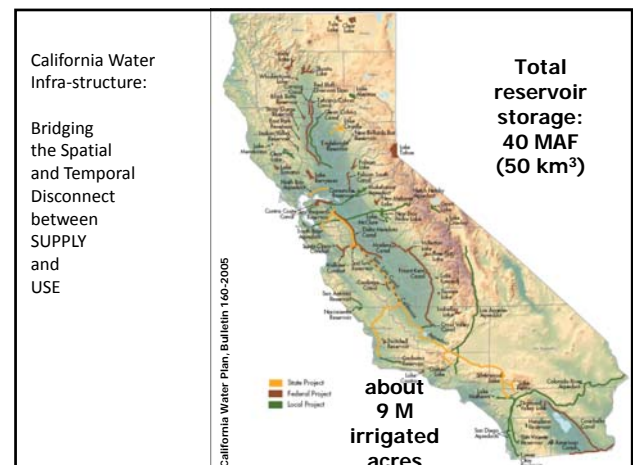
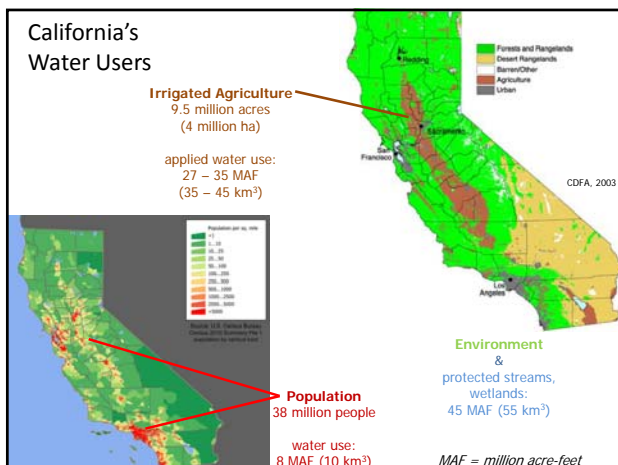
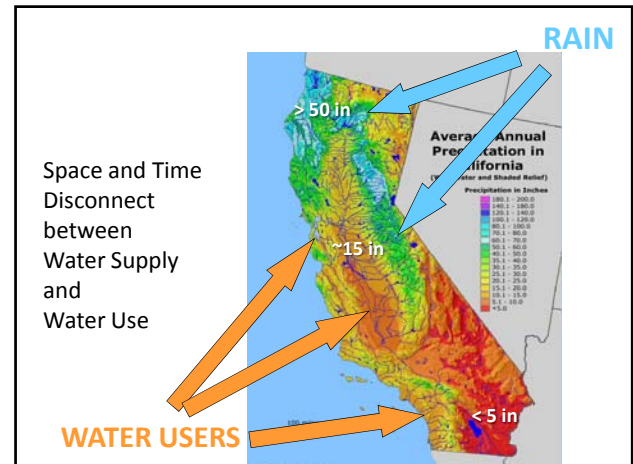
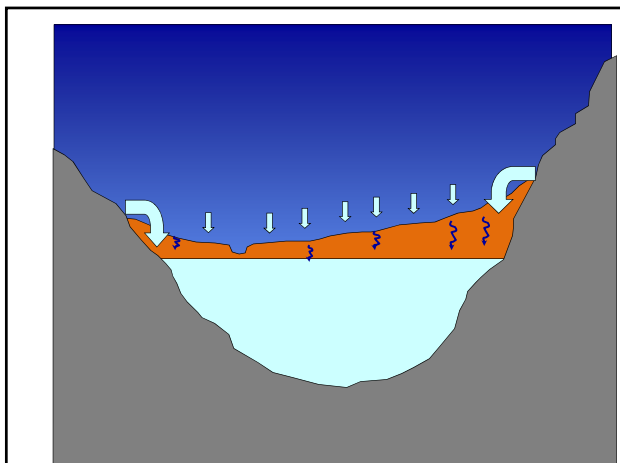
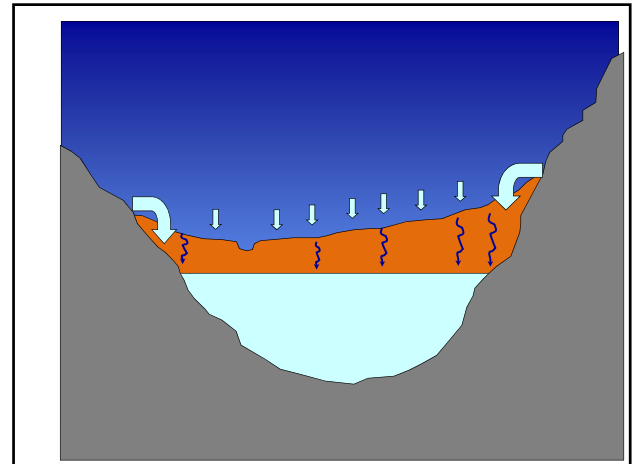
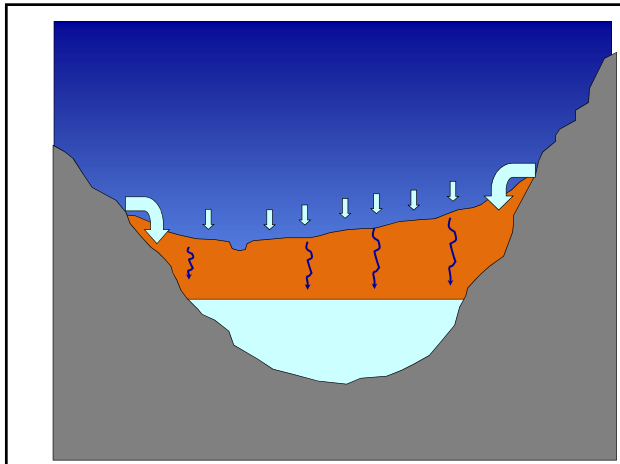
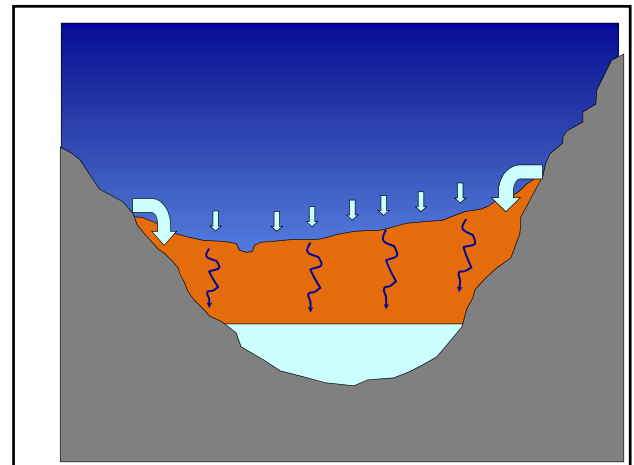
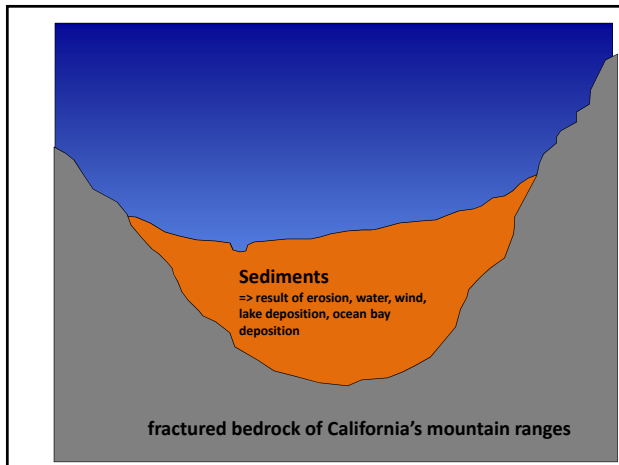
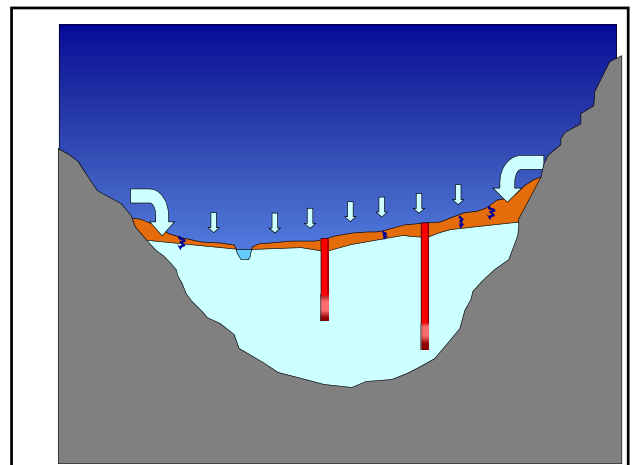
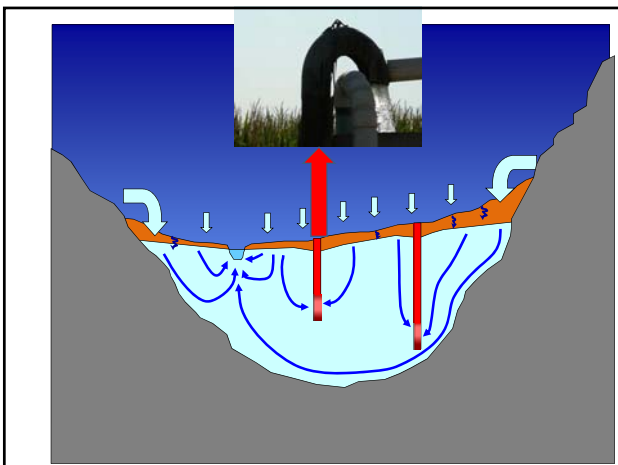
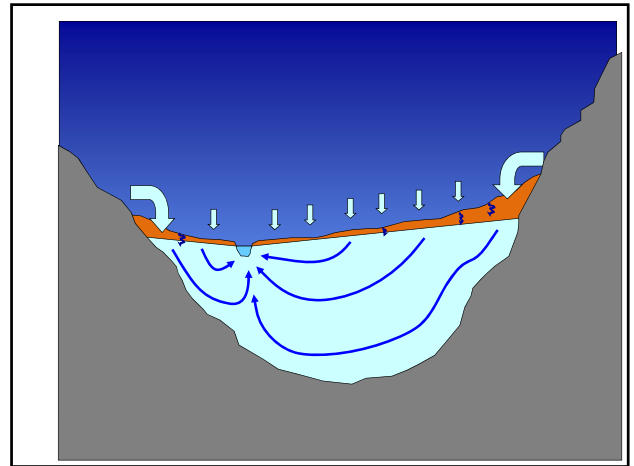
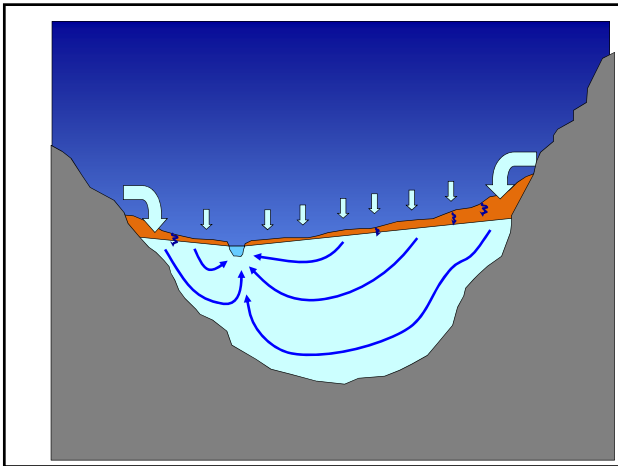
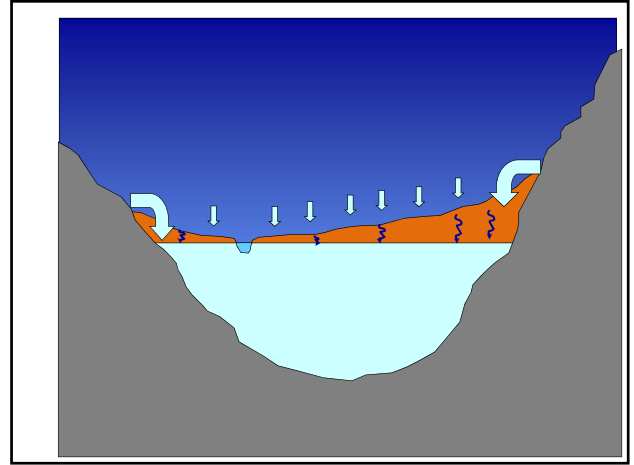
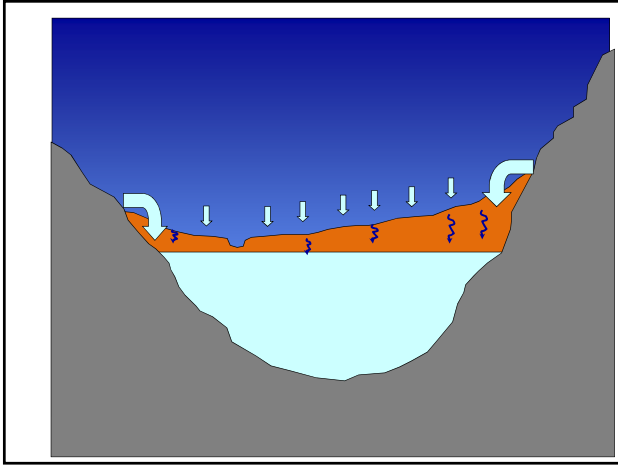


