

Conjunctive Water Management in the Central Platte Valley



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Outline

- What is conjunctive management?
- Background on the project
 - Phase I: Data development and existing conditions evaluation
 - Phase II: Development of tools and evaluation of various strategies
 - Phase III: Implementation of strategies

What is Conjunctive Management?

- Conjunctive management in its broadest definition is the coordinated and combined use of surface water and groundwater to increase the available water supply of a region and improve the reliability of that supply.

http://www.water.ca.gov/pubs/groundwater/bulletin_118/california's_groundwater_bulletin_118_update_2003_bulletin118-chapter6.pdf

What is Conjunctive Management? (cont.)

- Conjunctive management may be implemented to meet other objectives as well, including reducing groundwater overdraft, protecting water quality, and improving environmental conditions.



What is Conjunctive Management? (cont.)

- The concept of conjunctive management is that surface water and groundwater resources are hydrologically interconnected, and decisions to improve the management of one can't be made properly without considering the other.

How is Conjunctive Management Accomplished?

- Conjunctive management is typically accomplished by using or storing additional surface water when it is plentiful, and relying more heavily on groundwater during dry periods. Conjunctive management can change the timing and location of water so it can be used more efficiently.

Components of Conjunctive Management

- Although a specific project or program may be extremely complex, there are several components common to all conjunctive management projects.



Components of Conjunctive Management (cont.)

- The first is to recharge surplus surface water when it is available to increase groundwater in storage. Recharge may occur through surface spreading, by injection wells, or by reducing groundwater use by substituting surface water.
- The surplus surface water used for recharge may be local runoff, imported water, stored surface water, or recycled water.

Components of Conjunctive Management (cont.)

- The second component is to reduce surface water use in dry years or dry seasons by switching to groundwater. This use of the stored groundwater may take place through direct extraction and use, pumping back to a conveyance facility, or through exchange of another water supply.

Components of Conjunctive Management (cont.)

- A third and final component that should be included is an ongoing monitoring program to evaluate operations and allow water managers to respond to changes in groundwater, surface water, or environmental conditions that could violate management objectives or impact other water users.

Where is Conjunctive Management Currently being Planned for Implementation?

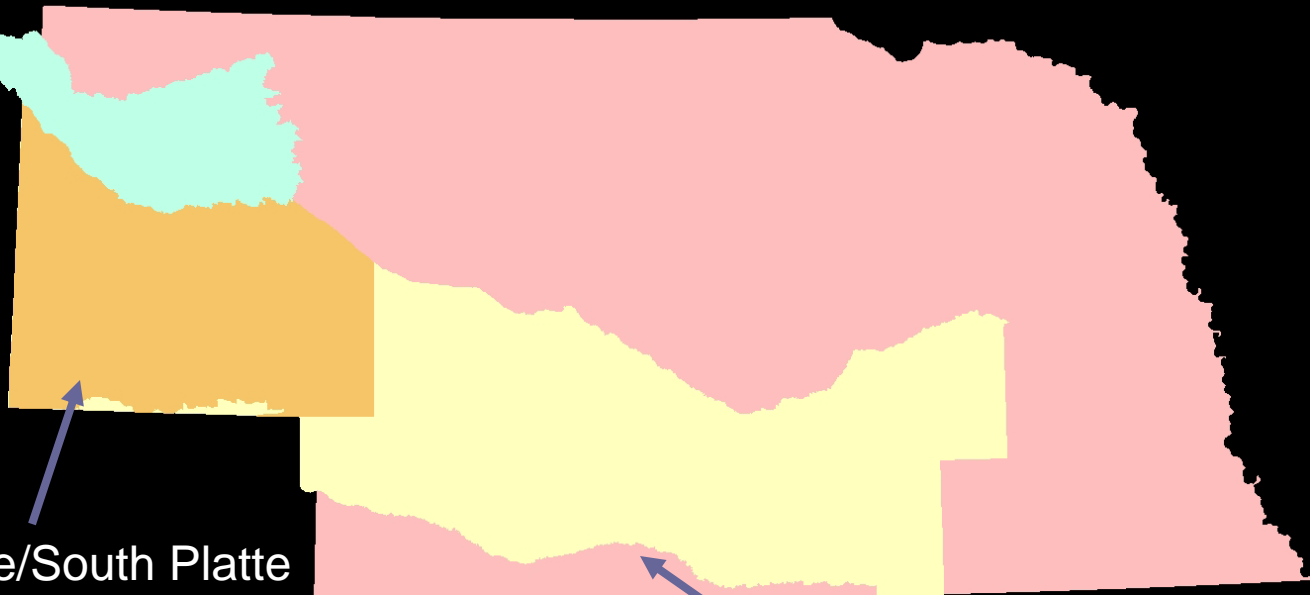
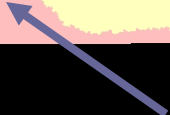
Upper Niobrara River
CM Project



