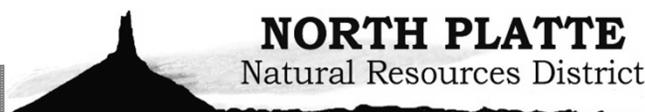


NORTH PLATTE NRD SURFACE WATER RECHARGE PROJECTS

COW CAMP AND RUSH/ROGERS PROJECTS

By John Berge
General Manager
North Platte NRD



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



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Natural Resources District

ARI
Water Resources for the West

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

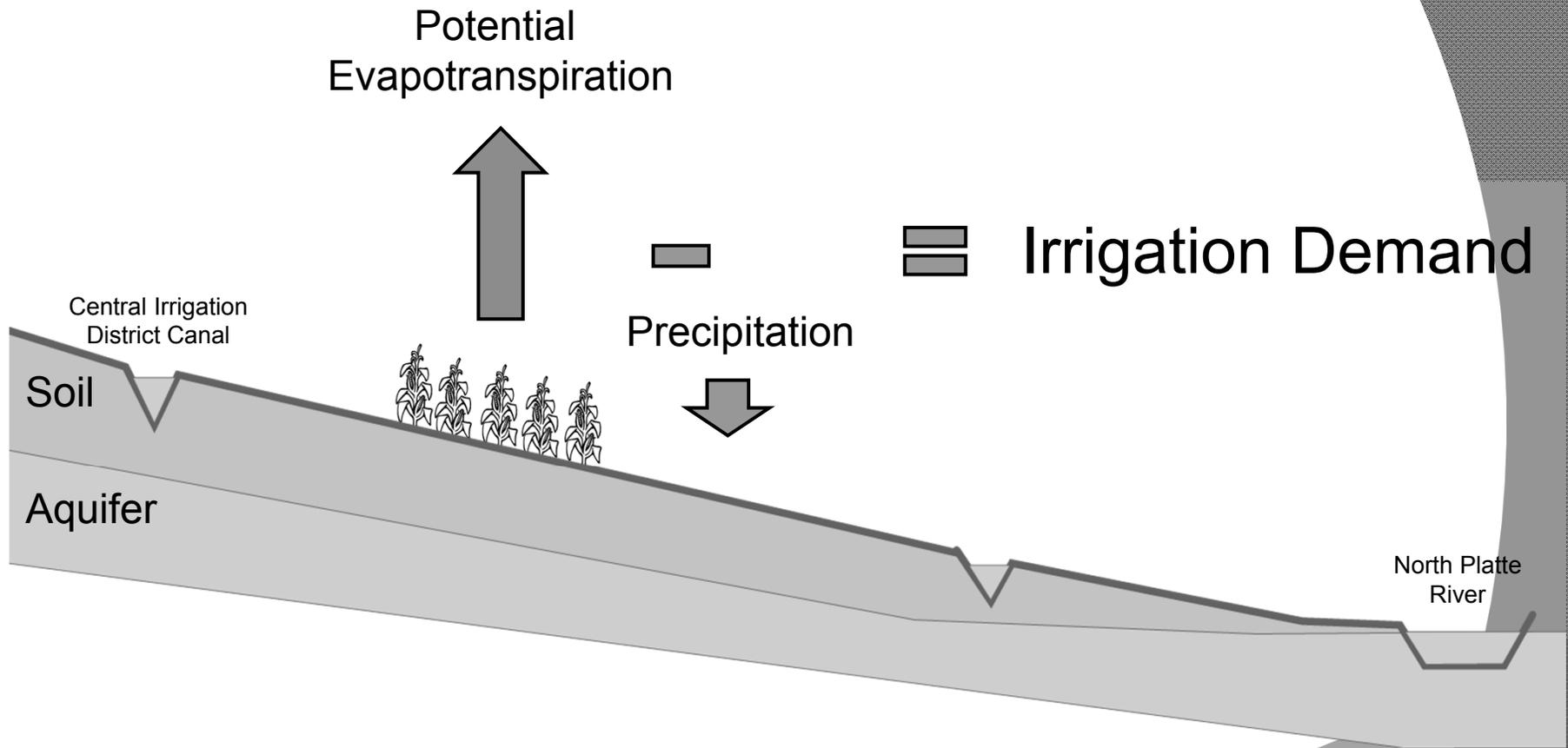
- ◎ Determine Historic Canal Loss and Irrigation Inefficiency Return Flows
 - These will be preserved to protect downstream water rights

