

Treasure Valley Water

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Outline

❖ Treasure Valley Hydrologic Project

- Background
- Hydrologic concepts
- Aquifer description
- Findings



Project Description

- ❖ Purpose: provide information and data for water management
- ❖ Components
 - Describe ground water flow characteristics
 - Develop computer model of ground water flow
 - Simulate potential changes in recharge and effects of increased pumping

Cooperative Effort

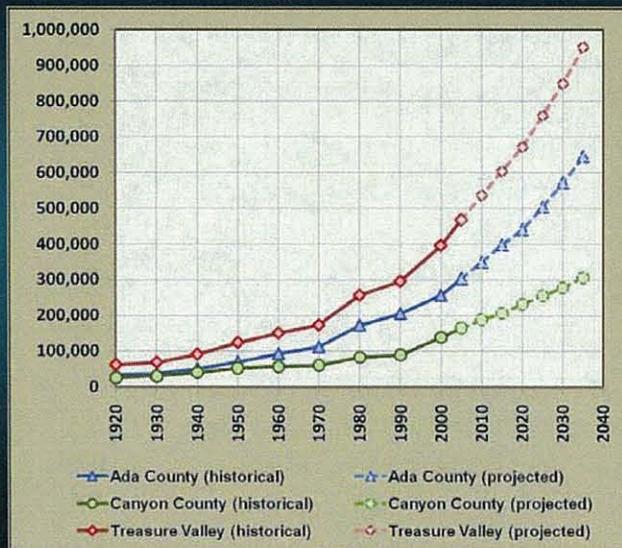
- ❖ Policy Committee helped define issues and questions
- ❖ Technical Committee provided technical guidance and review

Contributors and Participants

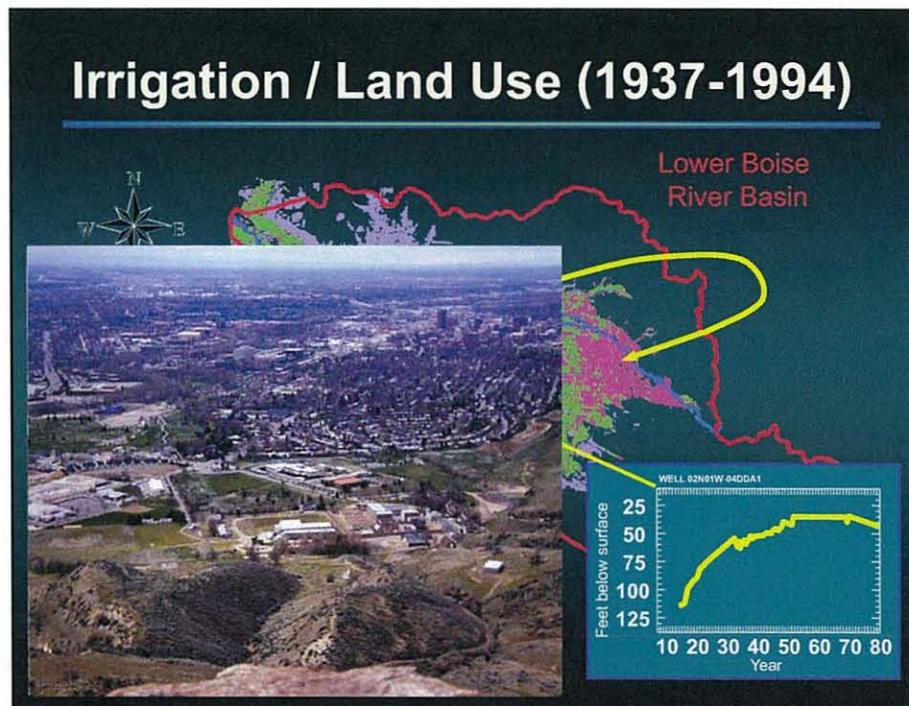
- ❖ Idaho State Legislature
- ❖ Idaho Department of Water Resources
- ❖ U.S. Congress
- ❖ Environmental Protection Agency
- ❖ United Water Idaho
- ❖ University of Idaho
- ❖ Idaho Water Resources Research Institute
- ❖ Idaho Water Resource Board
- ❖ Boise State University
- ❖ U.S. Geological Survey
- ❖ U.S. Bureau of Reclamation
- ❖ Ada and Canyon Counties
- ❖ Cities of Boise, Meridian, Nampa, Caldwell, Eagle, and Kuna



Increasing Population



John Church data (projections have not yet been updated to reflect current economic downturn)



Project Questions

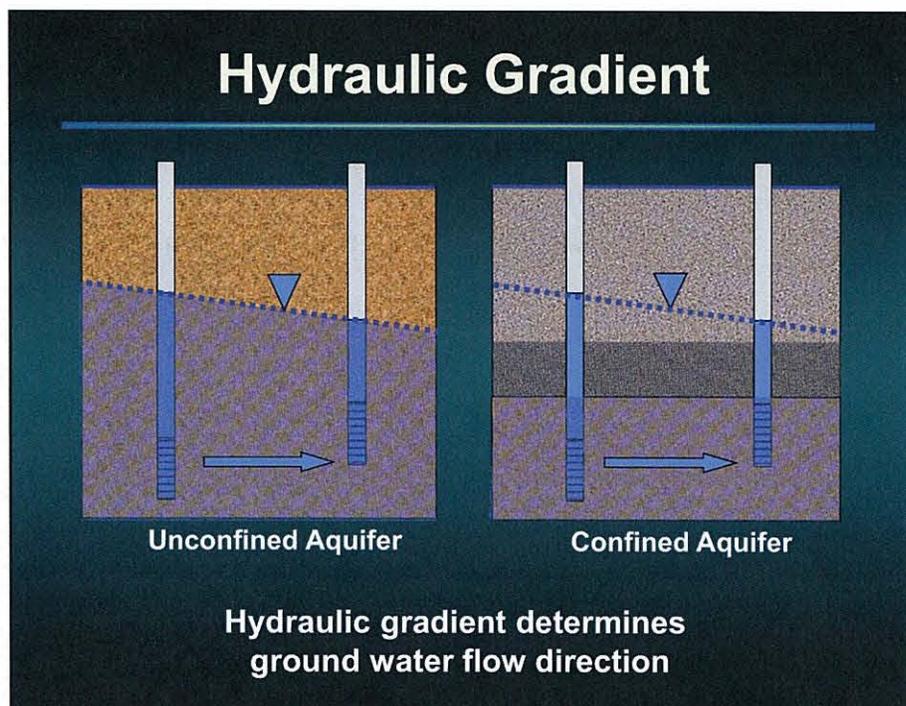
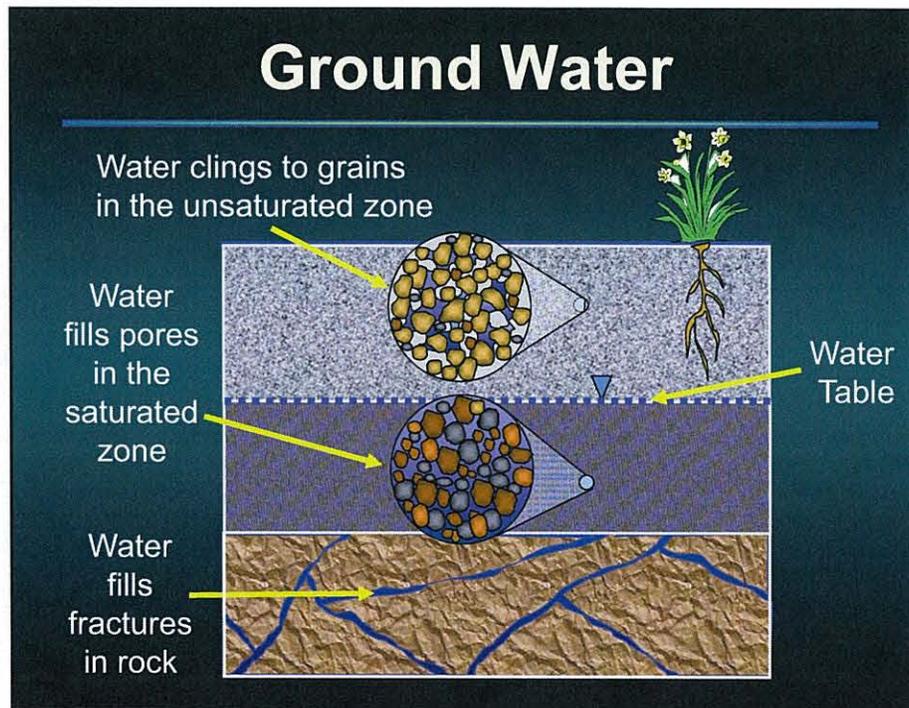
1. Does the Treasure Valley have a ground water shortage?
2. How big is the aquifer? Where are the aquifer boundaries?
3. Where and to what degree are ground water levels declining?
4. What is the carrying capacity of the aquifer?
5. What is the degree of hydraulic connection between Treasure Valley surface and ground water?
6. How are shallow and deep aquifer is connected?