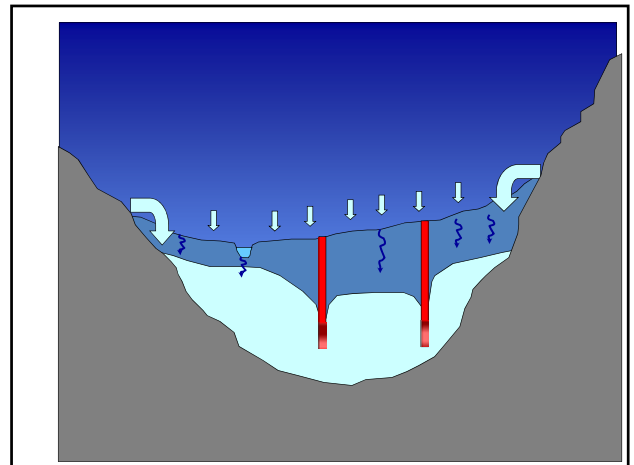
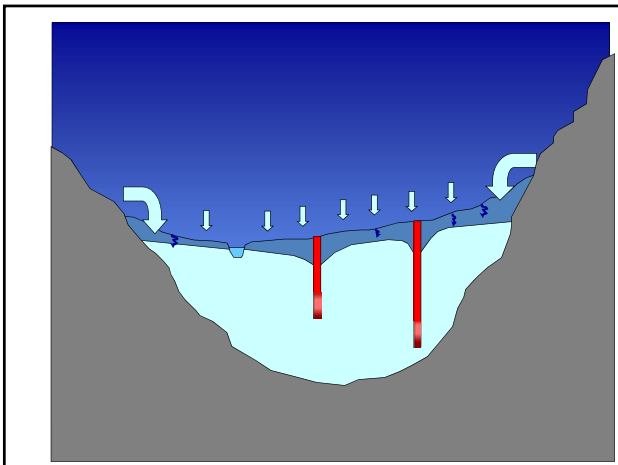
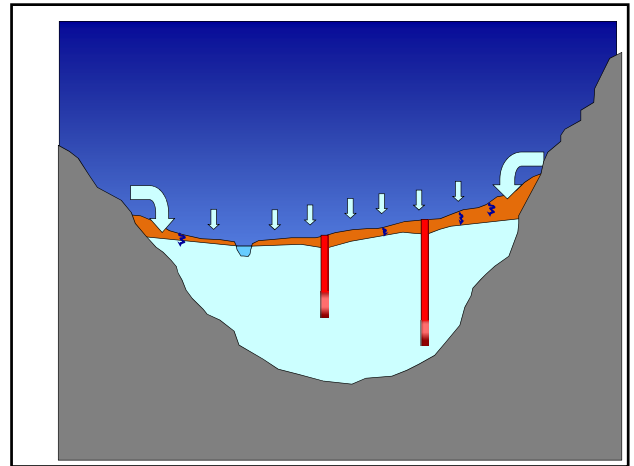
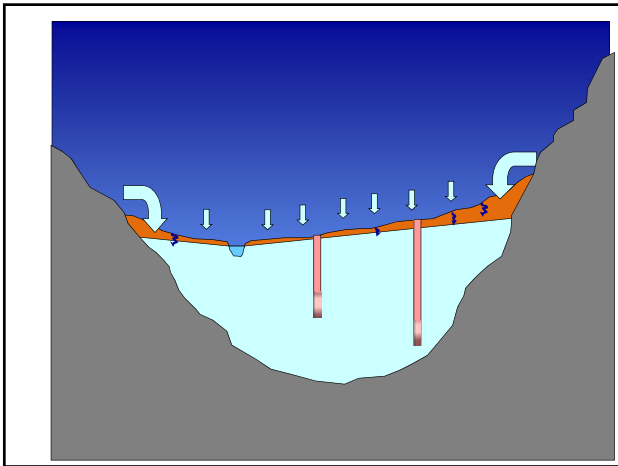
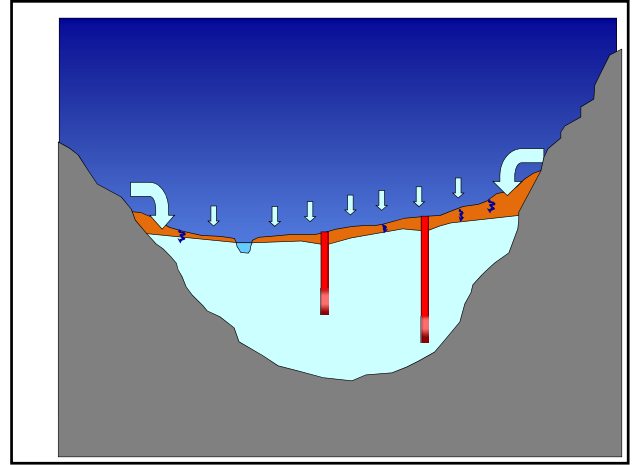
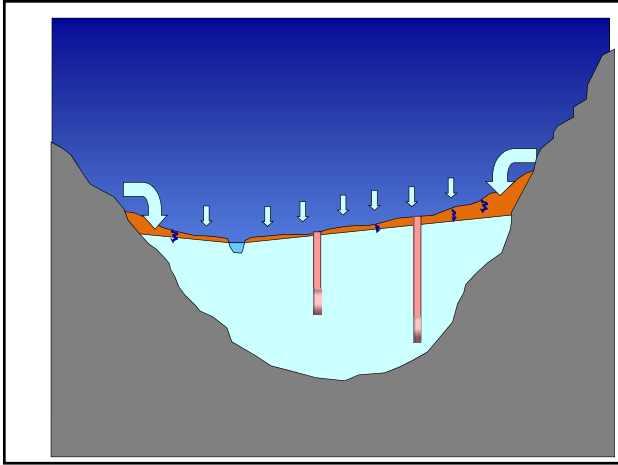
Lake County Historic Records