North Platte/South Platte
CM Project



Central Platte
CM Project



Central Platte Conjunctive Management Project

- NPPD, CPNRD, TPNRD, CNPPID, and NDNR
- Study, develop, and implement a conjunctive surface and groundwater management program.
 - Optimize the total water supply
 - Sustain the surface water delivery system
 - Manage for surface and groundwater quality
- Public Involvement
 - Program development
 - Education
- Phased approach



Conjunctive Management Study, Specific Objectives

- Study how surface water and groundwater compliment each other now and in the future.
 - Account for existing water budget.
- Study costs of providing surface water.
 - Propose alternatives for offsetting those costs.
- Analyze economic benefits of various alternatives.
- Evaluate alternatives for implementing conjunctive management strategies.

Phase I CWM Work Task

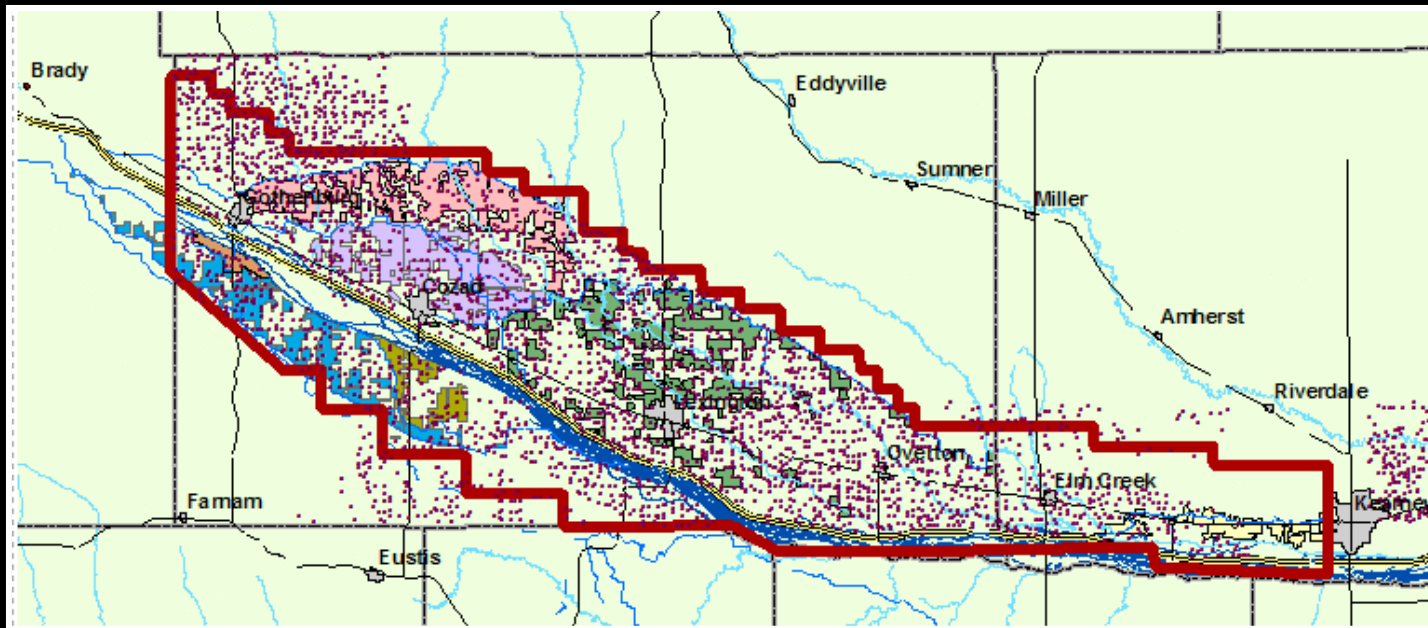
- Resource Information –
 - description of existing conditions
 - develop meta –data base
 - synoptic data survey
 - valley water budget
- Management Information –
 - survey of users
 - institutional analysis
- Management Tools –
 - case studies, literature search
 - existing Models
 - conceptual models workshop
 - develop Phase II scope



Phase I Study Area Irrigation



Map of surface water and groundwater irrigation



*Dots are irrigation wells.