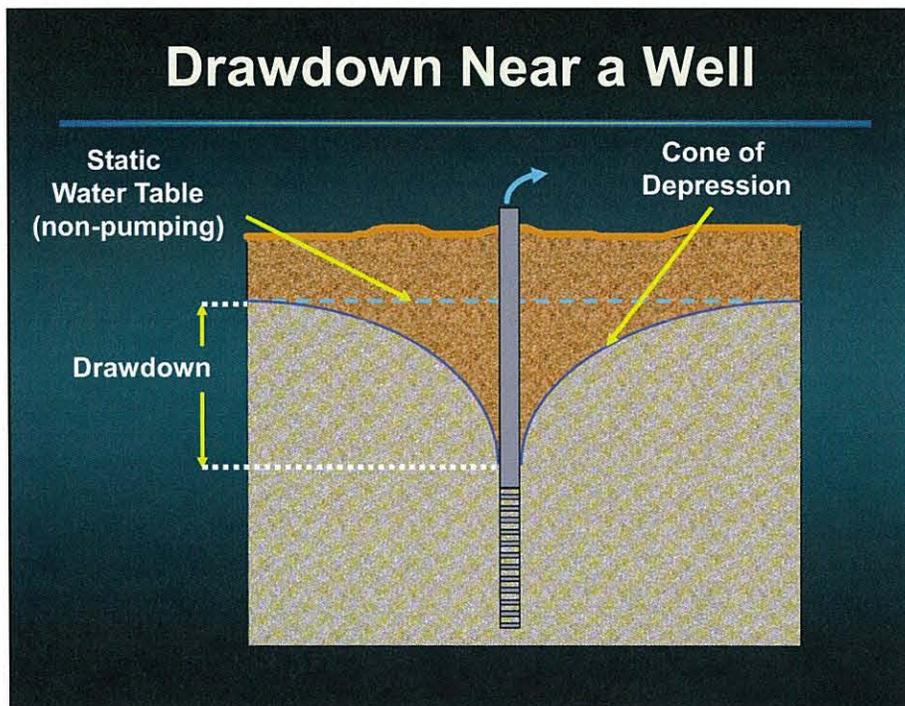
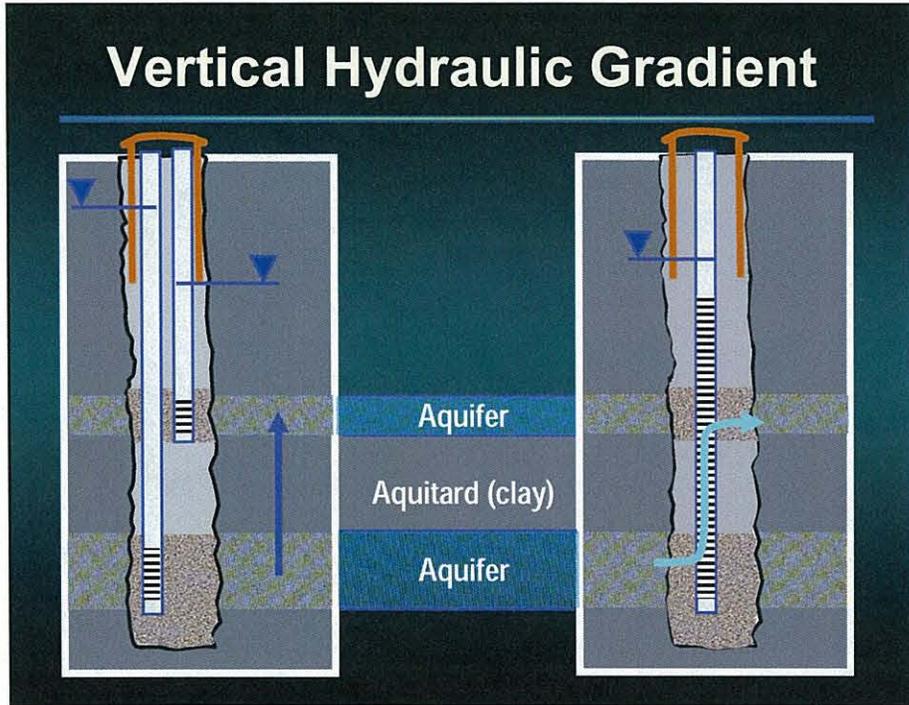
Project Questions

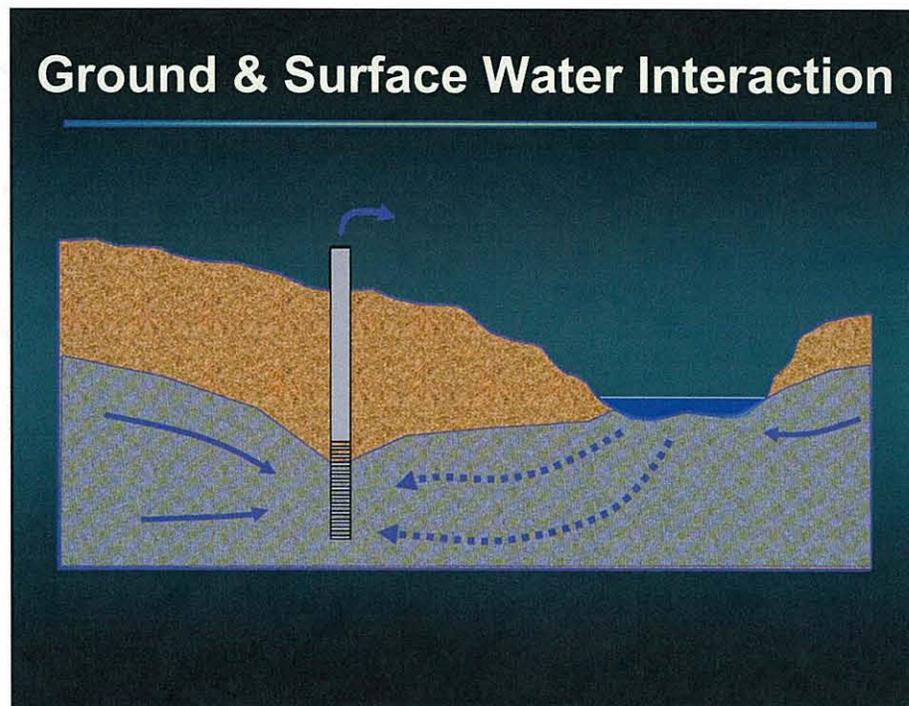
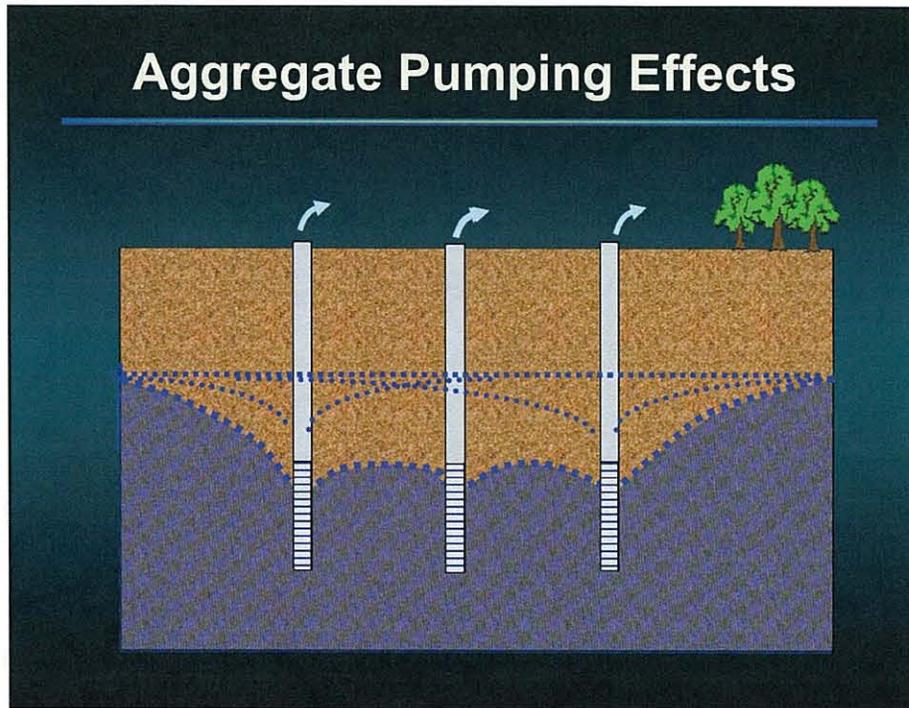
7. How are Treasure Valley aquifers recharged and where does the recharge occur?
8. How has land development impacted Treasure Valley water supplies?
9. How susceptible is the Treasure Valley aquifer system to contamination?
10. Is water conservation necessary to meet future water demands?
11. Can tools or data be developed to assist with land-use planning decisions regarding water resources?