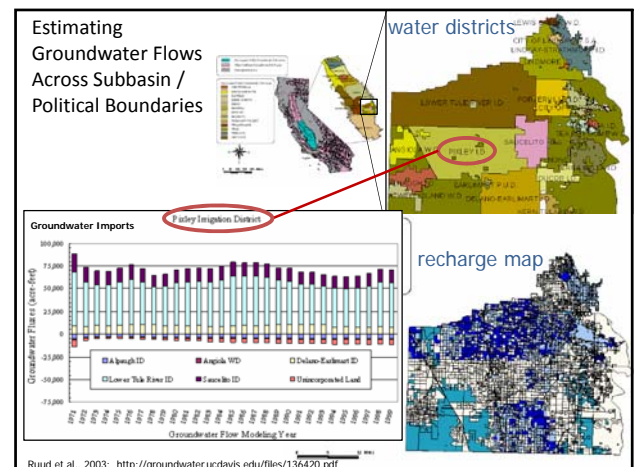
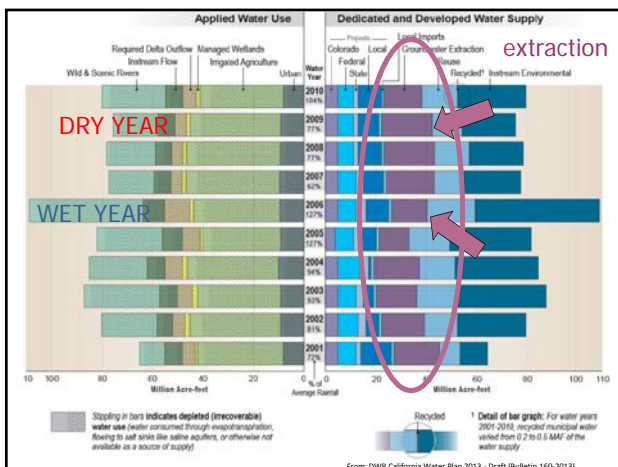
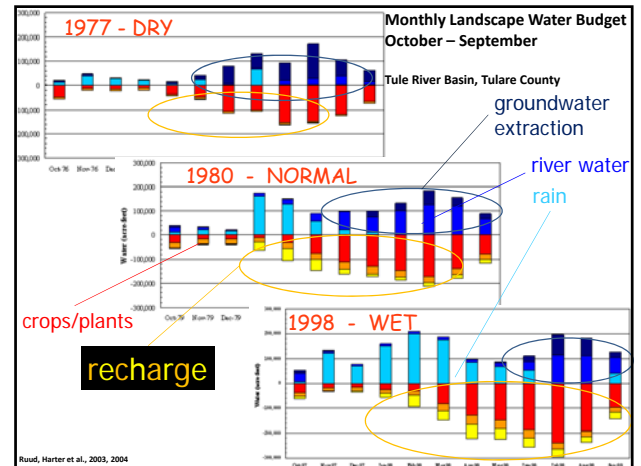
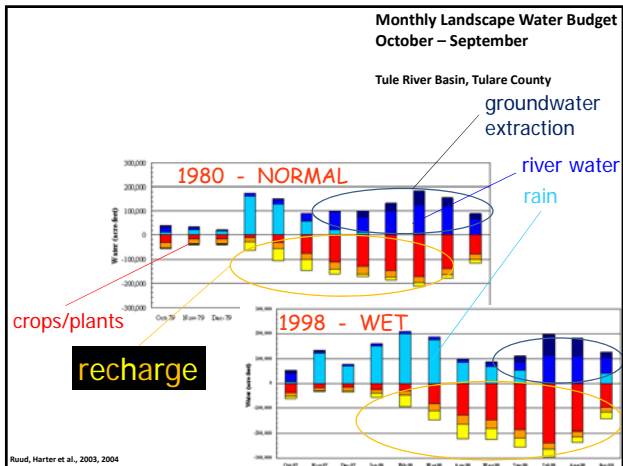
Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Total
Lakeport (Altitude 1,340 feet) - Continued													
1929-30	0.50	4.42	5.20	1.92	0.12	1.10	1.30	0	0	0	0	0	12.50
1930-31	0.50	5.50	10.50	1.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	20.50
1931-32	0.50	5.50	10.50	1.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	20.50
1932-33	0.50	5.50	10.50	1.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	20.50
1933-34	0.50	5.50	10.50	1.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	20.50
1934-35	0.50	5.50	10.50	1.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	20.50
1935-36	0.50	5.50	10.50	1.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	20.50
1936-37	0.50	5.50	10.50	1.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	20.50
1937-38	0.50	5.50	10.50	1.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	20.50
1938-39	0.50	5.50	10.50	1.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	20.50
1939-40	0.50	5.50	10.50	1.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	20.50
1940-41	0.50	5.50	10.50	1.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	20.50
1941-42	0.50	5.50	10.50	1.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	20.50
1942-43	0.50	5.50	10.50	1.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	20.50
1943-44	0.50	5.50	10.50	1.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	20.50
1944-45	0.50	5.50	10.50	1.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	20.50
1945-46	0.50	5.50	10.50	1.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	20.50
1946-47	0.50	5.50	10.50	1.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	20.50
1947-48	0.50	5.50	10.50	1.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	20.50
1948-49	0.50	5.50	10.50	1.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	20.50
1949-50	0.50	5.50	10.50	1.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	20.50

