GROUNDWATER LAW AND HYDROLOGY

Presented to
Colusa County Groundwater Commission

by
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Downey Brand LLP

OVERVIEW

Groundwater Use in California

Groundwater Hydrology Concepts

- Basic Concepts
- Basins and Sub-Basins
- Safe Yield and Overdraft
- Well Interference

California Law of Groundwater Rights

- Types of Groundwater Rights
- Priority Rules
- Prescriptive Rights

Adjudications, Groundwater Management Alternatives, and CASGEM

Water Transfers Involving Groundwater

Groundwater Use in California

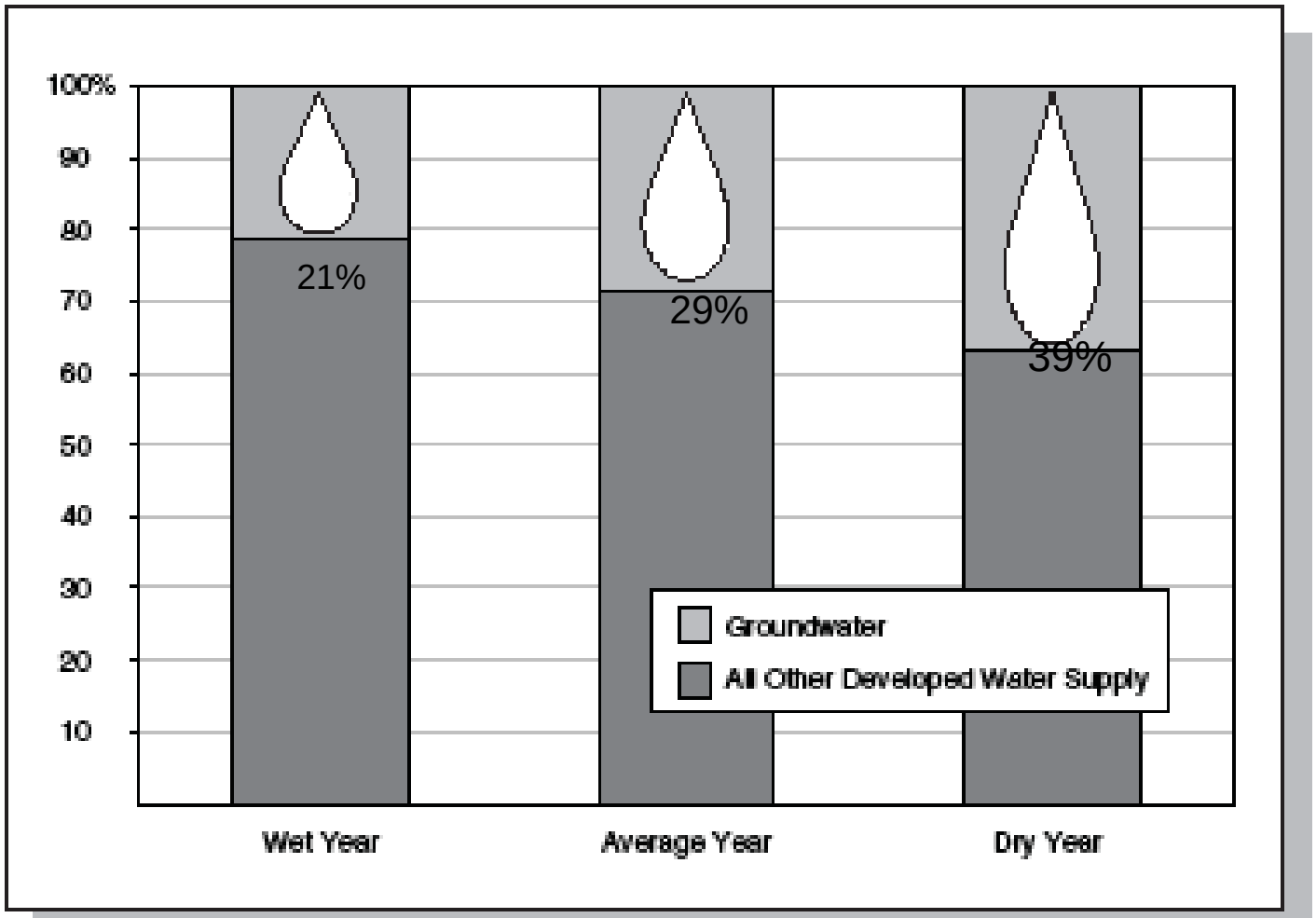
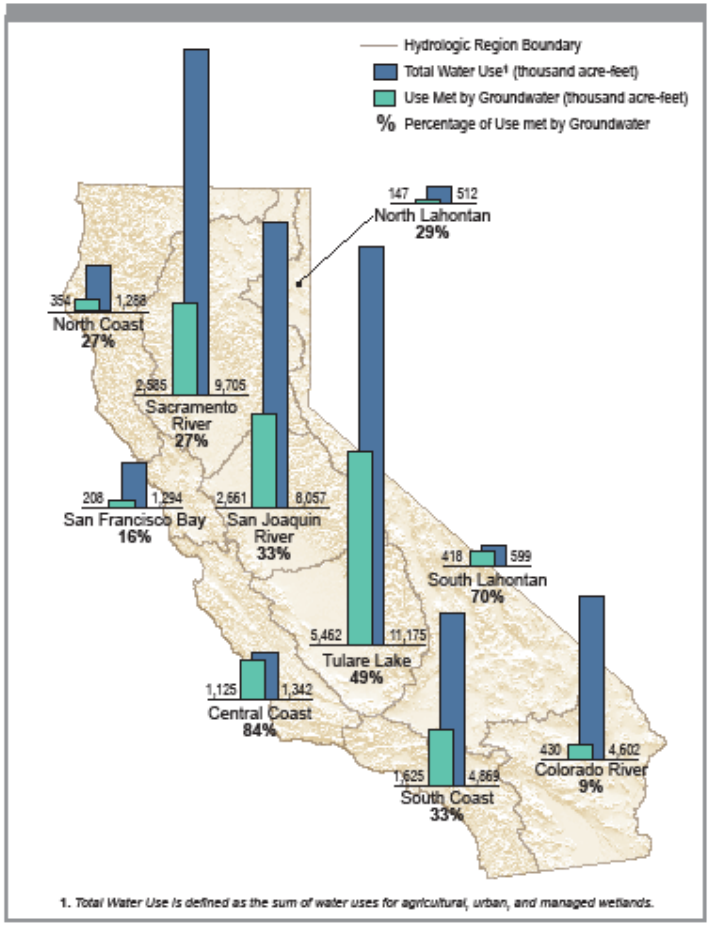
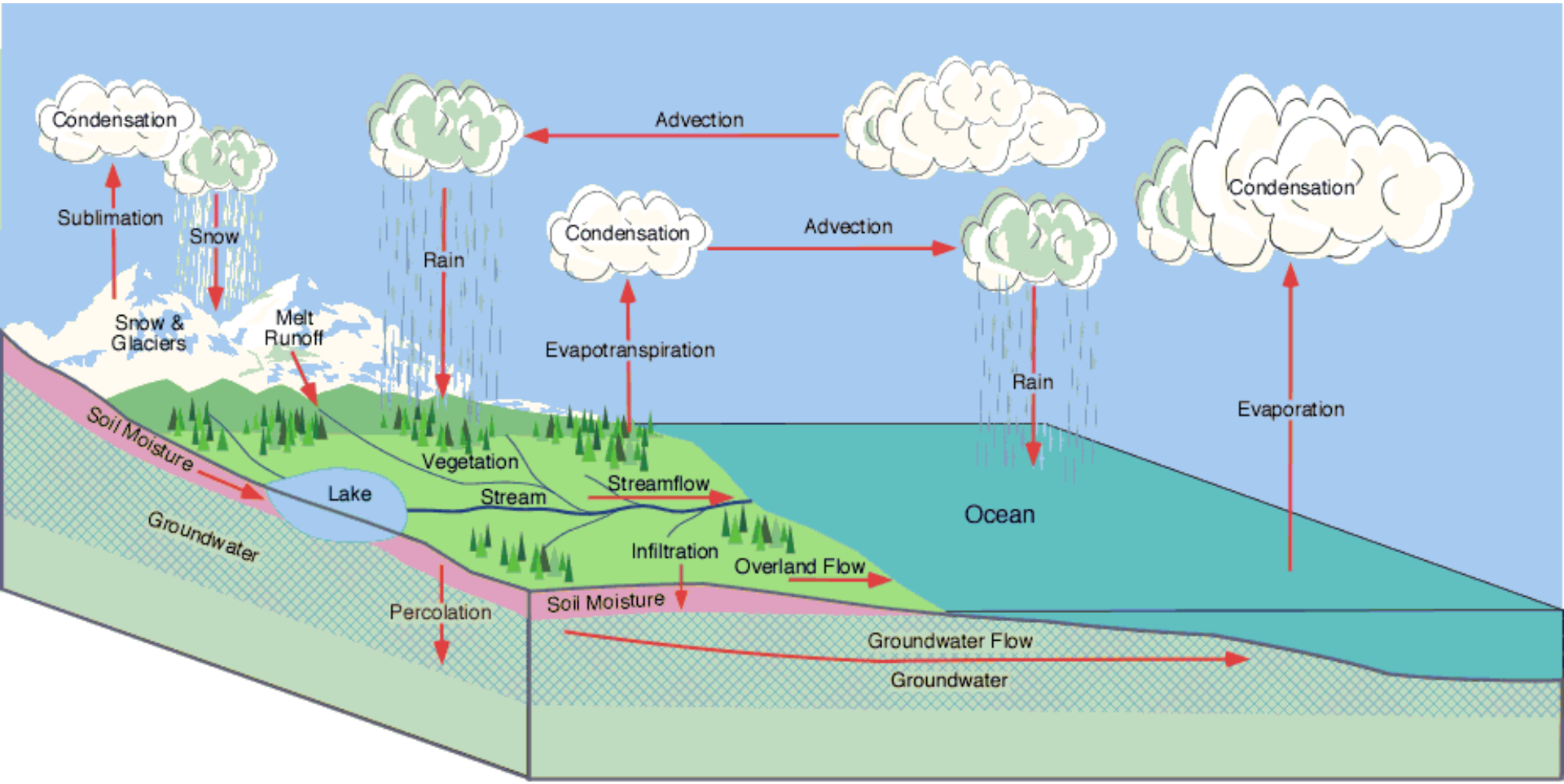