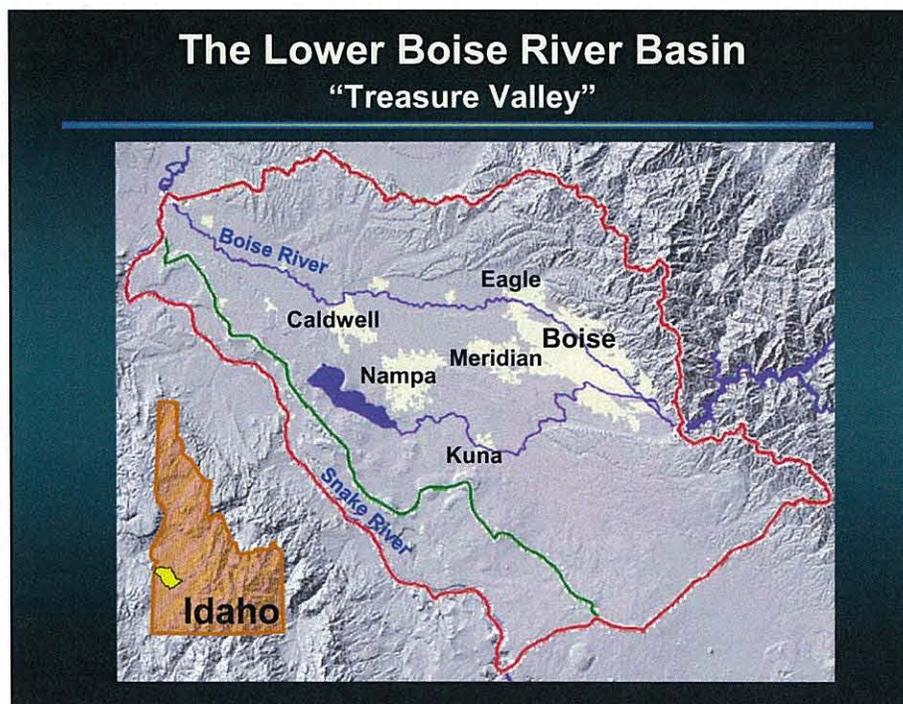
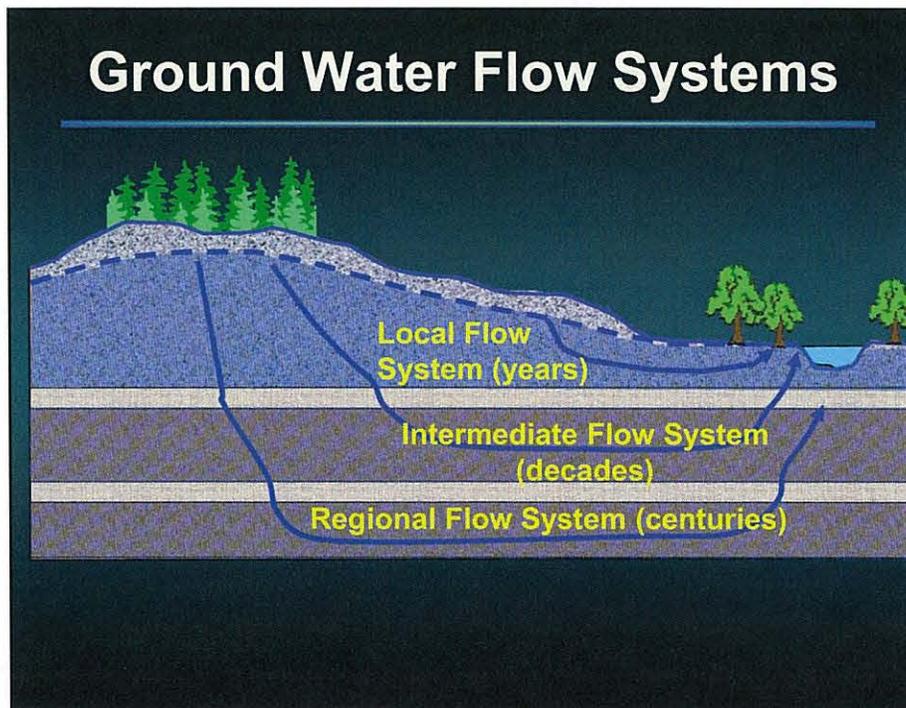
Hydrology Concepts

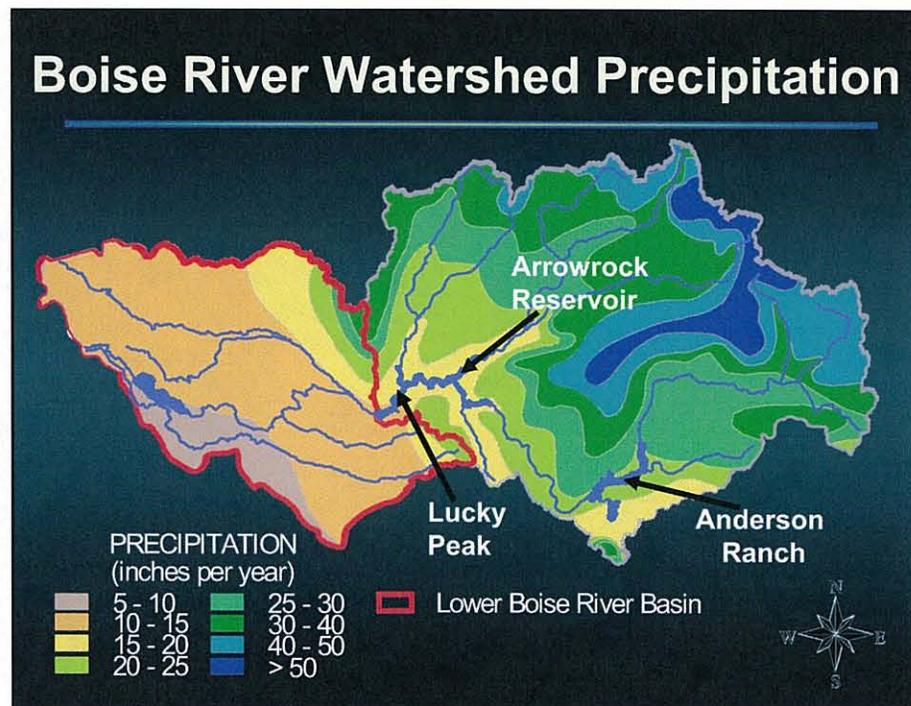
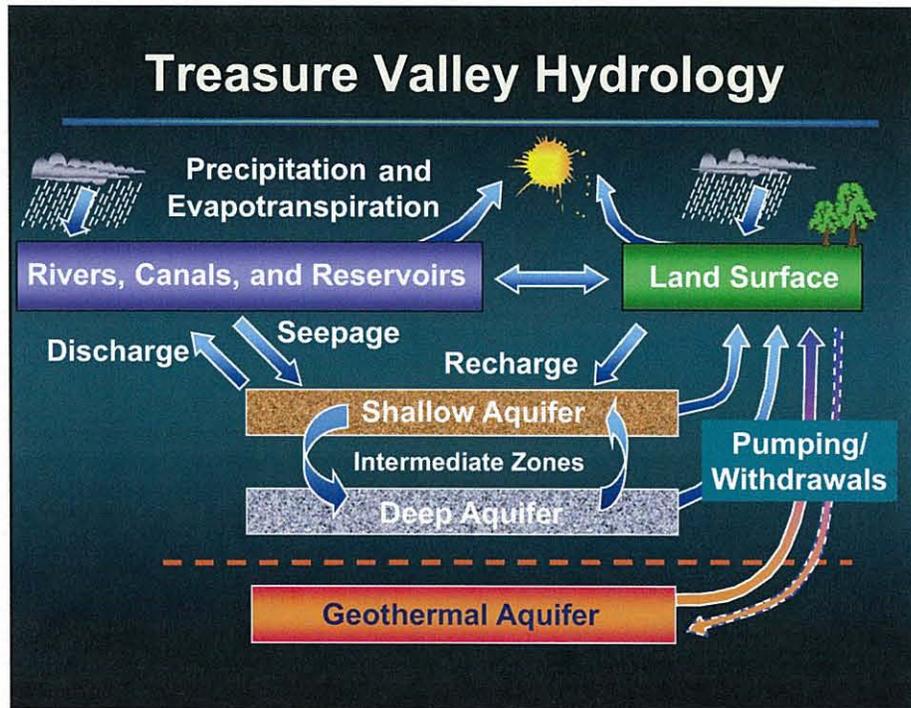
- ❖ Presence of ground water
- ❖ Hydraulic gradient
- ❖ Drawdown near a well
- ❖ Ground and surface water interaction
- ❖ Ground water flow systems

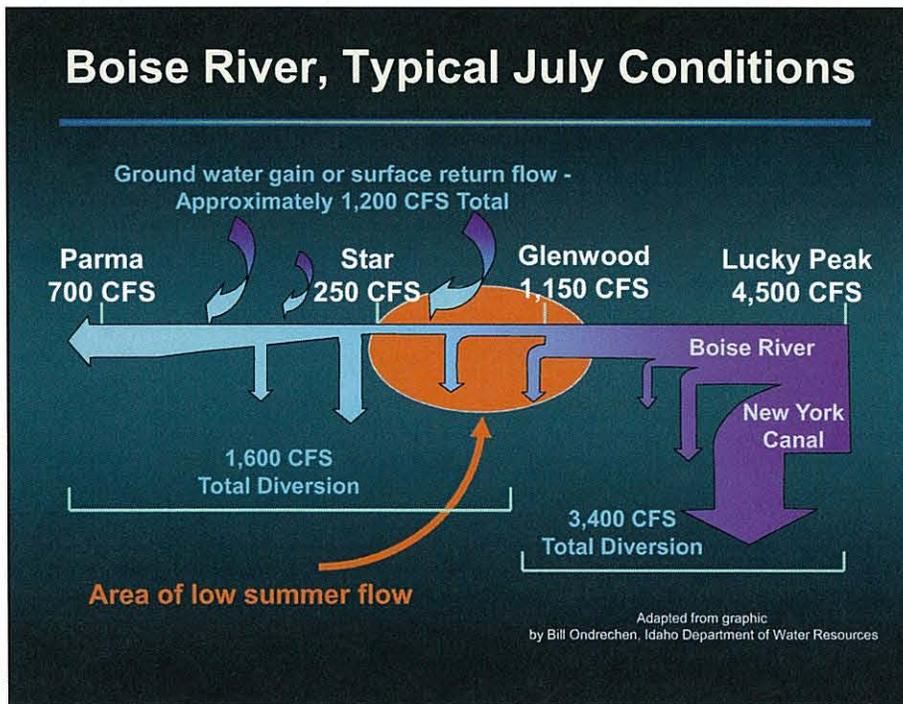
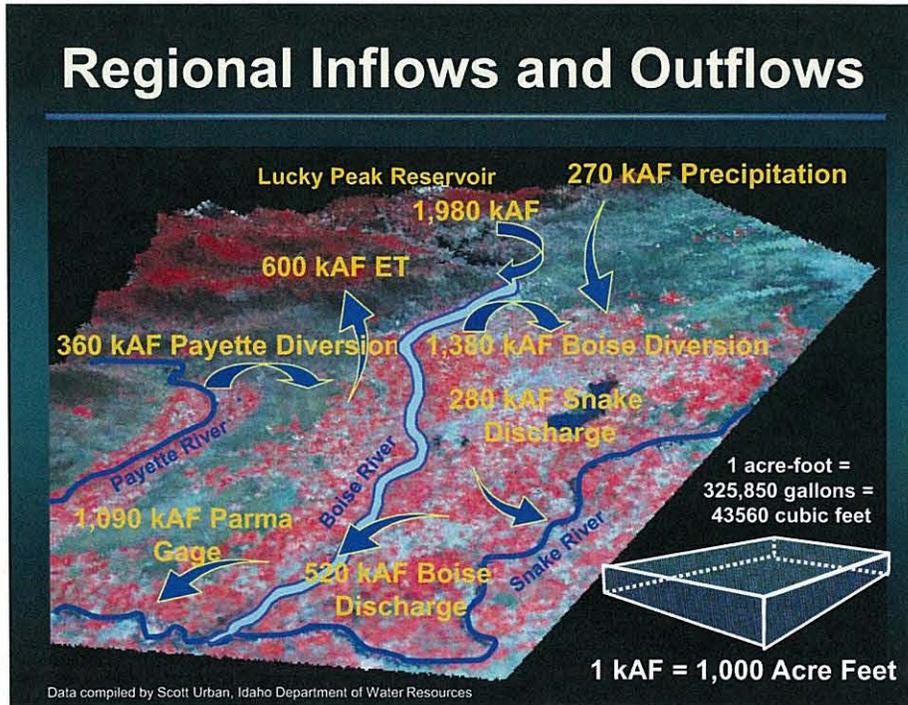