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

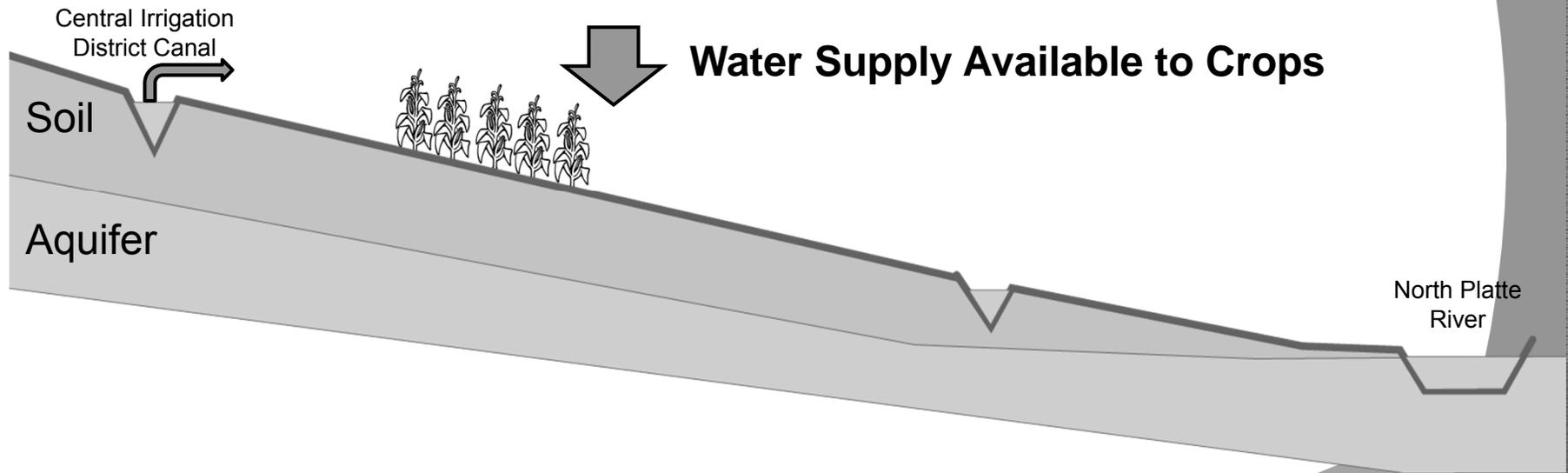


Historic CU Analysis Method

Crop Water Supply Calculation

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