Figure 8-3 **Groundwater Contribution to California Water Supply by Hydrologic Region** (1998-2005 average annual data)



Groundwater Hydrology Concepts

Groundwater and the Hydrologic Cycle

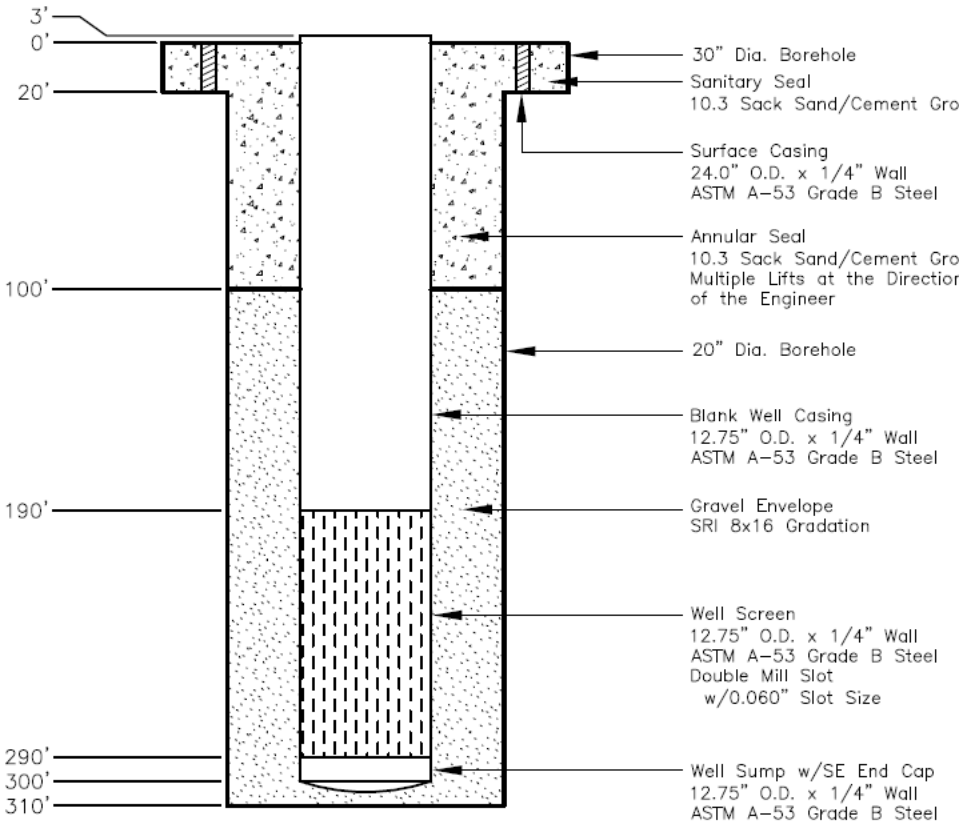


Groundwater Movement

- Flow through pores or fracture networks within the aquifer
- Hydraulic Gradients
  - Flow from high to low elevation in water table aquifer
  - Flow from high to low piezometric head in confined aquifer