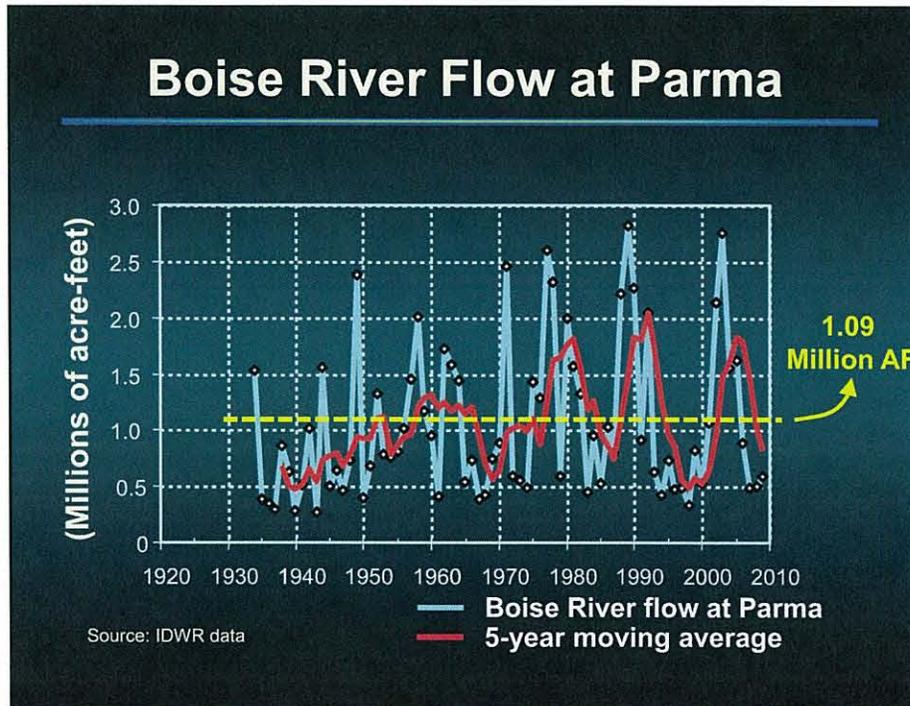






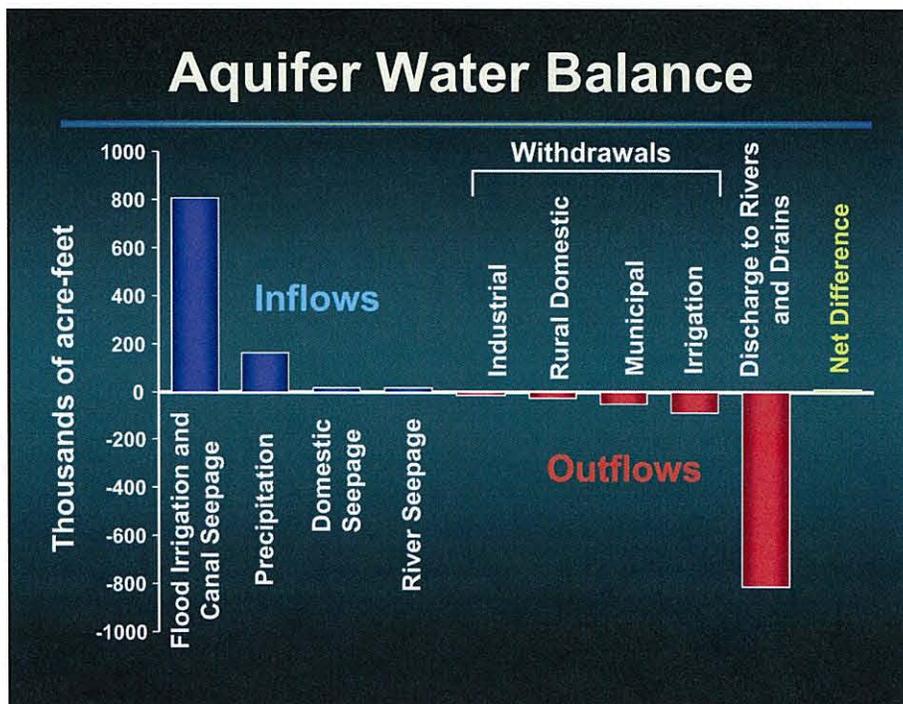
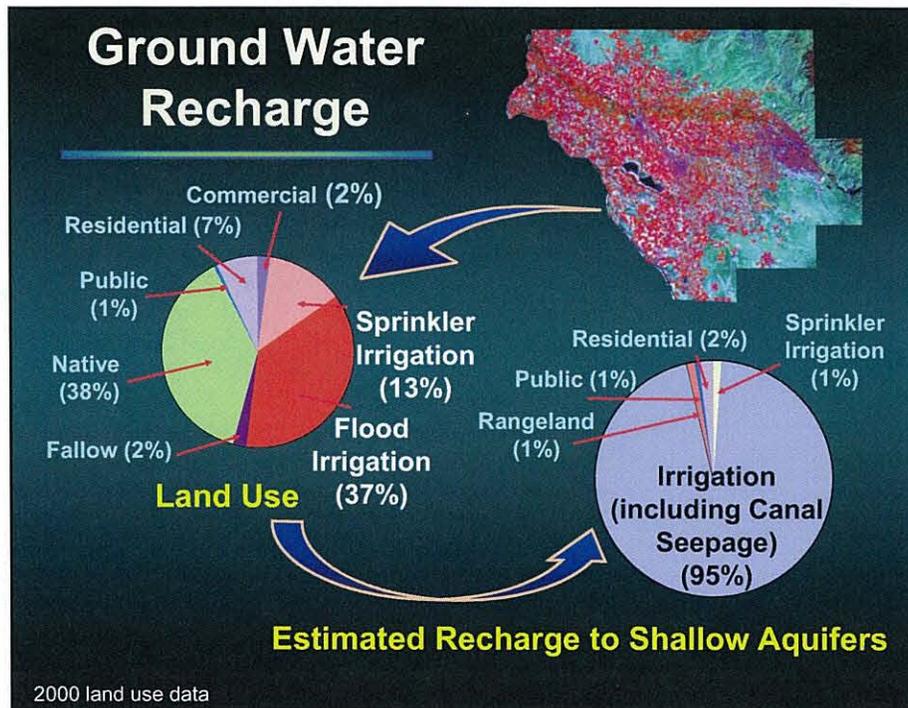




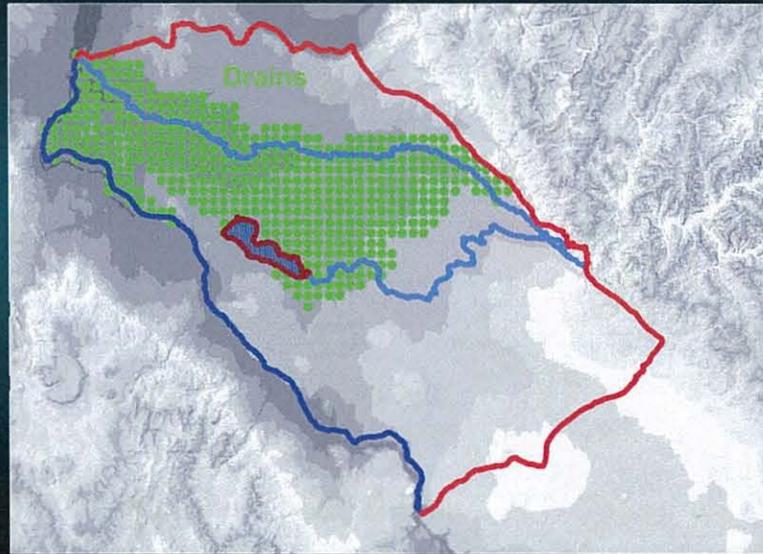


Carrying Capacity

- ❖ Carrying capacity is difficult to define
- ❖ If 1 million acre feet were available for use, how many people might it support?
 - 0.25 acre feet per housing unit (4 million homes)
 - 2.5 people per home (10 million people)
 - Most of this use is *non-consumptive*
 - With reuse ...?
- ❖ Unrealistic example, presented for discussion purposes only
 - Neglects irrigation
 - Neglects commercial/industrial use