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



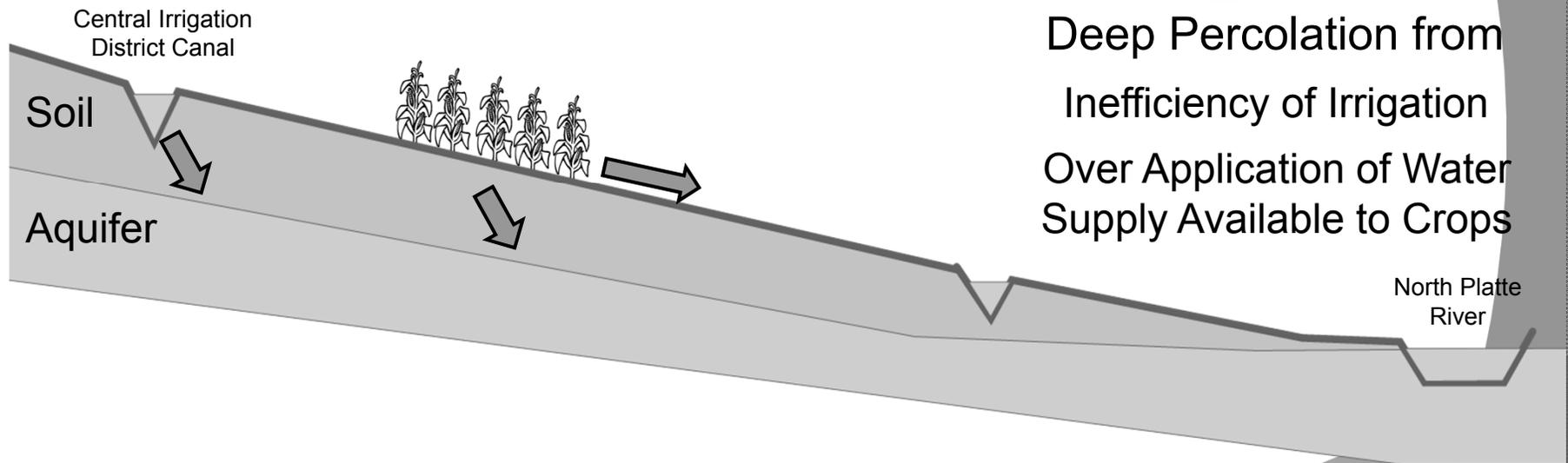
Historic CU Analysis Method

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