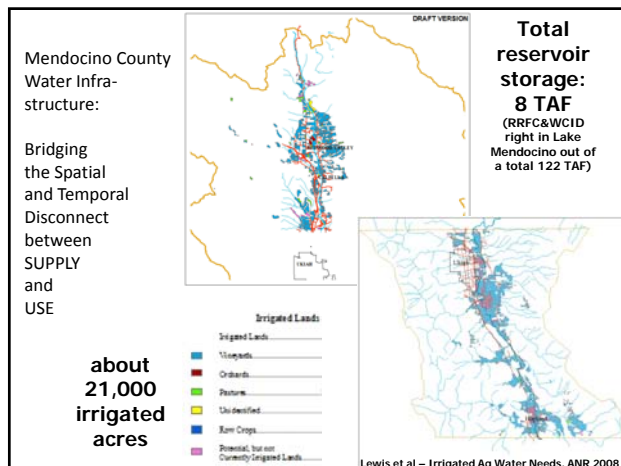
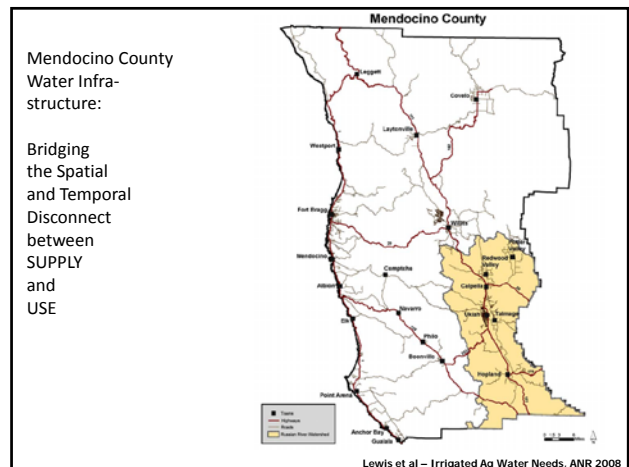
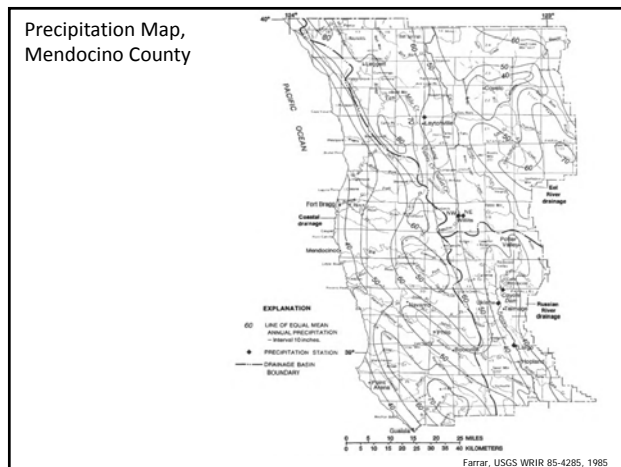












Agricultural Land and Water Demand

Table 6: Acreage of irrigated agriculture in the Mendocino County portion of the Russian River watershed by crop and sub-basin (Difference in subtotals of results from rounding values).

Crop	Redwood Valley	Potter Valley	Ukiah Valley	Hopland Valley	Subtotals	WATER DEMAND [acft per year]
Grapes	3,048	1,828	5,808	4,856	15,539	13,600
Pasture	219	2,607	105	213	3,144	6,300
Peas	43	292	1,175	335	1,845	5,700
Other	12	4	10	0	26	40
Unidentified	60	0	0	0	60	90
Subtotals	3,382	4,731	7,098	5,403	20,614	25,700
Potential	122	5	230	160	517	

Lewis et al – Irrigated Ag Water Needs, ANR 2008

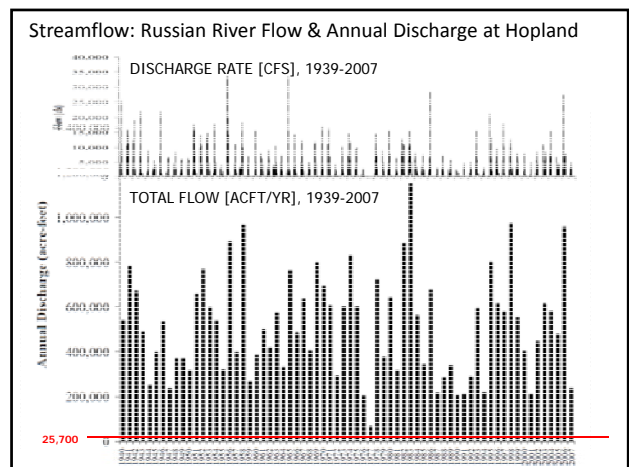
Agricultural Water Demand: Details

Table 10: Water demand (acre-feet) for irrigated agriculture by crop, water use, and sub-basin in 2007.