Phase I Existing Condition Study Area Irrigation

Surface Water

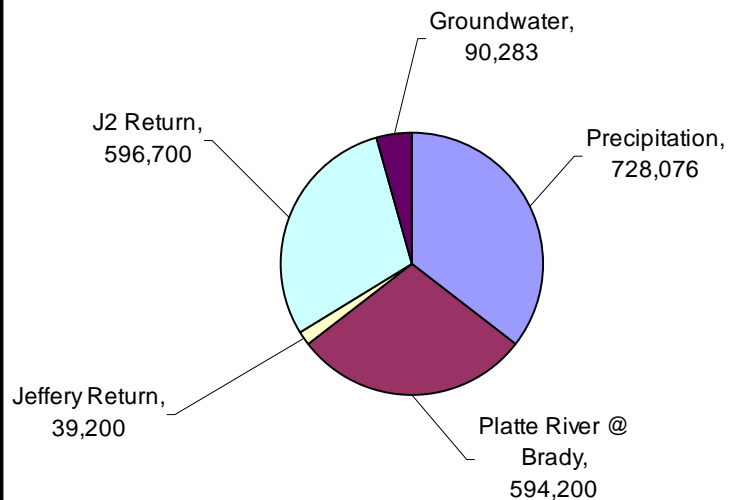
- 7 irrigation canals
- 60,000 acres
- 230,000 AF average annual diversion

Groundwater

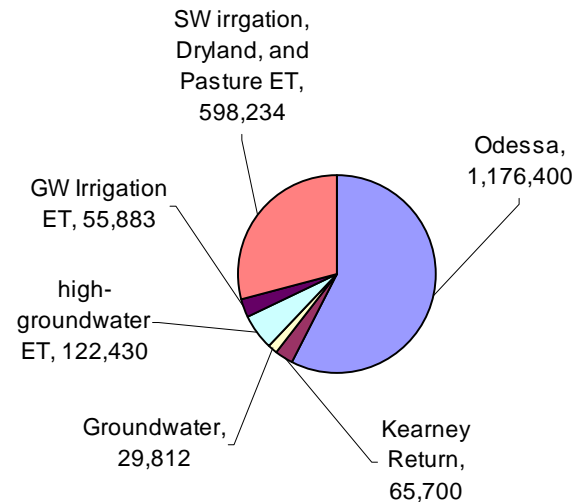
- 2,900 wells
- 120,000 acres groundwater irrigated
- Ground water also used to supplement surface water

Phase I Estimate of Average Annual Water Budget

Central Platte Valley Water Budget
Input, AF/year



Central Platte Valley Water Budget
Output, AF/year



Total Average Annual Budget: 2,048,459 AF/year

Phase II CWM Study

- Consists of developing specific management strategies and the evaluation tools to assess them; work task includes
 - Scenario development
 - Data base development
 - Model development
 - Evaluations
 - Follow-up –Phase III implementation