Wells

Well Structure

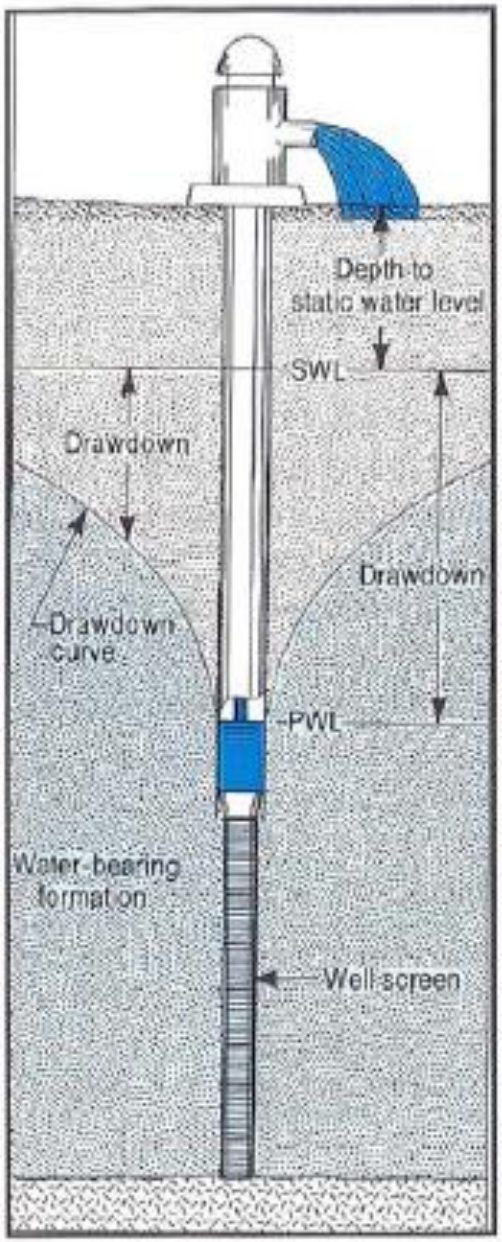


Well Intake

Coarse Gravel to Cobbles

Well Hydraulics

- Static Water Level (SWL):
  - Water level in idle well
- Pumping Water Level (PWL):
  - Water level during pumping
- Drawdown
  - s = PWL – SWL