Crop	Water Use	Sub-basin				Totals
		Redwood Valley	Potter Valley	Ukiah Valley	Hopland Valley	
Grapes	Consumptive Use	1,859	1,115	3,543	2,962	9,479
	Frost Protection	404	1,580	595	376	2,955
	Heat Protection	57	215	149	94	515
	Post Harvest	149	351	60	60	620
Peas	Consumptive Use	100	675	2,714	774	4,263
	Frost Protection	55	532	649	185	1,421
	Heat Protection	nd	nd	nd	nd	
	Post Harvest*	-	-	-	-	
Pasture	Consumptive Use	437	5,214	211	425	6,287
Other	Consumptive Use	18	6	15	0	39
Unidentified	Consumptive Use	90	0	0	0	90
Totals		3,169	9,688	7,936	4,876	25,669

Notes:
 * – Post-harvest applications for peas is combined with consumptive use.
 nd – Not determined.

Lewis et al – Irrigated Ag Water Needs, ANR 2008



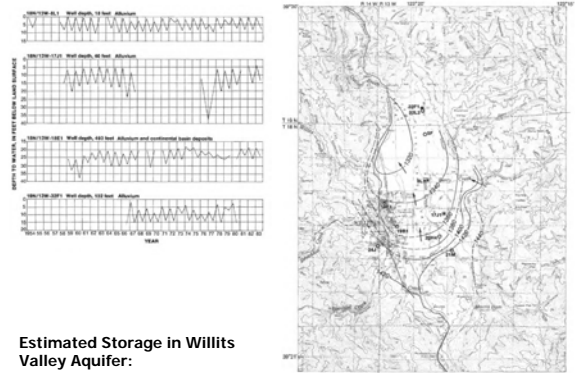
Groundwater Levels, Ukiah Valley: Contour Map



Estimated Storage in the Ukiah Valley Aquifer:
90,000 acft

Farrar, USGS WRIR 85-4285, 1985

Groundwater Levels, Willits Valley



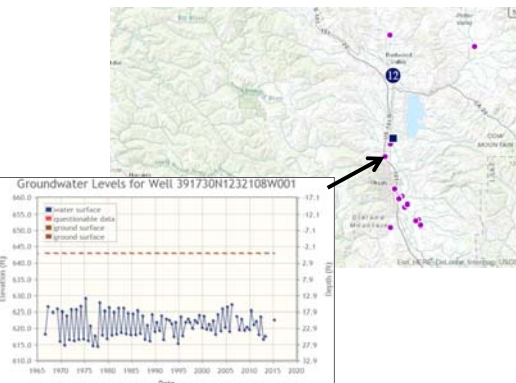
Estimated Storage in Willits Valley Aquifer:
23,000 – 48,000 acft

Farrar, USGS WRIR 85-4285, 1985

Groundwater Level Change: Spring 2011 – Spring 2014



Long-term Fluctuations in Water Level



Historic Long-term Fluctuations in Water Level

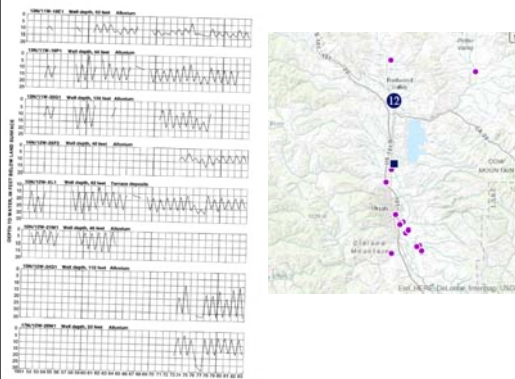
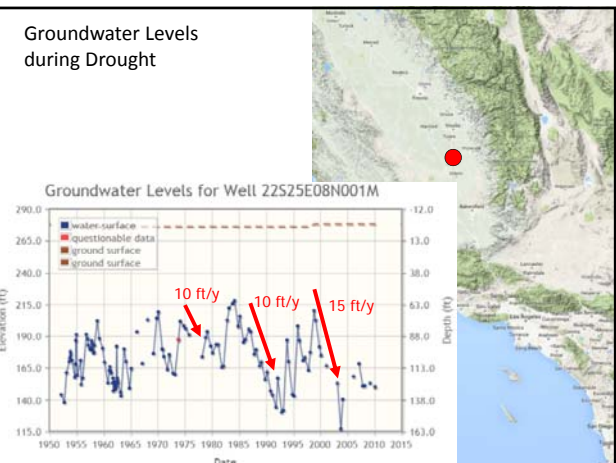


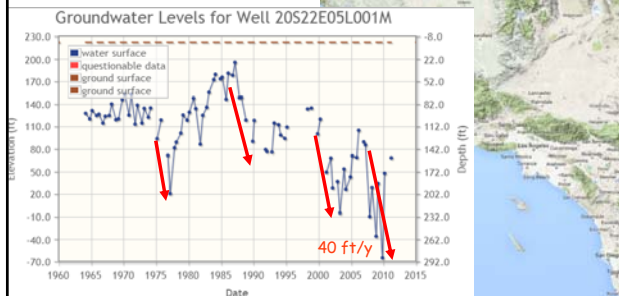
FIGURE 1. — Hydrographs for wells in Ukiah Valley. (Locations shown on plate 2)

Farrar, USGS WRIR 85-4285, 1985

Groundwater Levels during Drought



Groundwater Levels during Drought



California Groundwater Rights: Background

- Correlative Rights Doctrine – safe yield of groundwater basin shared by overlying users
 - Katz v. Wilkinshaw, 1908
- California constitutional mandate for beneficial use (1928)
- Special districts (20 different types, about 2,300 districts)
 - Water districts, irrigation districts, private water companies, reclamation districts, water conservation districts, water replenishment districts, water storage districts, etc.
- County police power – controls groundwater exports
 - Baldwin vs. Tehama County, 1994
- The Courts: basin adjudication / “physical solution” – controls extraction
 - Many Southern California (sub)basins, mid 20th century
 - City of Barstow vs. Mojave Water Agency, 2000:
 - Right of water users to negotiate physical “equitable, practical” solution, regardless of water rights
 - Individual water rights holders cannot be forced into a voluntary agreement

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 - City of Barstow vs. Mojave Water Agency, 2000:
 - Right of water users to negotiate physical “equitable, practical” solution, regardless of water rights
 - Individual water rights holders cannot be forced into a voluntary agreement
- State groundwater management:
 - Voluntary local groundwater management plans: AB 3030 (1992)
 - Financial incentives for local groundwater management: SB 1938 (2002)
 - Sustainable Groundwater Management Act of 2014: mandatory & expanded local control

Sustainable Groundwater Management Act of 2014

SEC. 2.

Section 113 is added to the Water Code, to read:

113.

It is the policy of the state that **groundwater resources be managed sustainably for long-term reliability and multiple economic, social, and environmental benefits** for current and future beneficial uses.