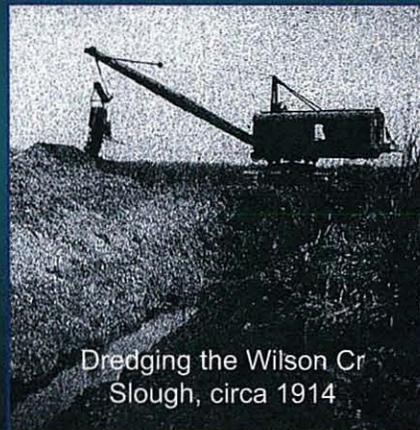


General Location of Drainage System



Drains

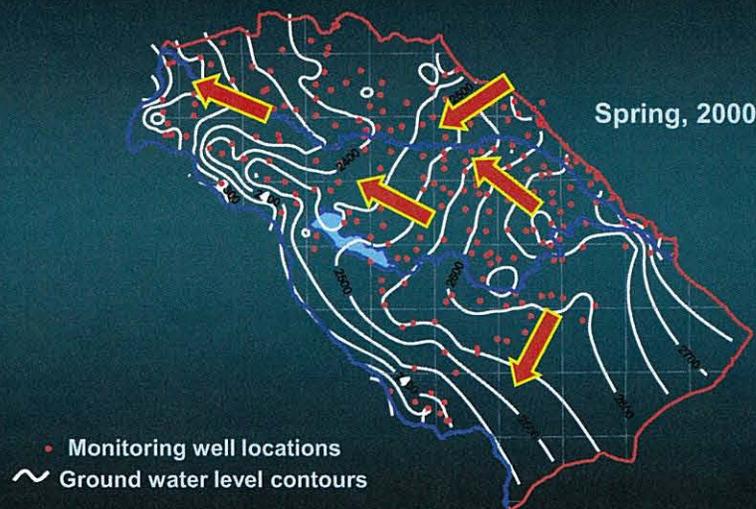
- ❖ Constructed to drain ground water from shallow aquifers
- ❖ Served to
 - Reduce “water-logged soils”
 - Provided for additional irrigation through re-diversion
- ❖ Drains flow year-round



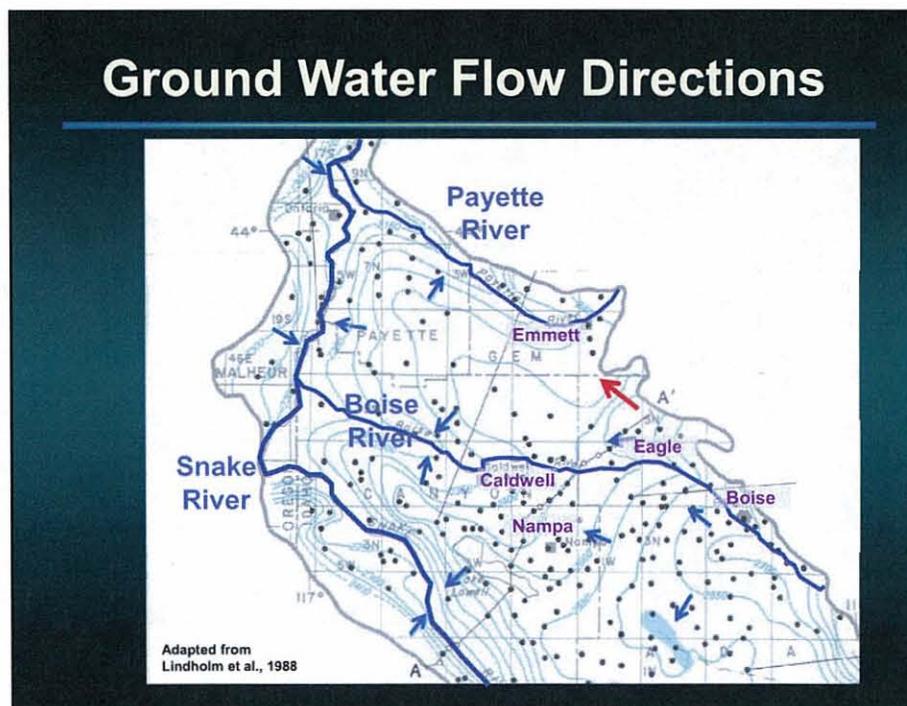
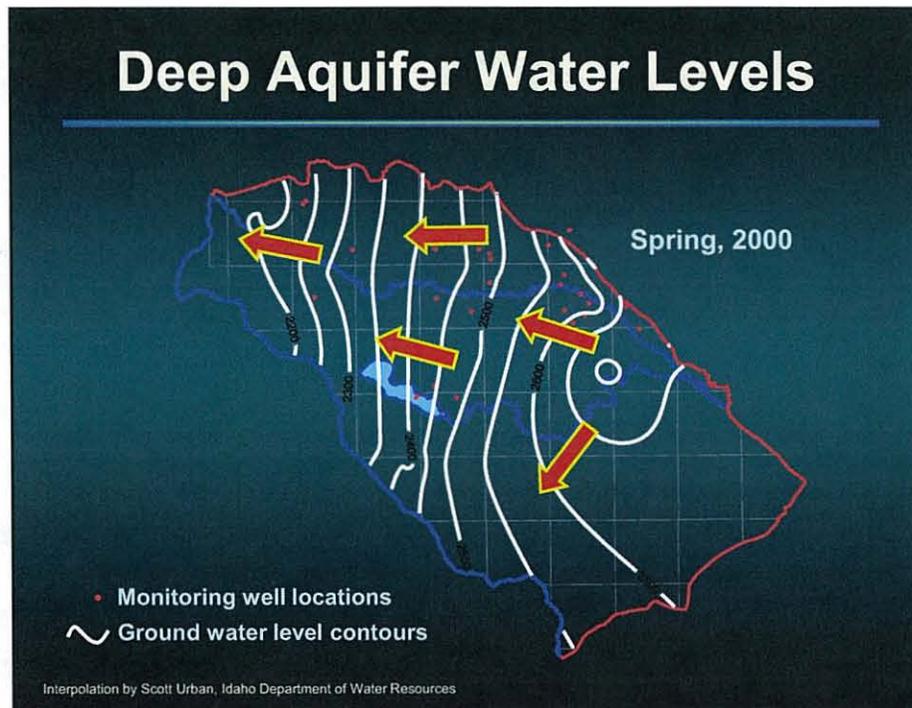
Ground Water Level Measurements

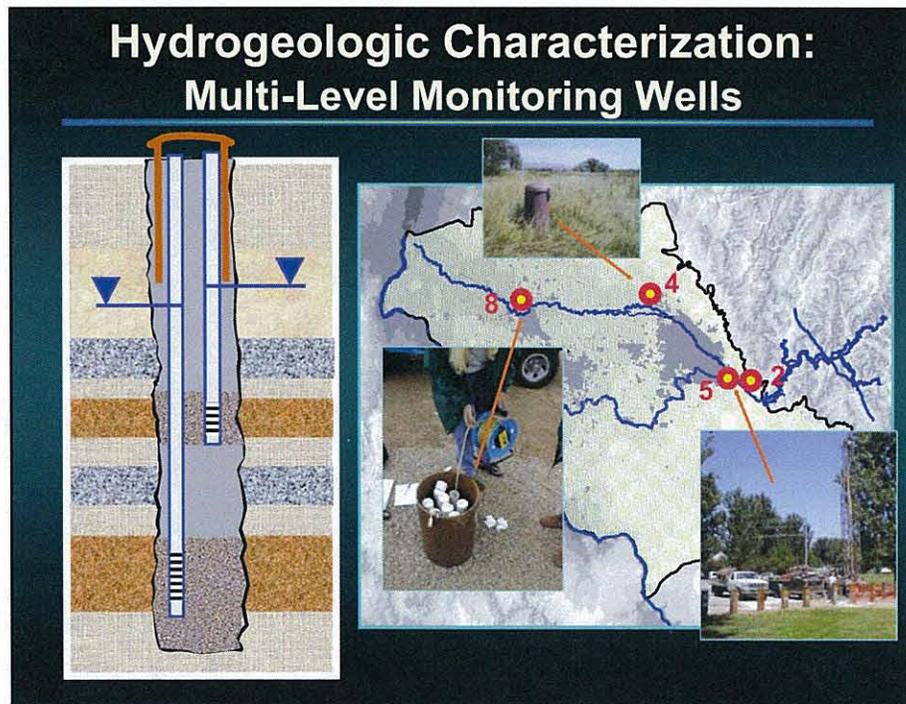
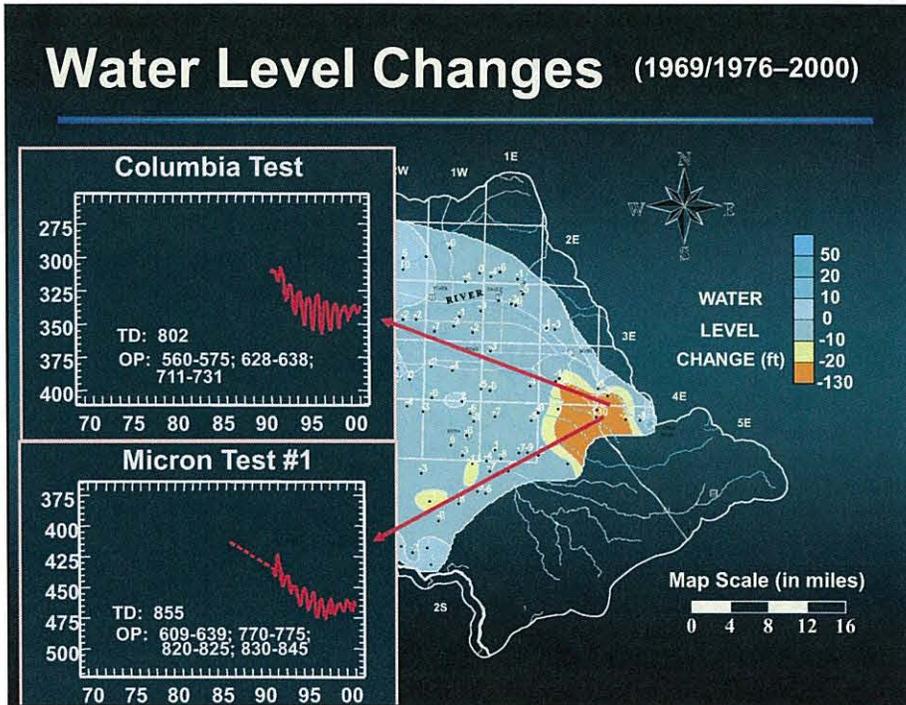
- ❖ “Mass” ground water level measurements in approximately 300 wells (spring and fall of 1996, 1998, 2000)
- ❖ Monthly measurements in about 70 wells
- ❖ Dedicated multi-level monitoring wells