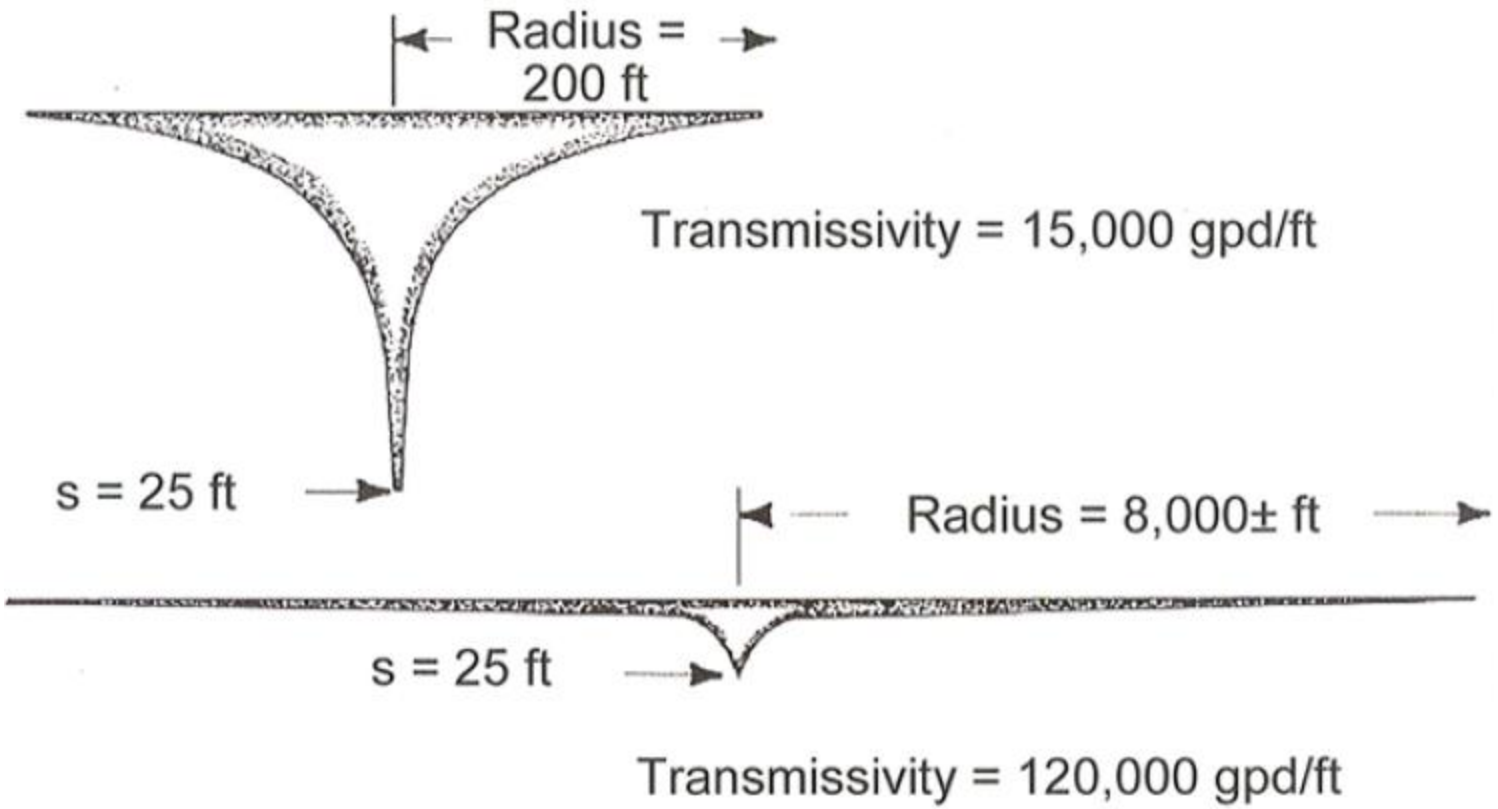


Groundwater and Wells, Johnson Division, 1986

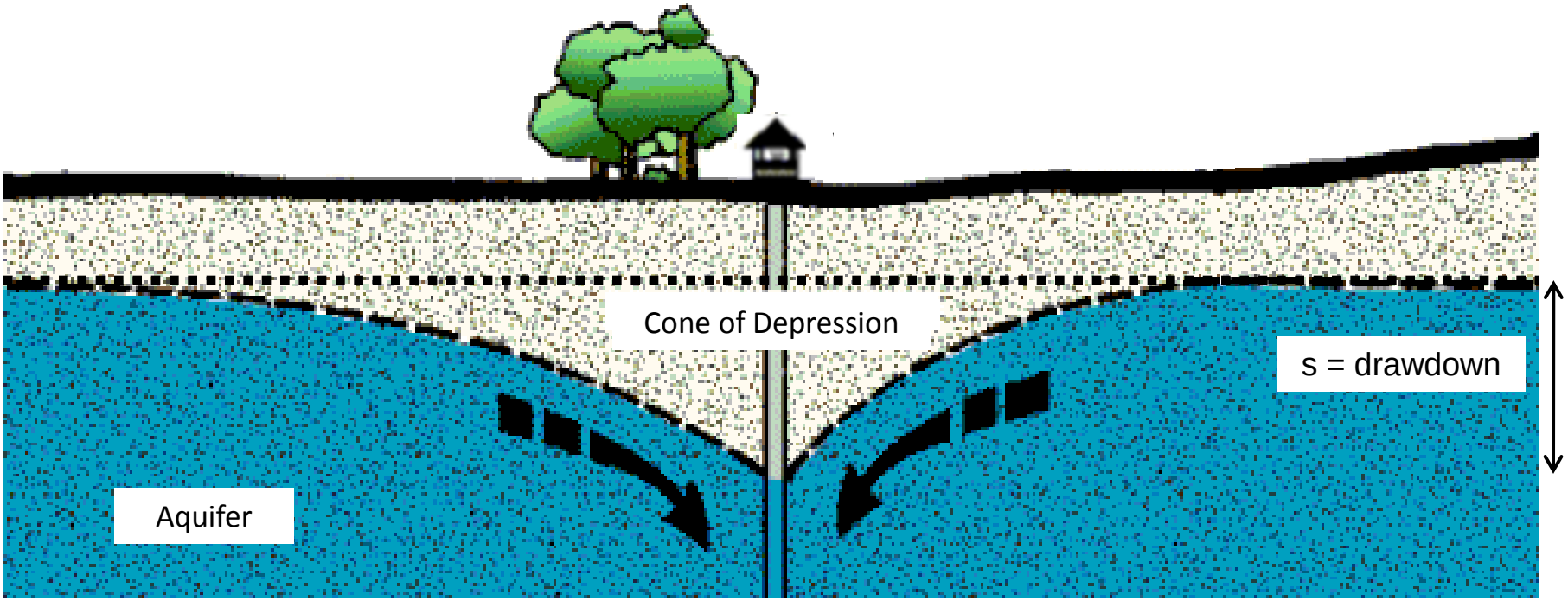
Aquifer Properties

- Transmissivity
  - Rate at which water is transmitted through a unit width of aquifer under a unit hydraulic gradient
- Storativity