Sustainable groundwater **management is best achieved locally** through the development, implementation, and updating of plans and programs based on the best available science.

[emphasis added]

Sustainability = No “Undesirable Results”

10721. Unless the context otherwise requires, the following definitions govern the construction of this part:

(u) “Sustainable groundwater management” means the management and use of groundwater in a manner that can be maintained during the planning and implementation horizon without causing undesirable results.

(w) “Undesirable result” means one or more of the following effects caused by groundwater conditions occurring throughout the basin (Section 10721 (w)):

- (1) **Chronic lowering of groundwater levels** indicating a significant and unreasonable depletion of supply if continued over the planning and implementation horizon. Overdraft during a period of drought is not sufficient to establish a chronic lowering of groundwater levels if extractions and recharge are managed as necessary to ensure that reductions in groundwater levels or storage during a period of drought are offset by increases in groundwater levels or storage during other periods.
- (2) Significant and unreasonable **reduction of groundwater storage**.
- (3) Significant and unreasonable **seawater intrusion**.
- (4) Significant and unreasonable **degraded water quality**, including the migration of contaminant plumes that impair water supplies.
- (5) Significant and unreasonable **land subsidence** that substantially interferes with surface land uses.
- (6) **Surface water depletions** that have significant and unreasonable adverse impacts on beneficial uses of the surface water.

[emphasis added]

Sustainable Groundwater Management Act: Goals

SEC. 3.

Part 2.74 (commencing with Section 10720) is added to Division 6 of the Water Code, to read:

PART 2.74. Sustainable Groundwater Management

CHAPTER 1. General Provisions

10720.

This part shall be known, and may be cited, as the “Sustainable Groundwater Management Act.”

10720.1.

In enacting this part, it is the intent of the Legislature to do all of the following:

- (a) To provide for the **sustainable management of groundwater basins**.
- (b) To **enhance local management** of groundwater consistent with rights to use or store groundwater and Section 2 of Article X of the California Constitution. It is the intent of the Legislature to preserve the security of water rights in the state to the greatest extent possible consistent with the sustainable management of groundwater.
- (c) To **establish minimum standards** for sustainable groundwater management.
- (d) To **provide local groundwater agencies with the authority and the technical and financial assistance** necessary to sustainably manage groundwater.
- (e) To **avoid or minimize subsidence**.
- (f) To **improve data collection and understanding** about groundwater.
- (g) To **increase groundwater storage** and remove impediments to recharge.
- (h) To manage groundwater basins through the actions of local governmental agencies to the greatest extent feasible, while **minimizing state intervention** to only when necessary to ensure that local agencies manage groundwater in a sustainable manner.

[emphasis added]

Role of the State: **Carrot**

- Department of Water Resources has a key role:
 - Technical assistance and funding (Prop 1: \$100 million for SGMA)
 - Regulation
 - Groundwater basin boundary adjustments
 - Minimum guidelines for appropriate GSP
 - Control
 - Review and approve GSPs
 - Review implementation

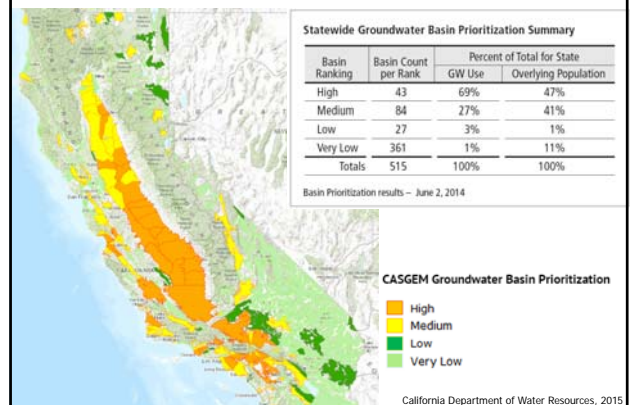
Role of the State: **Carrot & Stick**

- Department of Water Resources has a key role:
 - Technical assistance and funding (Prop 1: \$100 million for SGMA)
 - Regulation
 - Groundwater basin boundary adjustments
 - Minimum guidelines for appropriate GSP
 - Control
 - Review and approve GSPs
 - Review implementation
- State Water Resources Control Board:
 - Enforcement where local control fails (after 2017)
 - “probationary status”
 - Public hearing and 180 days to fix the problem
 - After 180 days: SWRCB poses as interim GSA
 - Groundwater extraction reporting mandatory
 - Possibly temporary control of groundwater extraction
 - Development and implementation of interim GSP
 - When locals are ready: get authority back from state

So What Exactly Will Happen?

- **First Step: forming a Groundwater Sustainability Agency (GSA)**
 - By June 2017

Medium and High Priority Groundwater Basins



Mendocino County:
GW Basin Priority
(DWR)



Existing Groundwater Management Plans: Inventory and Assessment (No or Limited Implementation)



Who can be a GSA?

- Exempt:
 - Adjudicated basins (mostly in southern CA)
 - Functional equivalent of a GSA, adjudicated basin
- Any local public agency
 - Cities
 - Counties
 - Water / irrigation districts
 - NEW special acts districts (created by legislature, then CEQA, LAFCO, public vote) => Paso Robles

GSA Formation: What's Next

- Stimulate dialogue / communication among local agencies, key stakeholders (e.g., Farm Bureau)
- Engage broad range of interested parties
- Gather information about the basin / find out where the information is / what is available
- Understand what Groundwater Sustainability Planning entails
- Consider facilitation services
- Look over the fence and see what's happening elsewhere
- Transparency, transparency, transparency
- DEADLINE: June 30, 2017

So What Exactly Will Happen?

- First Step: forming a Groundwater Sustainability Agency (GSA)
 - By June 2017
- **Second Step: developing a Groundwater Sustainability Plan (GSP)**
 - Within 5 years of GSA formation

Key Elements of (Local/regional) California Groundwater Management Plans

- Context / Basin Description
- Public and agency involvement
- Basin management objectives
- Monitoring
- Accountability and review



Sustainable Groundwater Mgmt Act:

- Enforcement mandate
- Empowerment for demand management (in addition to supply management)
- Integration with surface water management
- Integration with water quality management (source control, remediation, containment)
- Integration with landuse planning
- Local control / enforcement, with state oversight / enforcement