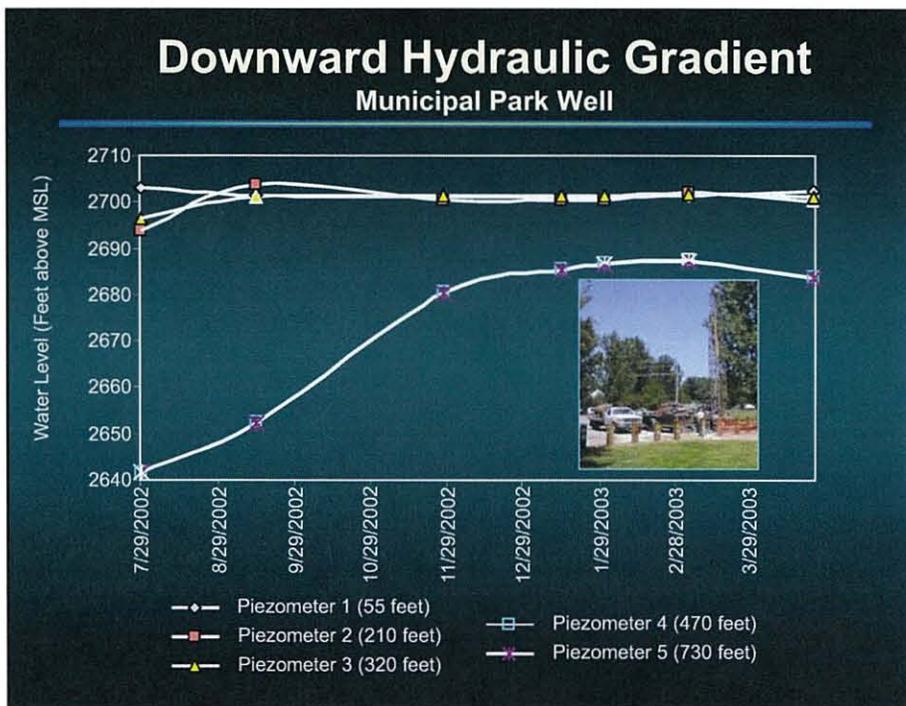
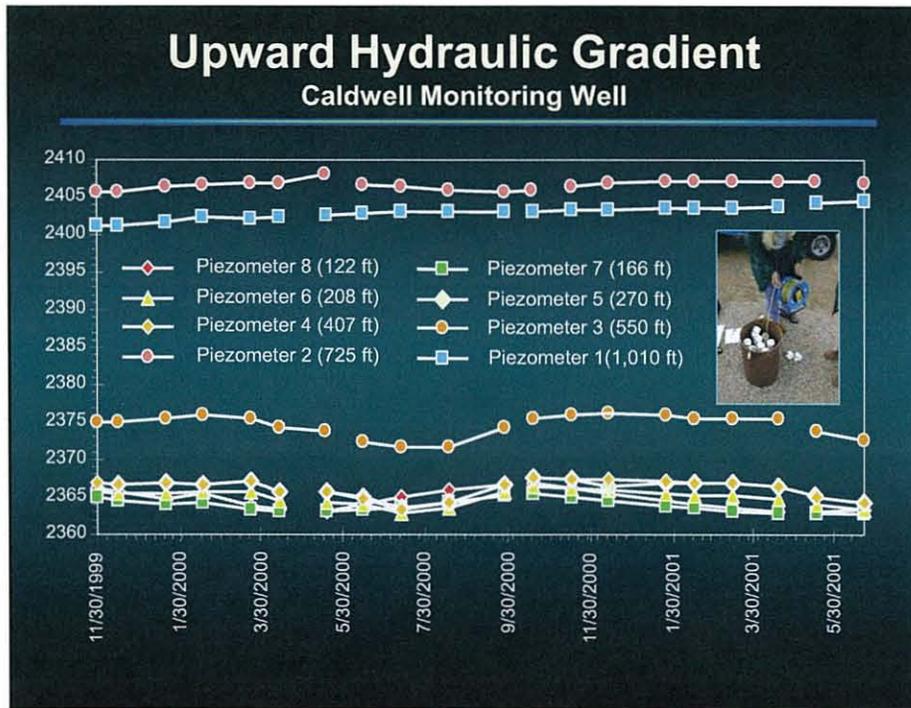
Shallow Aquifer Water Levels

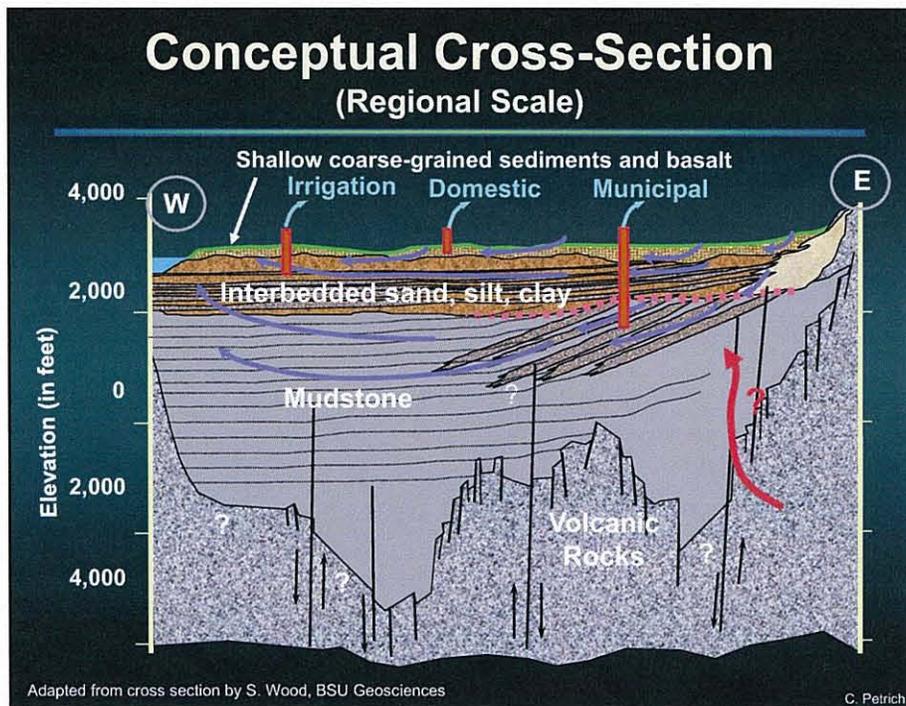
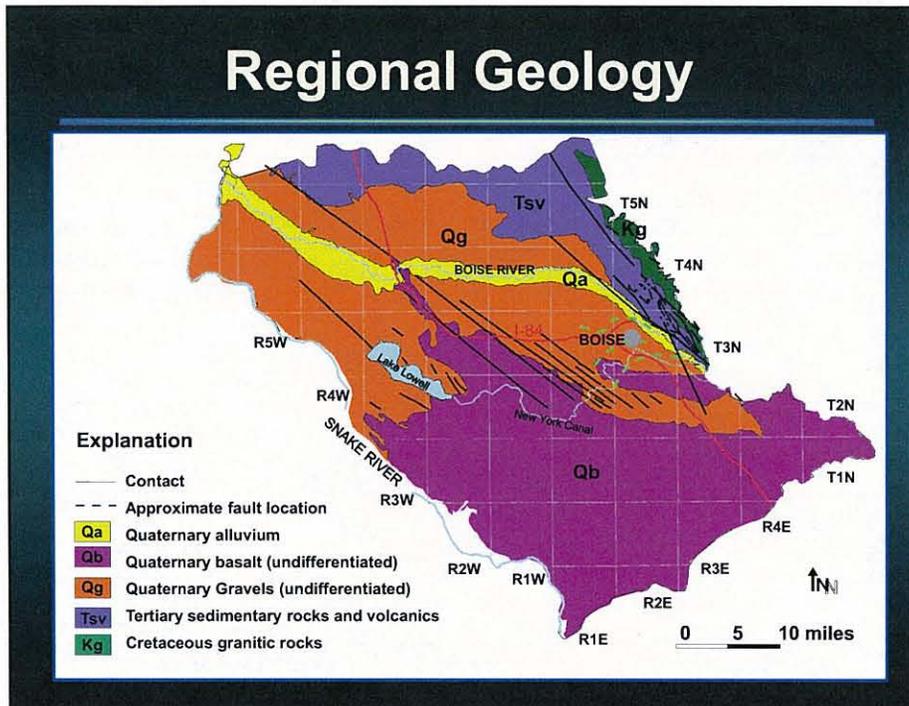