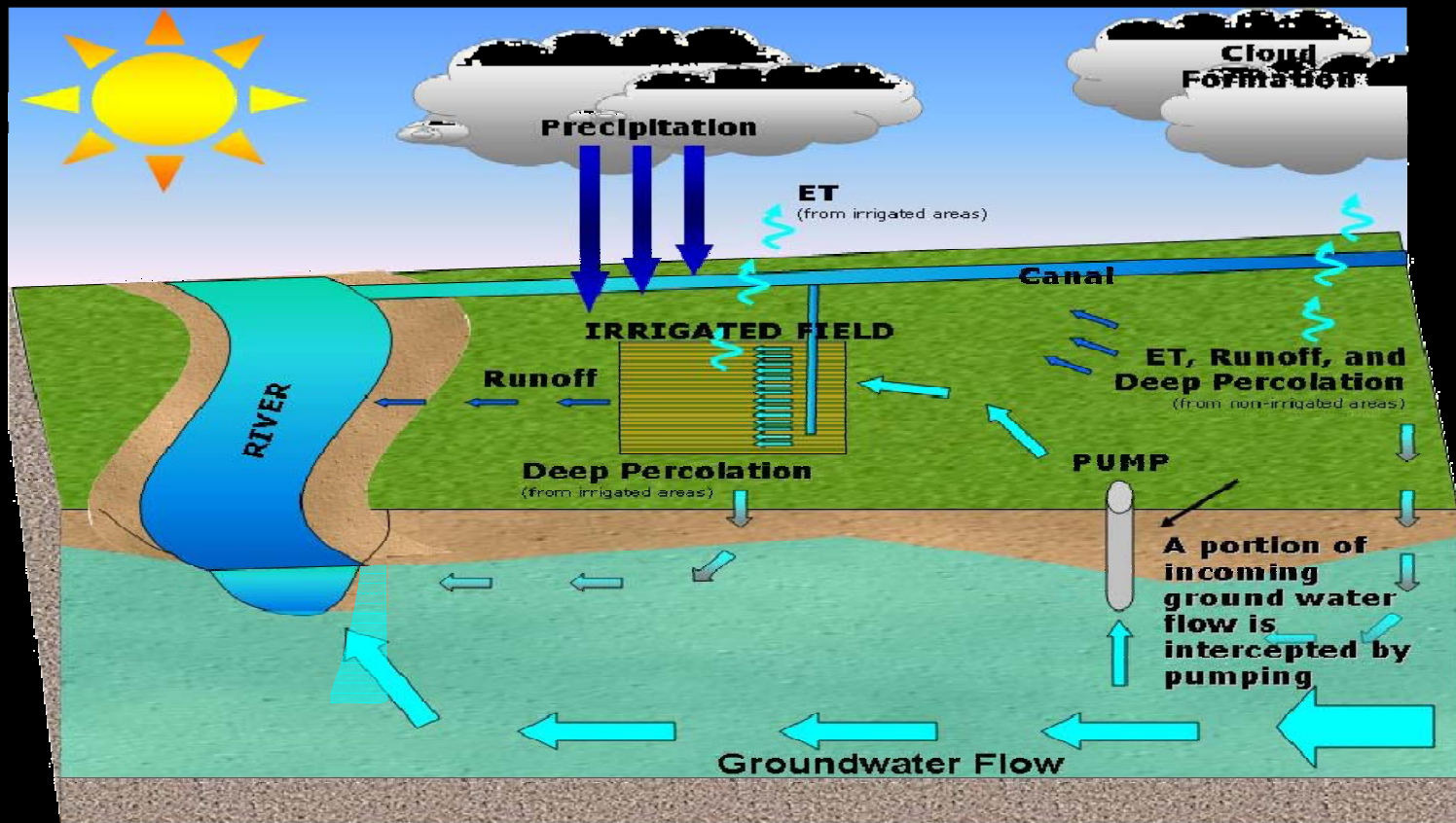
Phase II White Paper Strategic Concepts and Workshop

- White Paper Identified:
 - Incentive strategies
 - Payments for permanent retirements
 - Regulation strategies
 - Allocations, metering, priority administration
 - Market strategies
 - Incentives and regulations usually are the driver
 - Infrastructure strategies
 - Development of focused recharge areas, augmentation