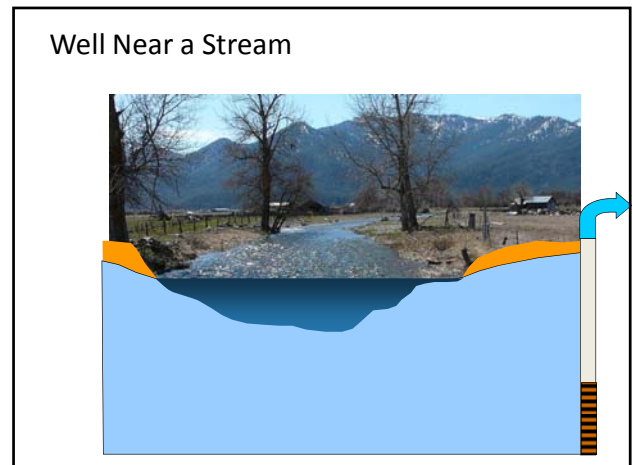
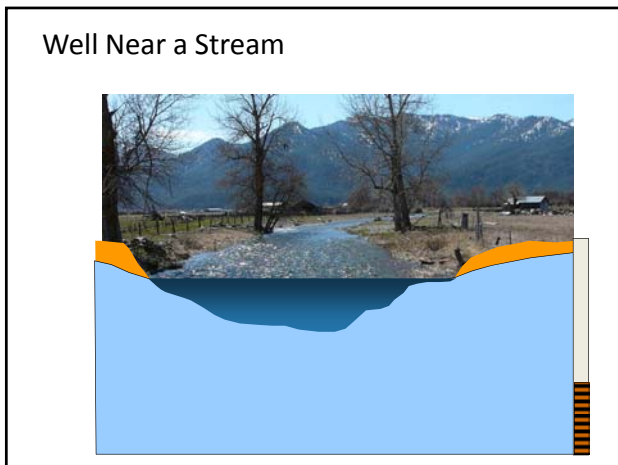
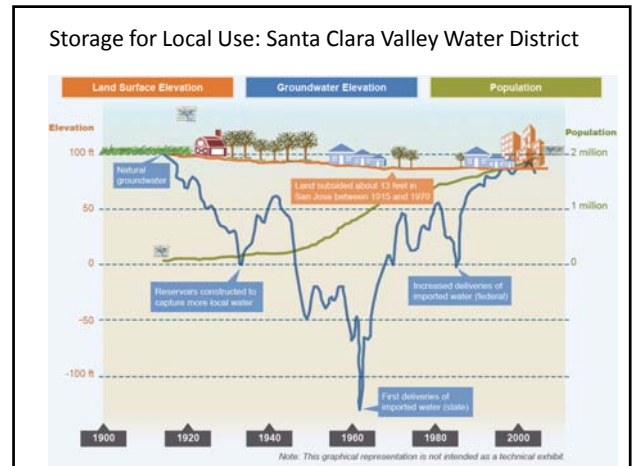
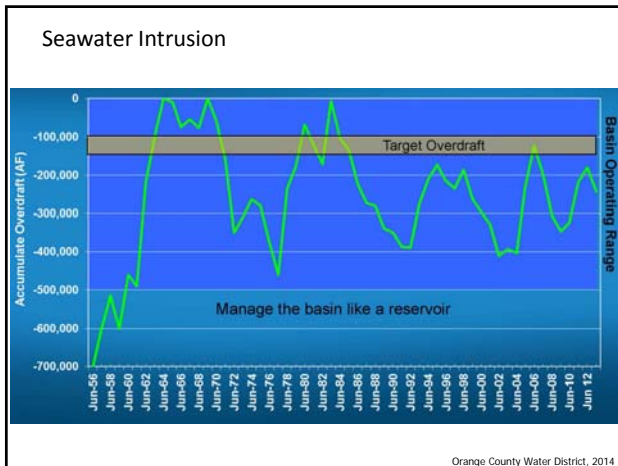
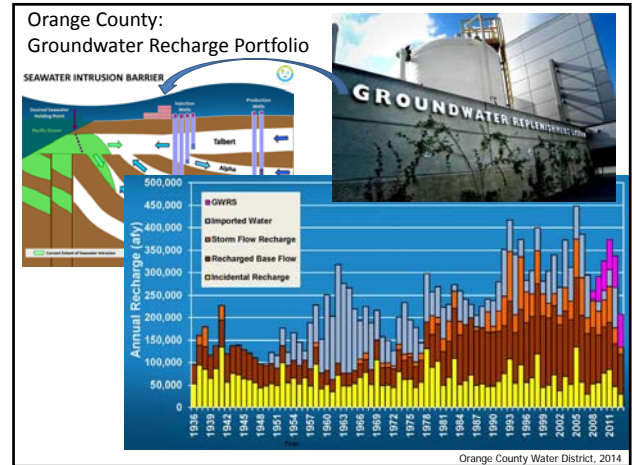
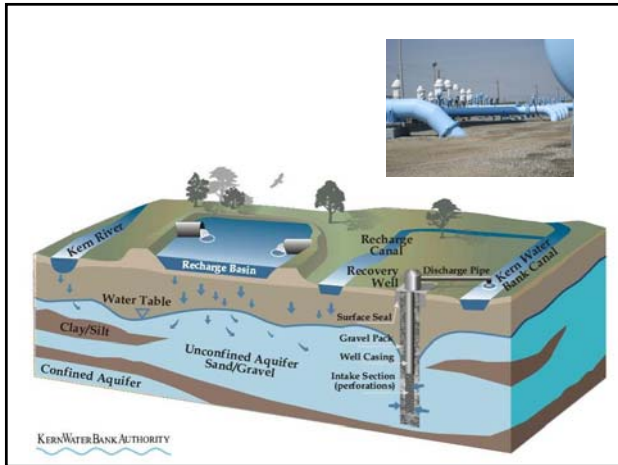
Groundwater Management Portfolio: Overview

- Data collection, monitoring, modeling, assessment
- Supply management
- Demand management
- Stakeholder engagement and management