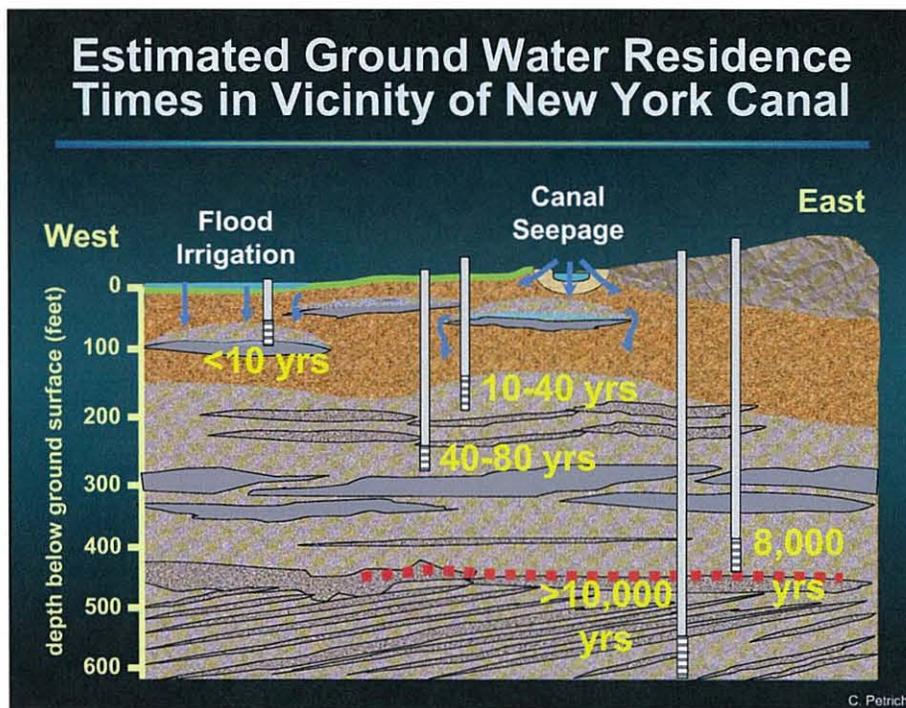
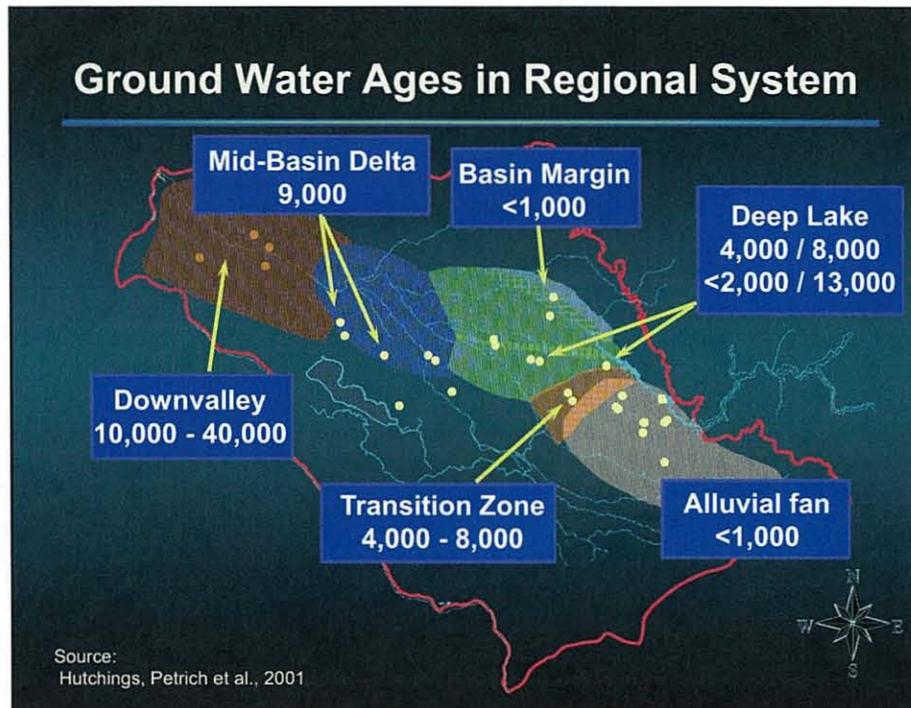
Interpolation by Scott Urban, Idaho Department of Water Resources



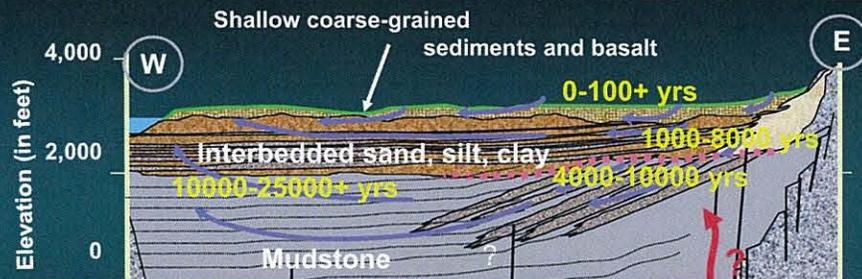








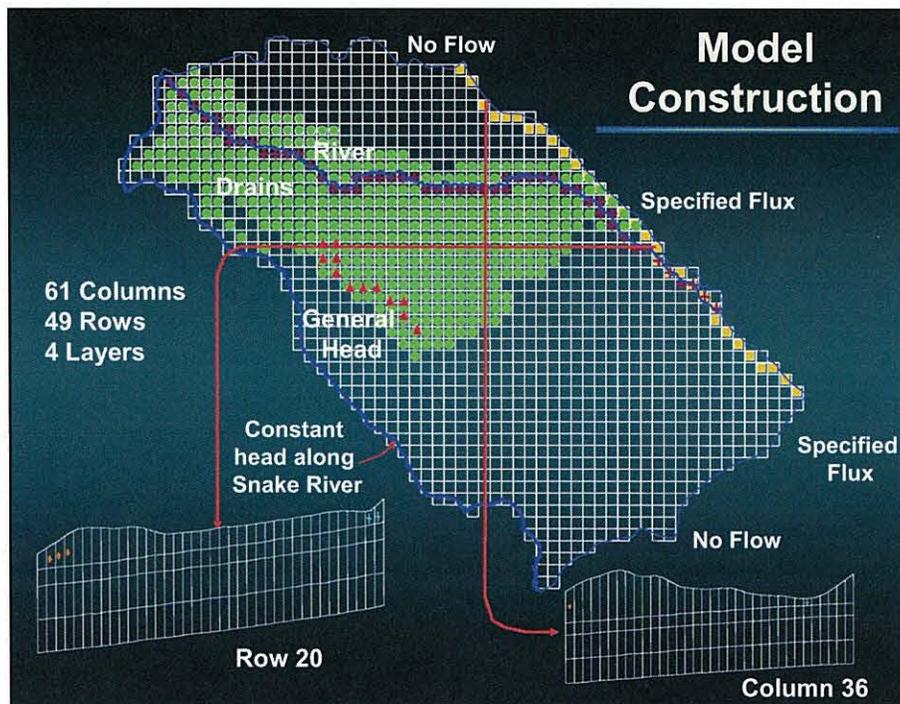
Regional Ground Water Flow System

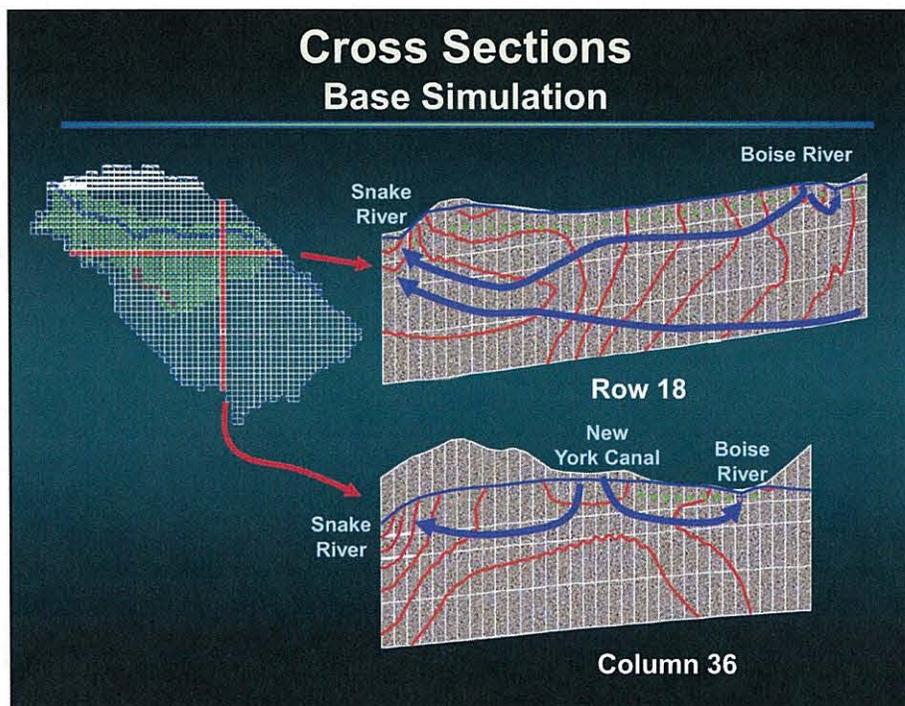
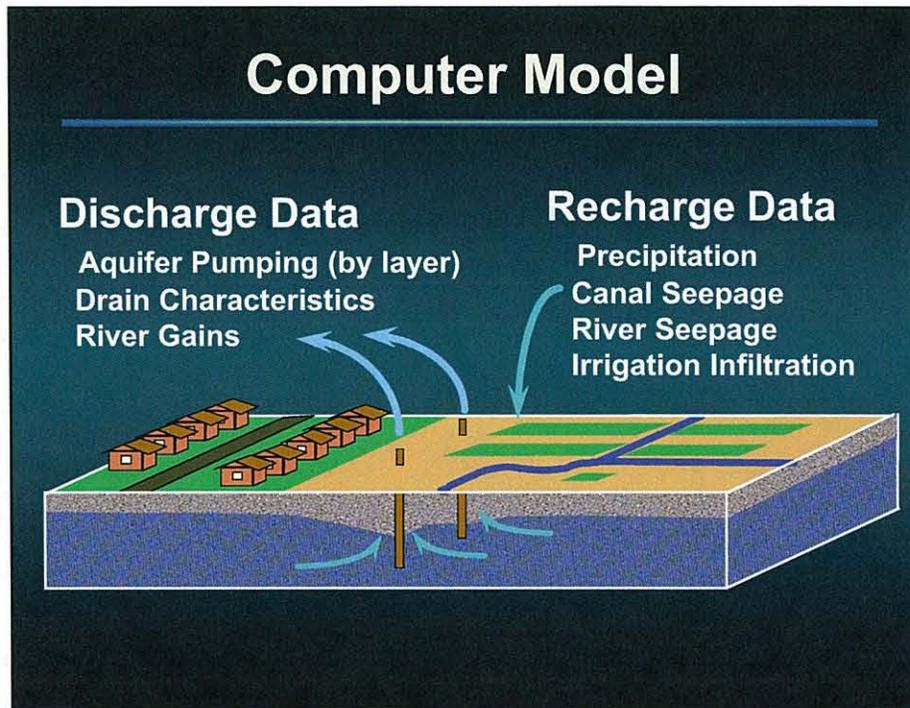