  - Volume of water in storage that is released or taken per unit surface area due to a unit change in hydraulic head

Effects of Aquifer Characteristics on Magnitude and Extent of Pumping Influences

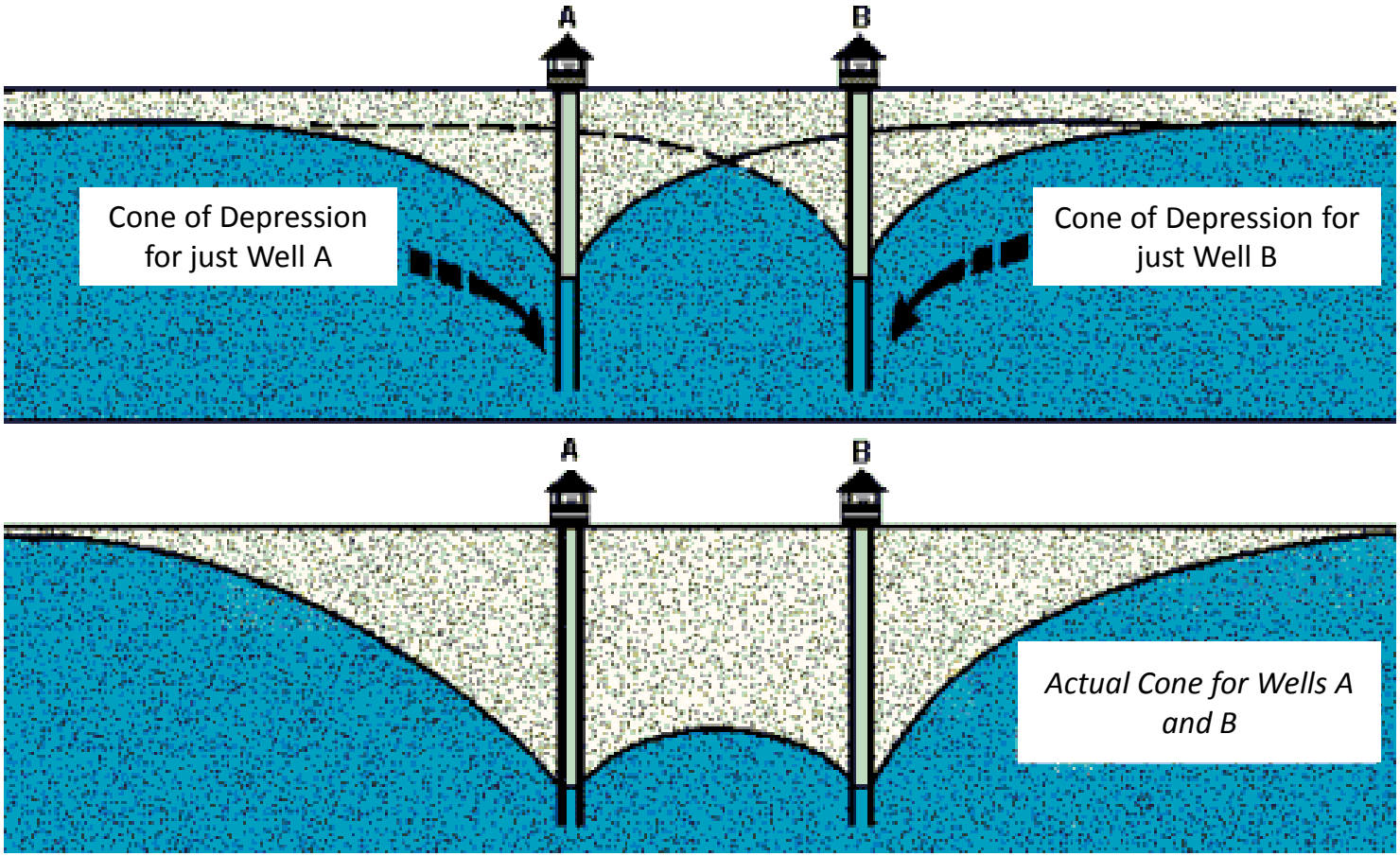


Cone of Depression



Adapted from Oregon State University (http://groundwater.oregonstate.edu/groundwater/)