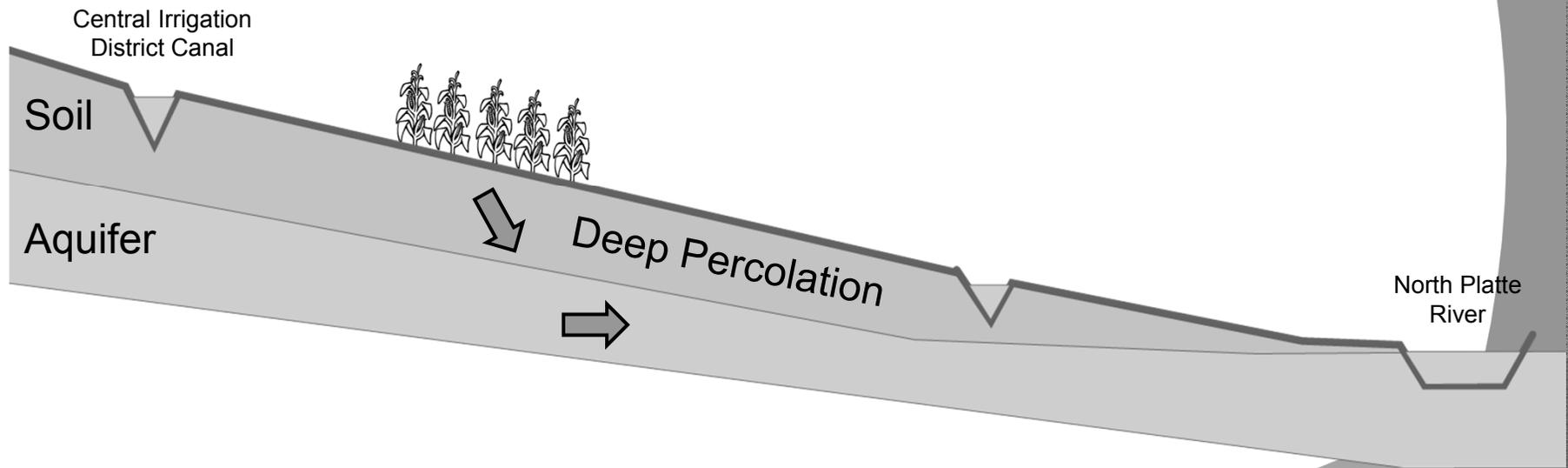


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Historic CU Analysis Method

Deep Percolation Return Flow to the North Platte River