Phase II CWM Model Development

Hydrologic Water Budget Approach

Physical basis

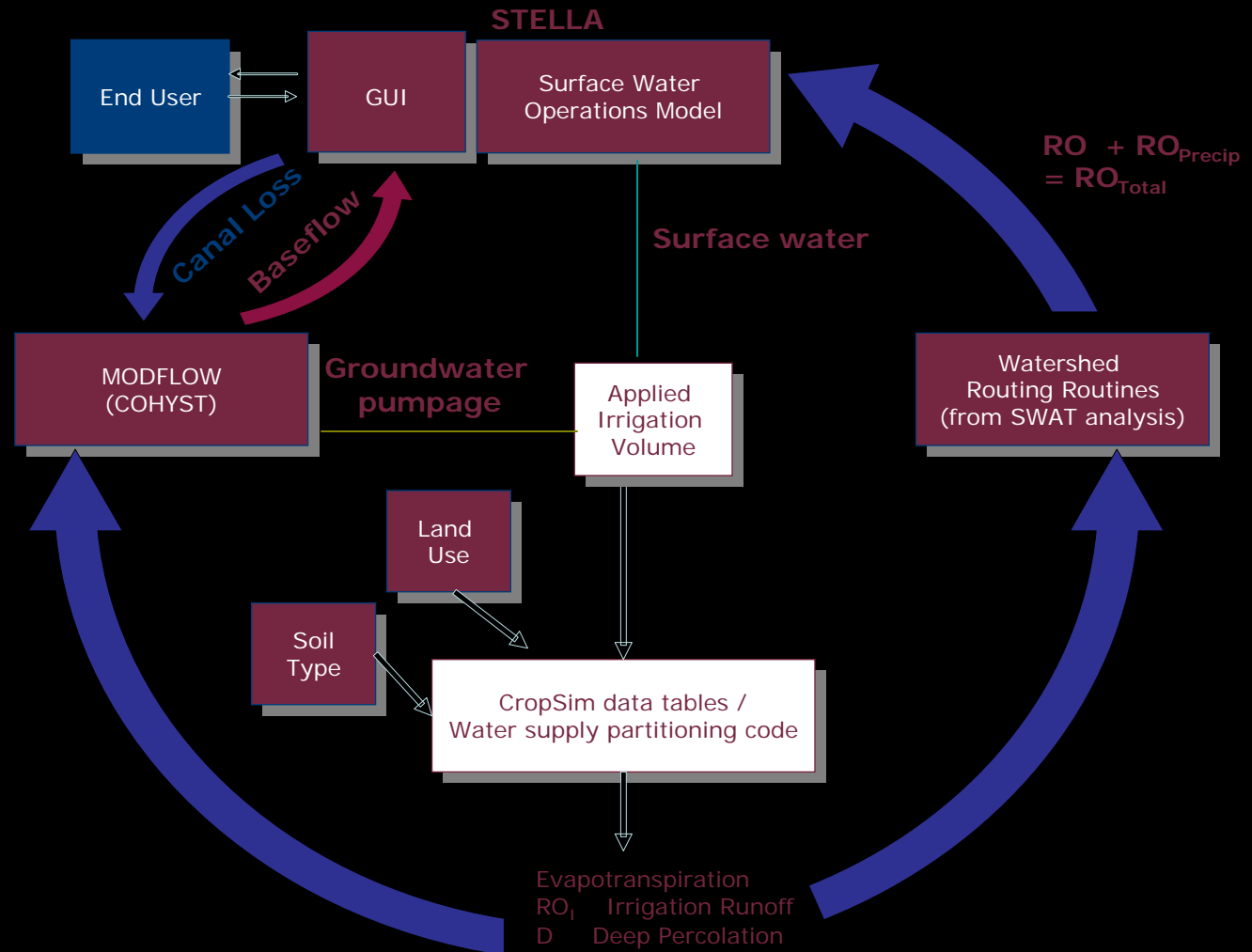


Phase II CWM

Detailed Schematic

Model Components:

- Groundwater Model
- Surface Water Operations Model
- Watershed Model – CropSIM & GIS products
- Linkage Code – Microsoft Program Language



$$ET = CIR (1 - (1 - I/GI)^{1/B})$$

$$Dp \sim f (ET, SL)$$

$$ROI \sim f (Dp, TL, SL)$$

Phase II Follow Up

- Cost benefits analysis of various management actions.
- Public input on scenarios.
- Develop Phase III Implementation Plan.
- Implement and Monitor the Actions.

Summary

- CM is a coordinated and combined use of surface water and groundwater to improve the reliability of the supply and the economic benefits derived from the use of the water supply.
- CM can play a key role in meeting goals and objectives of integrated management.

Summary (cont.)

- CM typically requires highly specialized tools to account for all hydrologic components.
- CM requires ongoing monitoring to evaluate operations and allow water managers to respond to changes in groundwater, surface water, or environmental conditions that could violate management objectives or impact other water users.

Questions?

