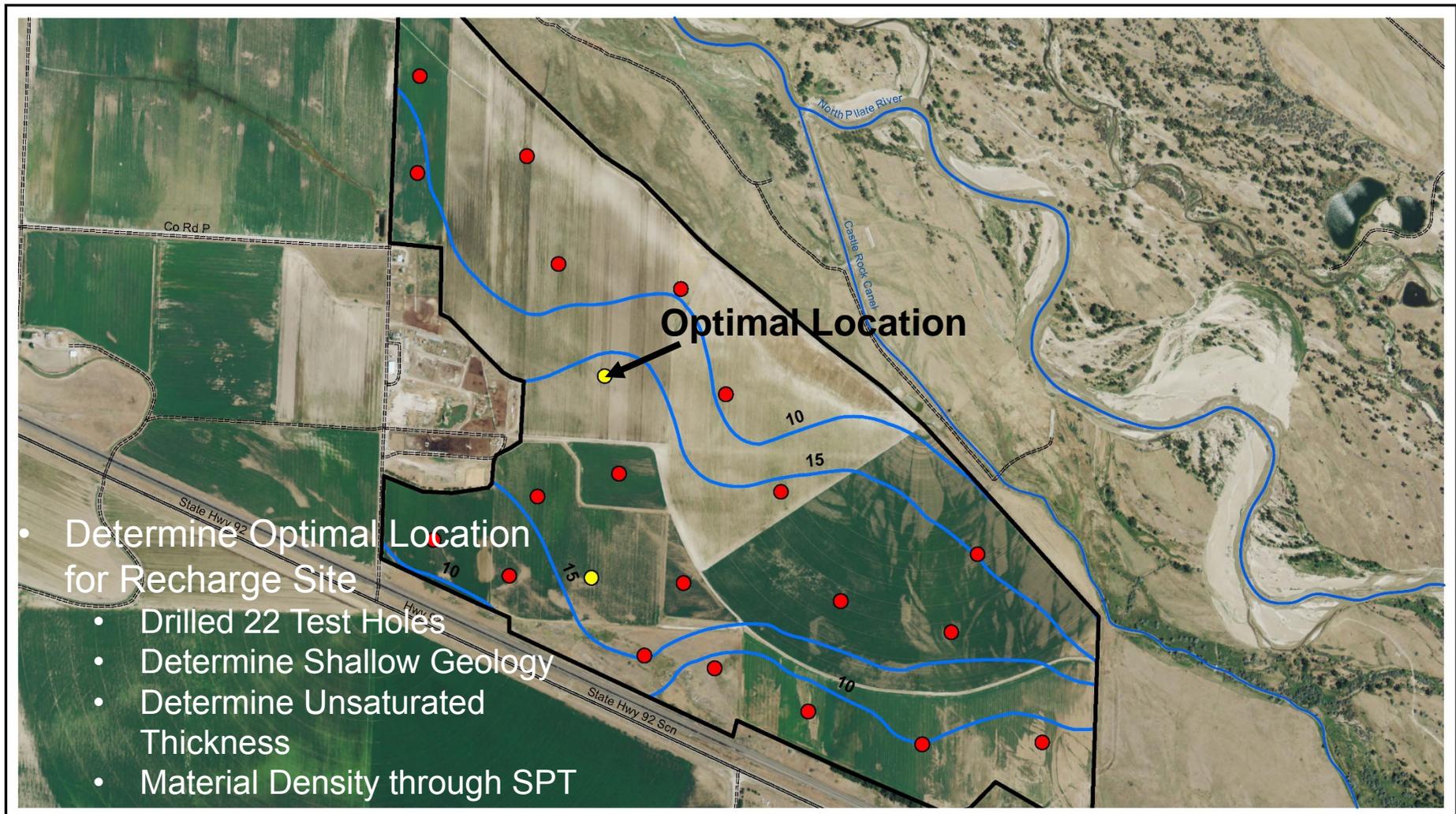
- Direct delivery to the North Platte River
- Protection of 3rd parties will be maintained including parties that rely on wintertime flow for storage



Geotechnical Survey Sampling for Recharge Pit



Determination of Optimal Location for Recharge Pit for Cow Camp Project



Legend

Geotechnical Test Holes

- Silt or Clay layers present
- No Silt or Clay layers present

Approximate Leased Boundary

- ==== Road
- Unsaturated Thickness Contour

This map is for reference purposes only, accuracy is not guaranteed. This product should not be construed as a legal document or survey instrument.

Cow Camp Next Steps

- ① Update and finalize supporting document for permit application to NDNR
- ① Submit amended permit application package to NDNR
- ① Landowner would like to renew lease



Rush/Rogers Surface Water Project

- Total farm is ~65 acres
- Located on Enterprise Canal
- In process of completing historic consumptive use analysis and documentation for NDNR permit applications