Factors Influencing Flow in Regional System

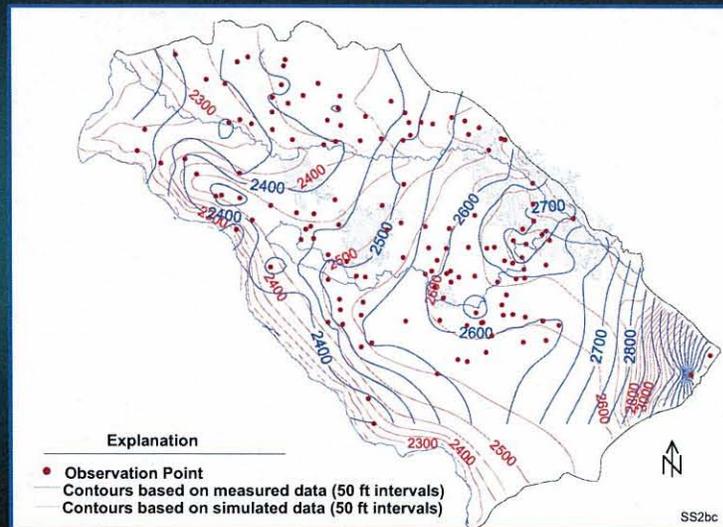
1. Discharge-limited in some areas (the water can't get out)
2. Recharge can be induced with pumping in some areas
3. Residence times do not necessarily reflect travel times
3. Aquifer properties control the rate of flow from shallow to deep zones, or vice versa

Model Construction





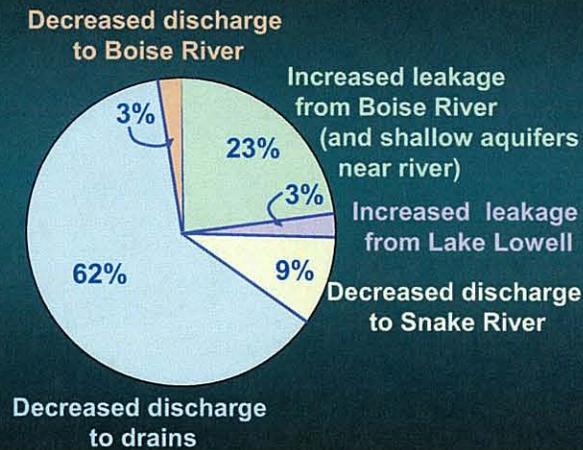
Base Calibration, Layer 1



Increased Pumping Scenario

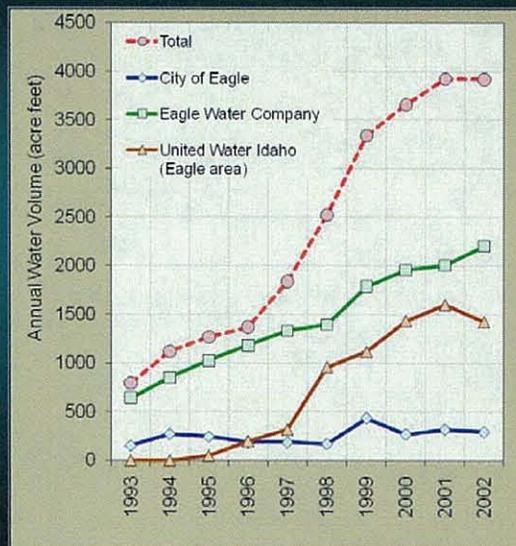
- ❖ Aggregate pumping represented by unprocessed water right applications
- ❖ Over 450 applications
- ❖ Proposed non-supplemental withdrawals approximately 20% of 1996 pumping
- ❖ Achieved new water level equilibrium

Sources of Water for Increased Simulated Withdrawals



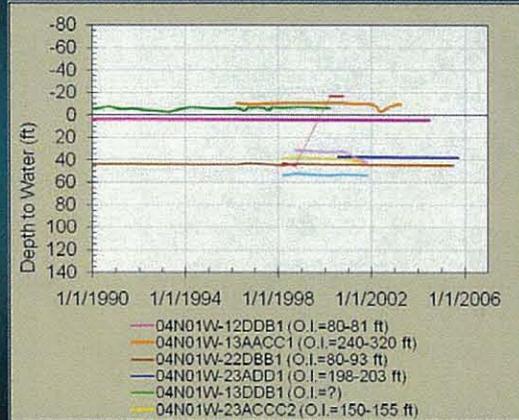
Eagle Vicinity Pumping and Water Levels

❖ Production in Eagle area quadrupled between 1993 and 2002



Eagle-Area Water Levels

- ❖ Eagle-area water levels remained relatively stable

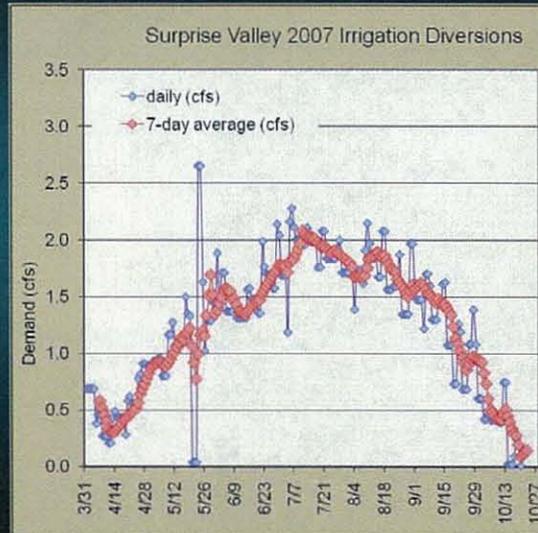


Urbanization of Agricultural Land

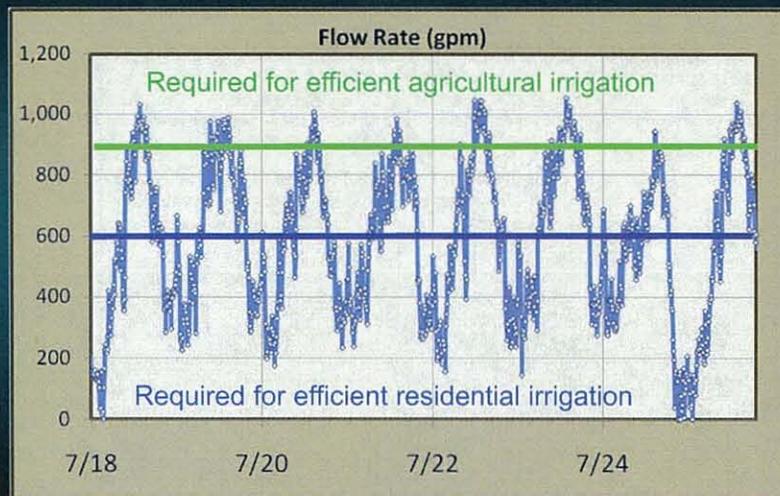


Pressurized Irrigation System

- ❖ ~ 60% Irrigated
- ❖ 4.2 to 4.4 AF/acre for actual irrigated area
- ❖ 2.5 to 2.6 AF/acre for gross area



Pressurized Residential Irrigation System



Hypothetical example

What did we learn?

Water Supply

- ❖ Abundant water supply (although not unlimited)
- ❖ Treasure Valley does not have a water shortage
- ❖ Approximately 2 million acre feet flow into the valley
- ❖ Approximately 1 million acre feet flow out of the valley
- ❖ Greater flows in some years, less in others

Aquifer Characteristics

- ❖ Treasure Valley Aquifer System extends throughout valley
- ❖ Aquifer extends several thousand feet deep, although upper 400 to 800 feet are generally most productive
- ❖ Shallow and deeper aquifers have varying degrees of hydraulic connection
- ❖ Recharge occurs primarily as infiltration from surface channels and irrigated ground

Carrying Capacity

- ❖ “Carrying capacity” of aquifer is difficult to define
 - The best way to assess pumping increases is to pump and monitor
 - Can continue to increase pumping (in some areas) until aquifers no longer discharge to drains
 - Ground and surface water is likely ample for very large increase in population
 - In gross numbers, existing water supplies could provide for more people than we currently envision

Ground Water Levels

- ❖ **Ground water levels are stable in most areas**
 - Historic declines have been observed in some local areas
 - » But water levels now stable
 - » Tribute to successful management
 - Modest declines have been observed in other areas, but some drawdown is necessary for water to flow to wells
 - Ground water levels have increased in some areas
 - Some areas will not support large increases in ground water pumping

Future Ground Water Development

- ❖ **Abundant ground water in western portion of valley**
- ❖ **Areas of more limited water availability**
 - Eastern areas
 - Southern areas
 - Portions of foothills
- ❖ **Increased pumping**
 - Possible in many areas
 - Ground water levels will reach new equilibrium
 - Pumping may result in
 - » Increased recharge from river or shallow aquifers
 - » Decreased discharge to surface channels
 - » Or both

Other “Sources” of Future Water Supply

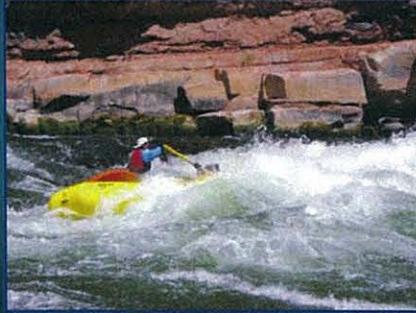
- ❖ Targeted efficiency improvements
- ❖ Improved water management
- ❖ Changes in existing water use
- ❖ Snake River
- ❖ Payette River
- ❖ Aquifer storage and recovery

Summary

- ❖ Adequate supply of water for current and future needs
- ❖ Challenge is to
 - Plan now to meet future water demand
 - » Infrastructure
 - » Policy
 - Some opportunities will require regional approach
 - Identify current policies that may inadvertently preclude future water-supply options



Questions



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