Mutual Interference

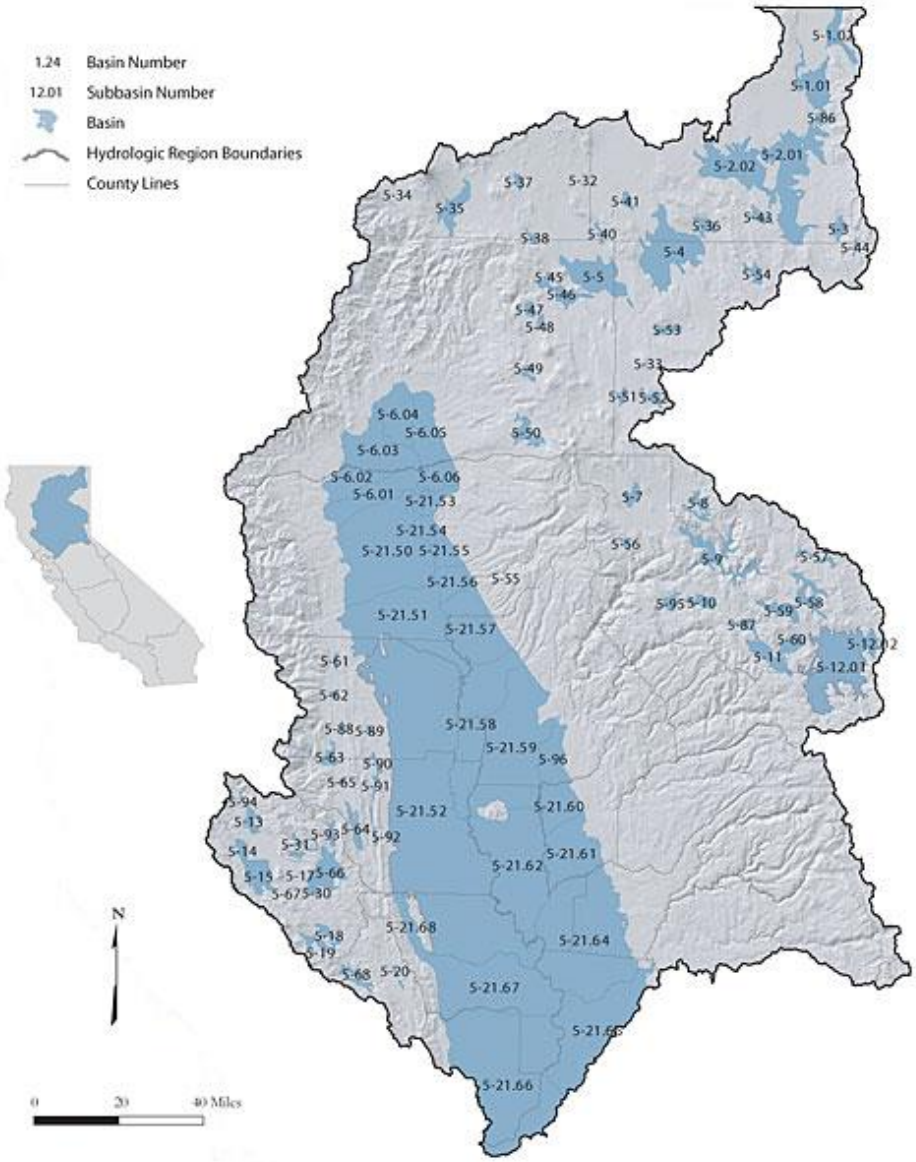


Groundwater Basins

What is a Groundwater Basin?