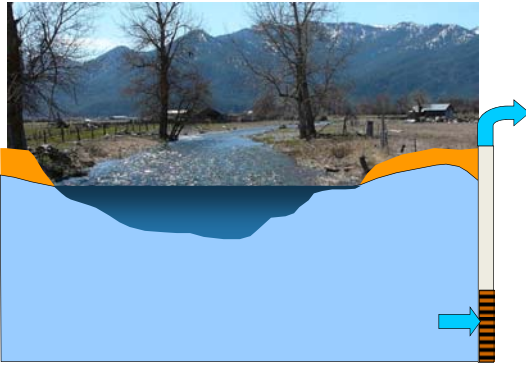


From: Ted Johnson, WRD 2013

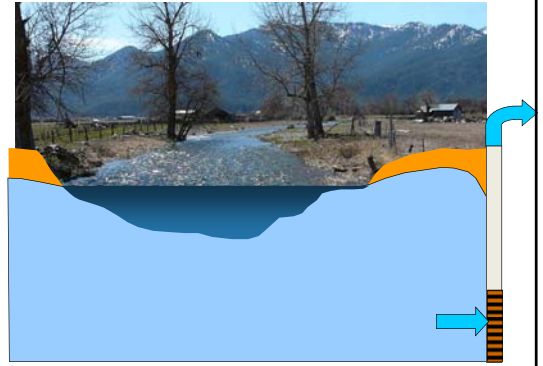
DWR, California Water Plan Update 2013



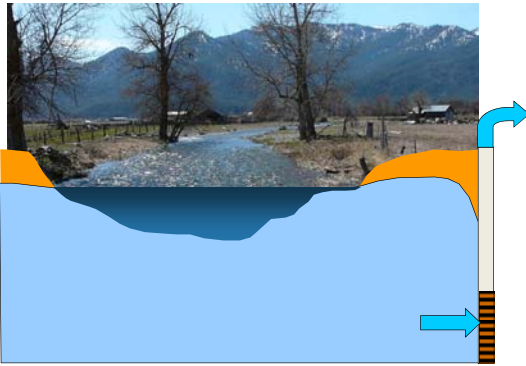
Well Near a Stream



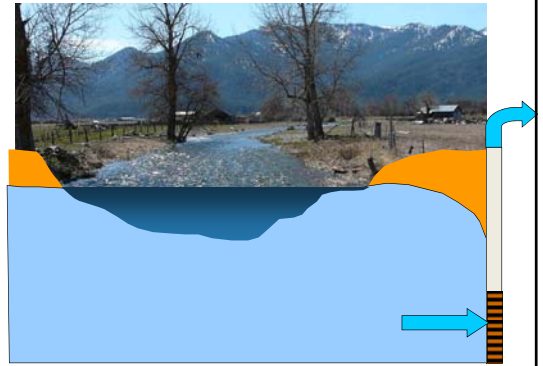
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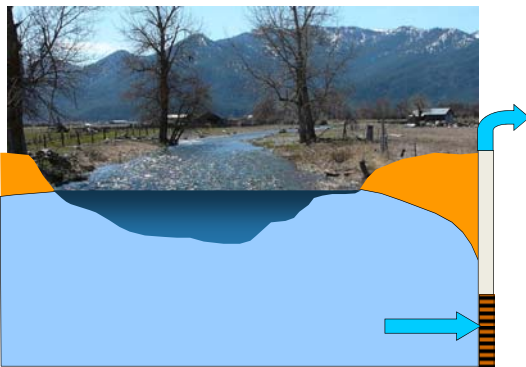
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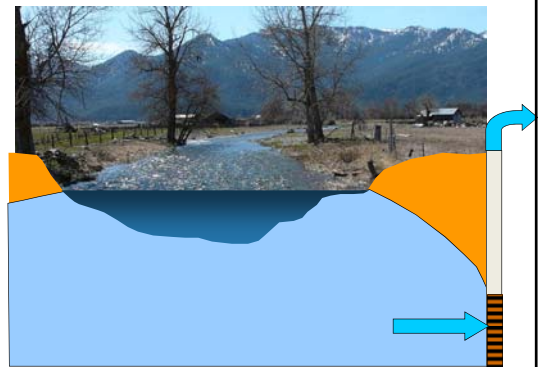
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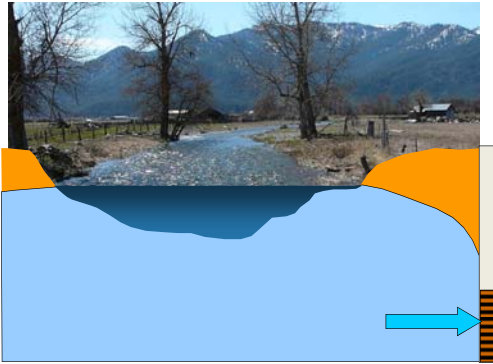
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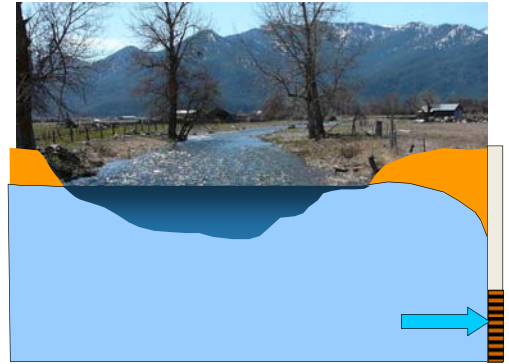
Well Near a Stream



Well Near a Stream



Well Near a Stream



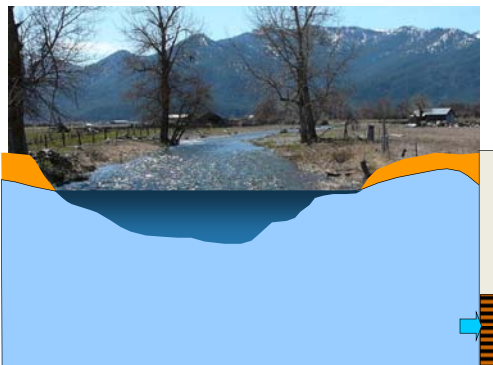
Well Near a Stream



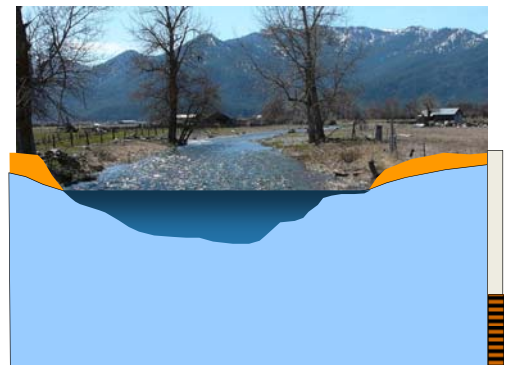
Well Near a Stream



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Groundwater Banking for Environmental Flows: Scott Valley, Siskiyou County



Groundwater Management Tools for Regional Organization

- Limiting Groundwater Use / Mandates:
 - Limit extraction
 - Mandate reductions in current pumping
 - Limit construction of new wells
 - Requiring water conservation measures
 - Fees to support management/infrastructure/communication efforts
- Infrastructure measures:
 - Water efficiency projects
 - Wastewater treatment and recycling
 - Importing water
 - Conjunctive use of surface water and groundwater
 - Groundwater banking
 - Monitoring networks, data collection, and data analysis/modeling
- Communication and networking measures
 - Facilitate stakeholder participation
 - Education
 - Data analysis and reporting
 - Secure funding (grants, project applications,...)

California Groundwater Rights: Background

- Correlative Rights Doctrine – safe yield of groundwater basin shared by overlying users
 - Katz v. Wilkins, 1908
- California constitutional mandate for beneficial use (1928)
- Special districts (20 different types, about 2,300 districts)
 - Water districts, irrigation districts, private water companies, reclamation districts, water conservation districts, water replenishment districts, water storage districts, etc.
- County police power – controls groundwater exports
 - Baldwin vs. Tehama County, 1994
- The Courts: basin adjudication / "physical solution" – controls extraction
 - Many Southern California (sub)basins, mid 20th century
 - City of Barstow vs. Mojave Water Agency, 2000:
 - Right of water users to negotiate physical "equitable, practical" solution, regardless of water rights
 - Individual water rights holders cannot be forced into a voluntary agreement
- State groundwater management:
 - Voluntary local groundwater management plans: AB 3030 (1992)
 - Financial incentives for local groundwater management: SB 1938 (2002)
 - Sustainable Groundwater Management Act of 2014: mandatory & expanded local control
- => If local/regional control fails: State Water Resources Control Board
- The Courts
 - Streamlined adjudication (legislation in 2015?)

So What Exactly Will Happen?

- First Step: forming a Groundwater Sustainability Agency (GSA)
 - By June 2017
- Second Step: developing a Groundwater Sustainability Plan (GSP)
 - Within 5 years of GSA formation
- Third Step: implementing Groundwater Sustainability Plan
 - achieve sustainable management no later than 2040

Online Resources

- <http://groundwater.ucdavis.edu/sgma>
- <http://groundwater.ucdavis.edu/calendar>
- <http://www.water.ca.gov/groundwater/casgem/> (California DWR groundwater level monitoring program)
- <http://www.water.ca.gov/waterconditions/drought/#> (California DWR drought information)
- http://www.waterboards.ca.gov/gama/geotracker_gama.shtml (California groundwater quality information)
- http://groundwater.ucdavis.edu/links_California/ (miscellaneous groundwater information sources)
- Contact Dr. Thomas Harter at ThHarter@ucdavis.edu