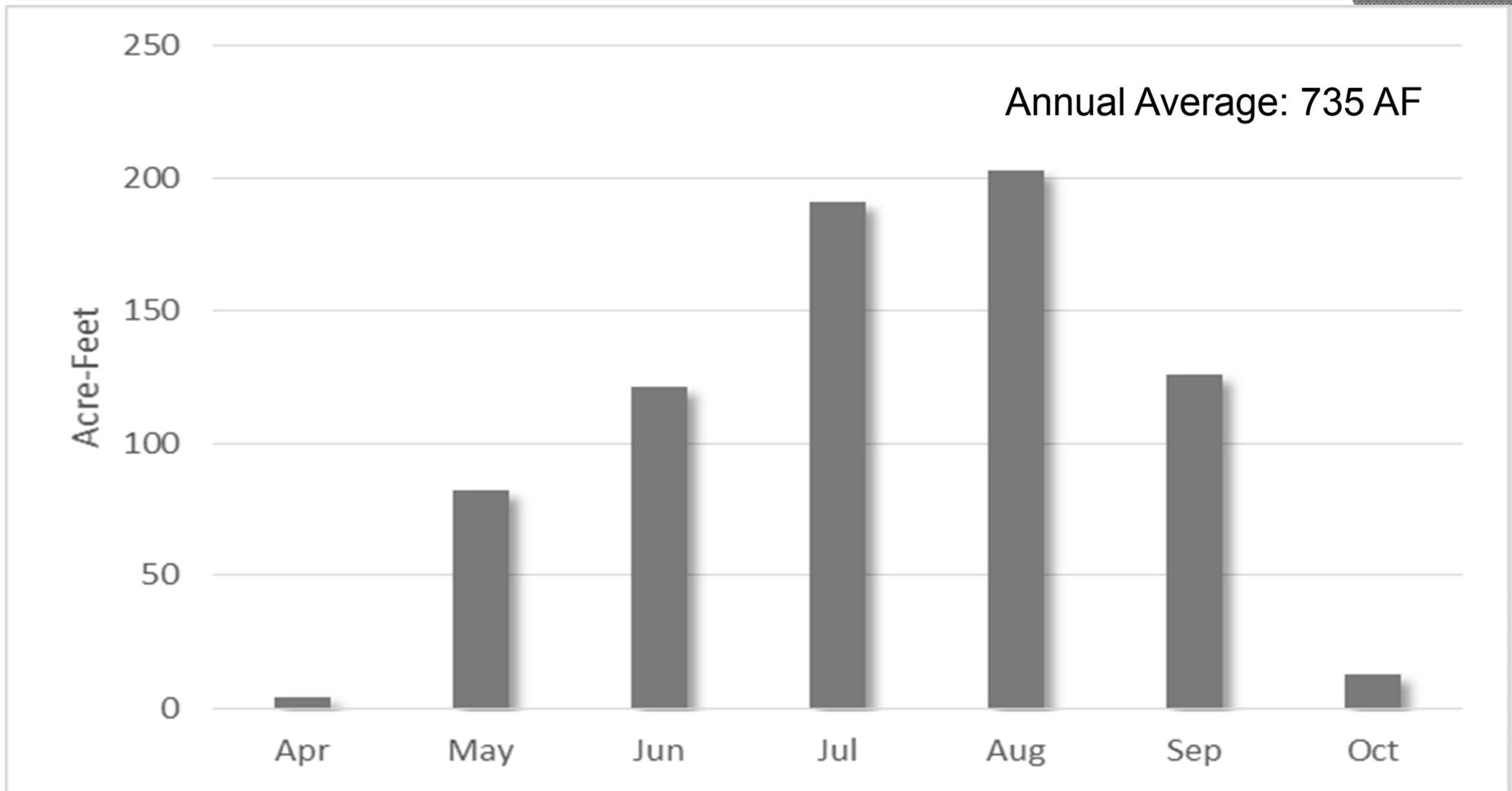


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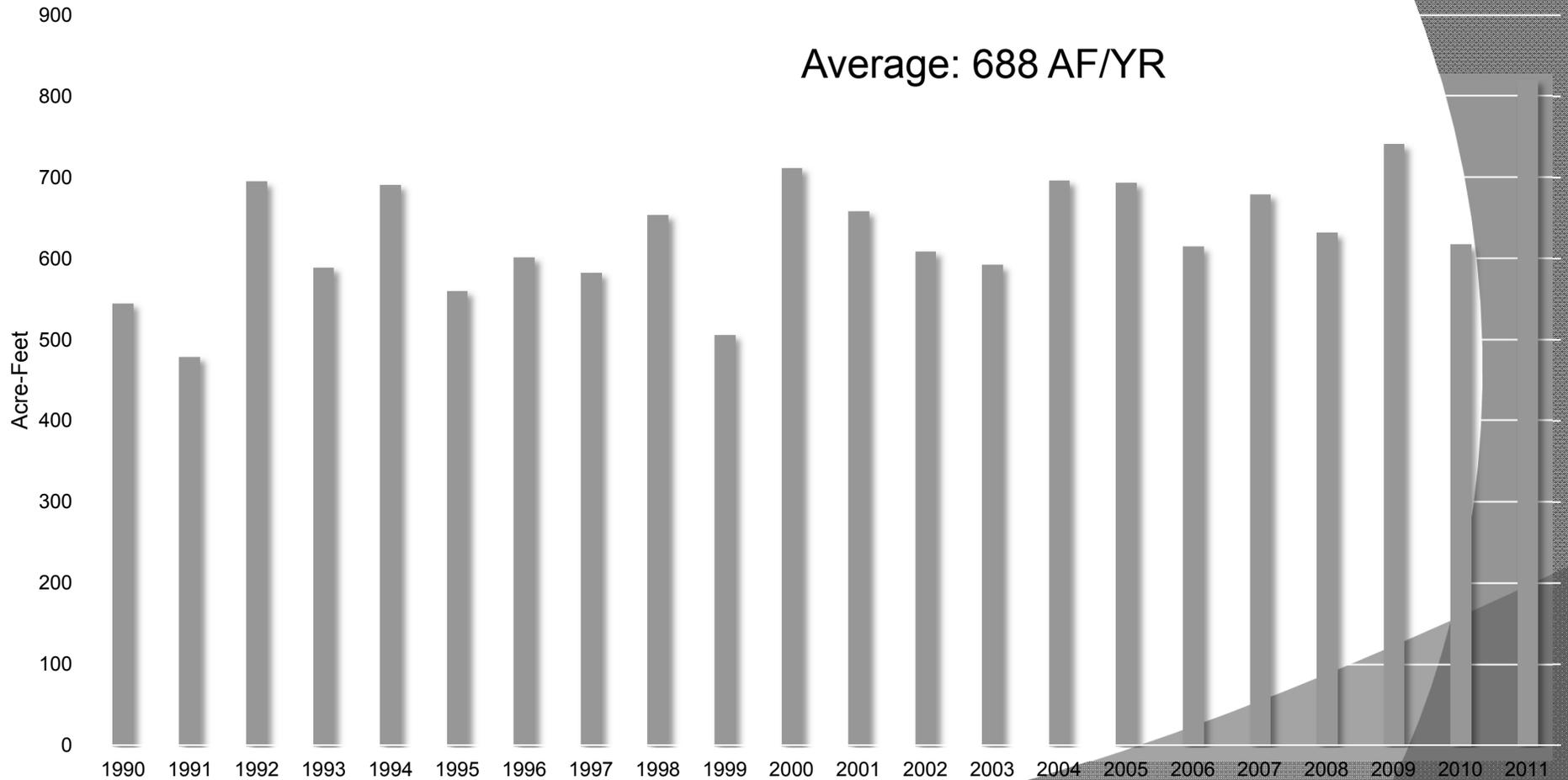
Historic Consumptive Use Analysis

◎ Average Monthly Diversion to Project Farm



Cow Camp Historic Consumptive Use Analysis

Annual Total Consumptive Use for Credit



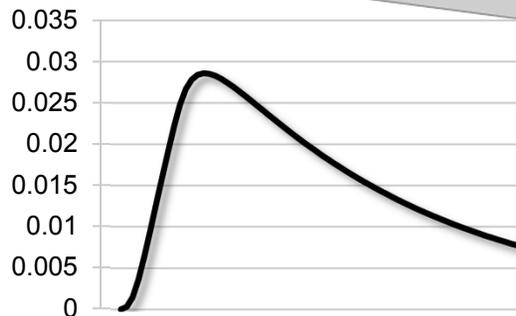
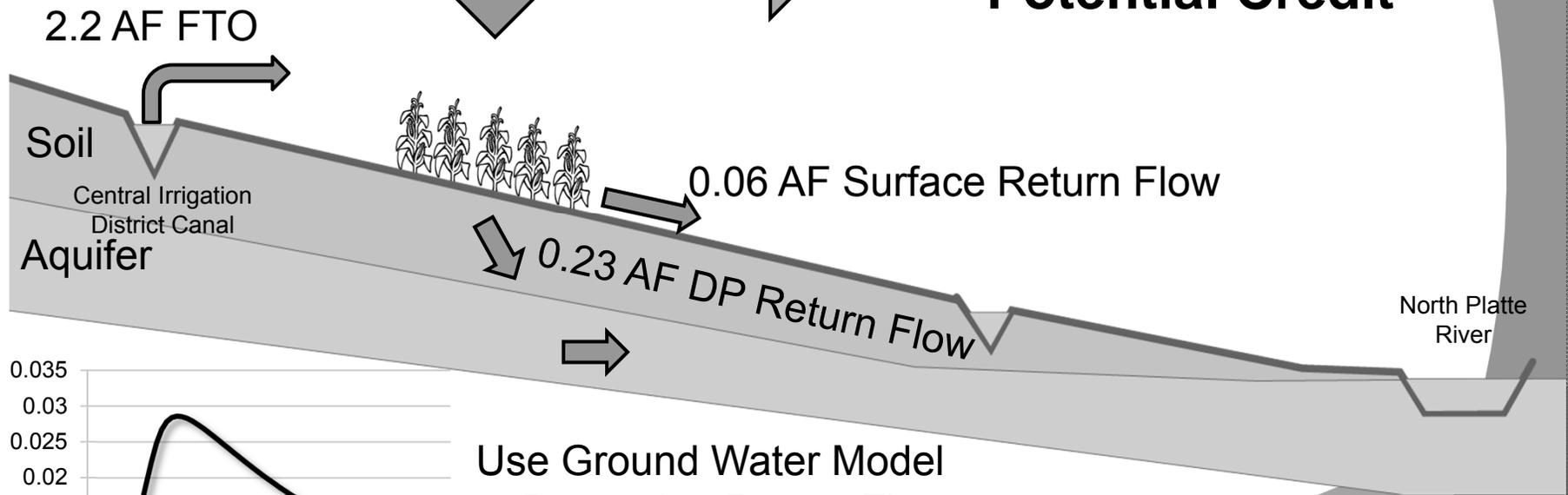
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Results Summary of Cow Camp Historic CU Analysis (Per Acre)

2.2 AF
Available to Crops

~1.9 AF of Average Annual
Potential Credit



Return Flow Pattern

Use Ground Water Model
to Determine Return Flow
Pattern

All Values based on Average of 1990 through 2011

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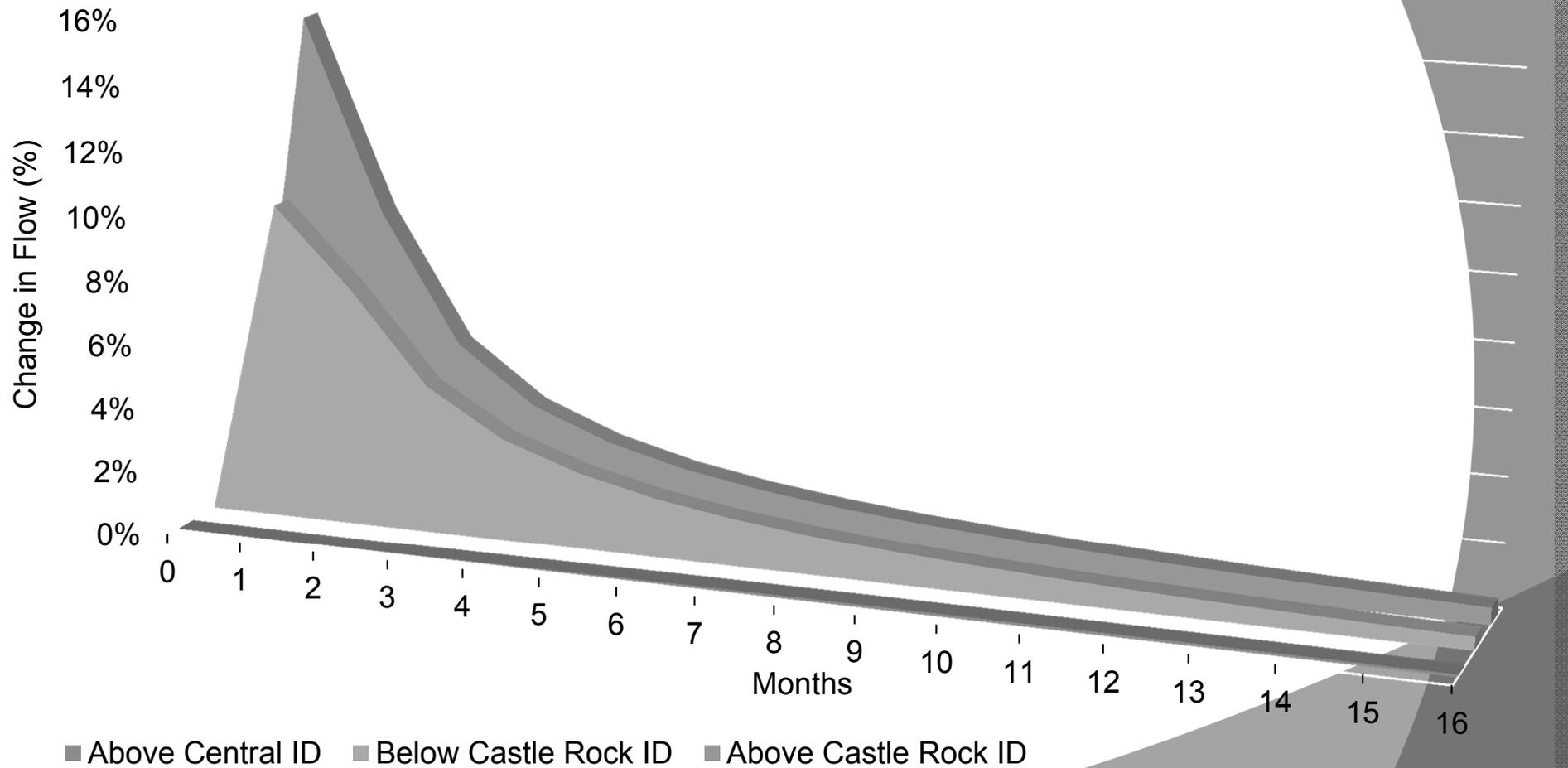
Cow Camp Aquifer Tests



- 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

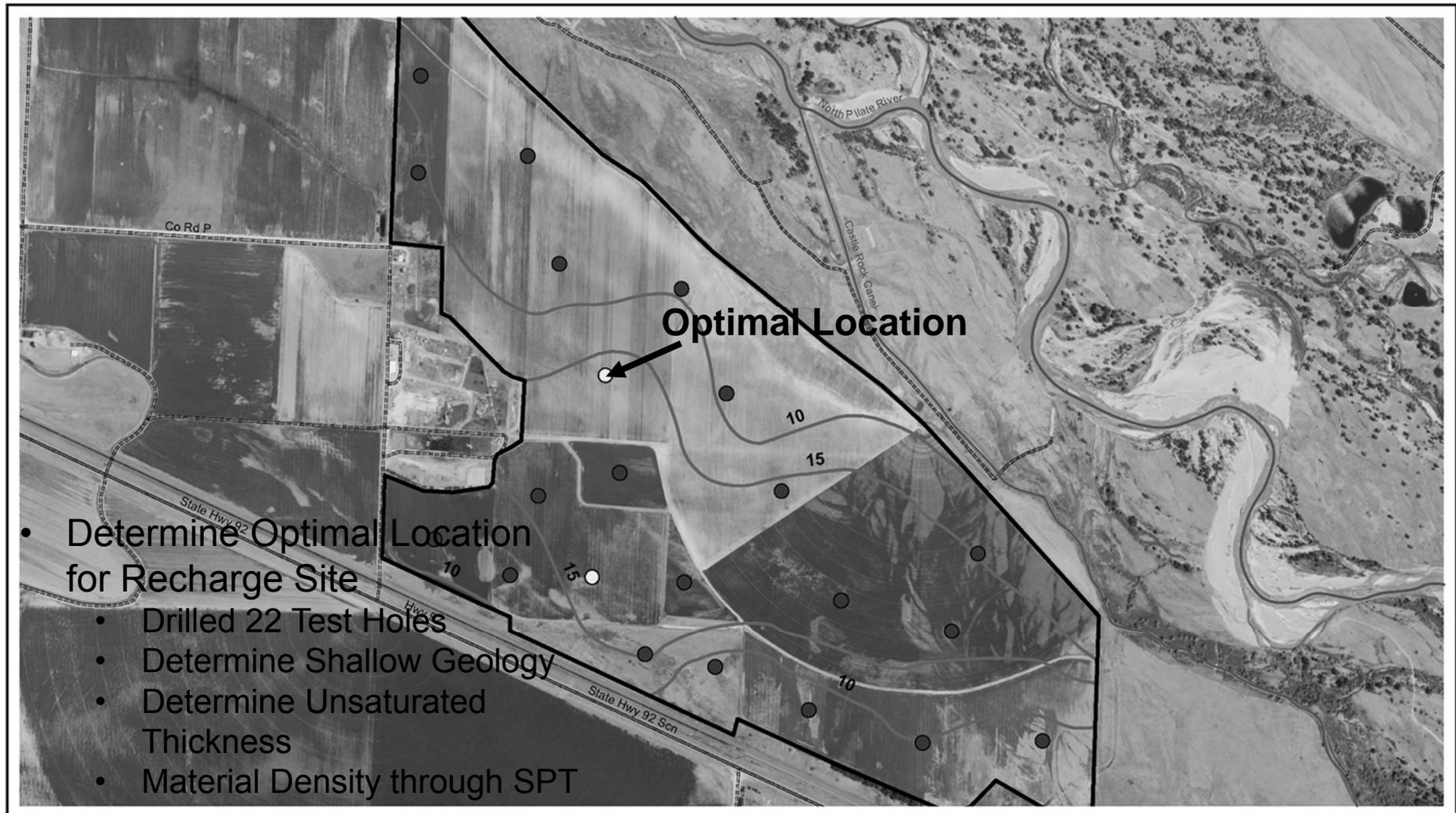
Geotechnical Survey Sampling for Recharge Pit



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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.

NPNRD Recharge Project
Hoehn Site
Geotechnical Investigation Overview

Map 1

Cow Camp Next Steps

- ◎ Update and finalize supporting document for permit application to NDNR
- ◎ Submit amended permit application package to NDNR
- ◎ 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

Thanks!

- ◎ Questions
- ◎ Comments