"A groundwater basin is defined as an alluvial aquifer or a stacked series of alluvial aquifers with reasonably well-defined boundaries in a lateral direction and a definable bottom." (DWR Bulletin 118, 2003)

Groundwater Basins in the Sacramento Hydrologic Region



Basin Yield

- Artificial development of groundwater by pumping (wells) to allow and/or induce recharge.
- Capture, or intercept, groundwater that otherwise “wastes” (rejected recharge).
- Changes in storage result in water level fluctuations

Groundwater Basin Yields

- Basin Yield usually expressed in acre-feet per year
- Basin Yield may be qualified as *safe, sustainable, perennial, overdrafted…*

Safe Yield and Undesirable Results

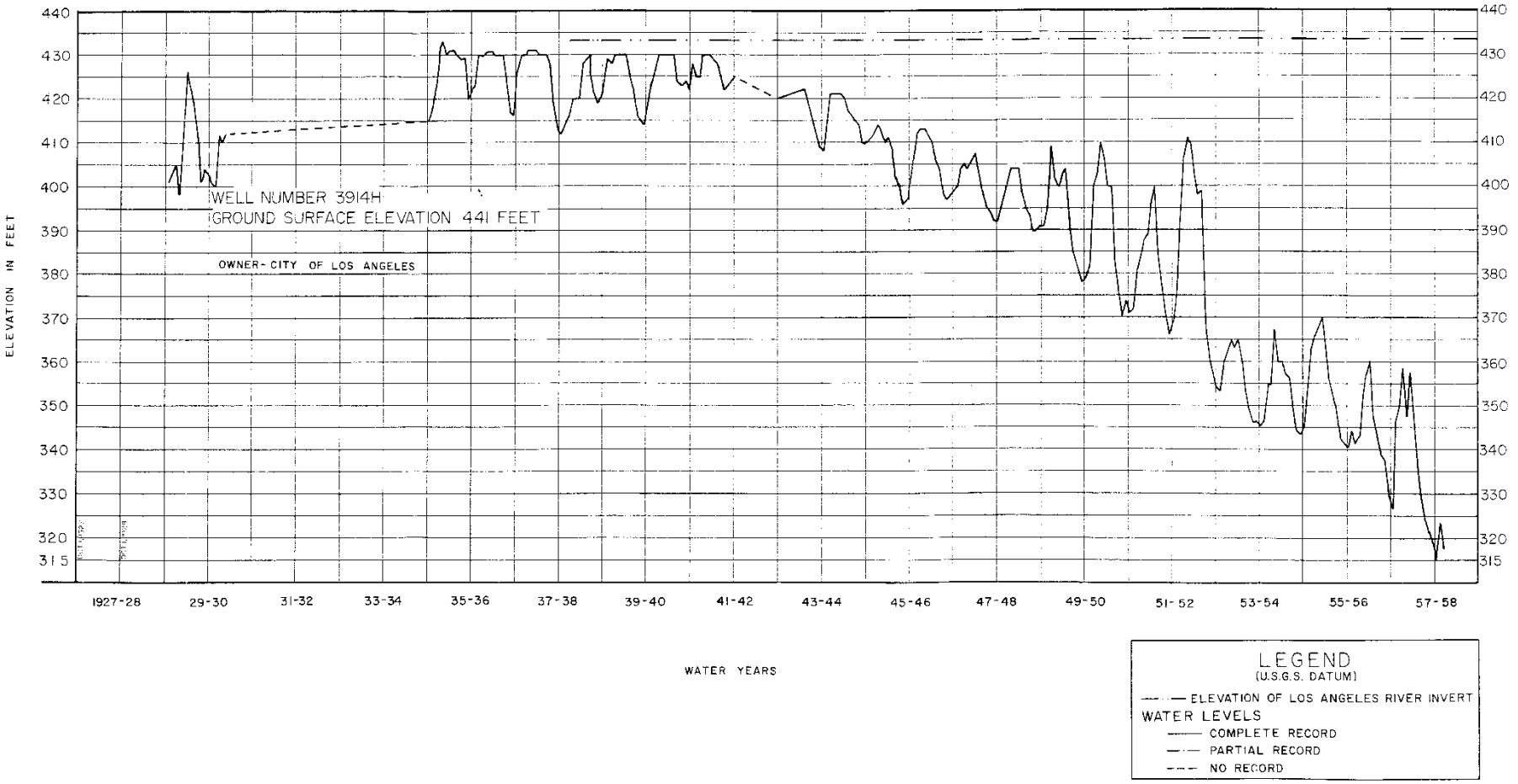
Safe yield is the maximum quantity of water which can be withdrawn annually from a groundwater supply under a given set of cultural and water management conditions without causing an **undesirable result**.

Undesirable result means a gradual lowering of the groundwater levels resulting eventually in depletion of the supply. "Undesirable result" may also mean depletion of groundwater storage, inducement of seawater intrusion or other degraded water quality, or land subsidence.

Overdraft

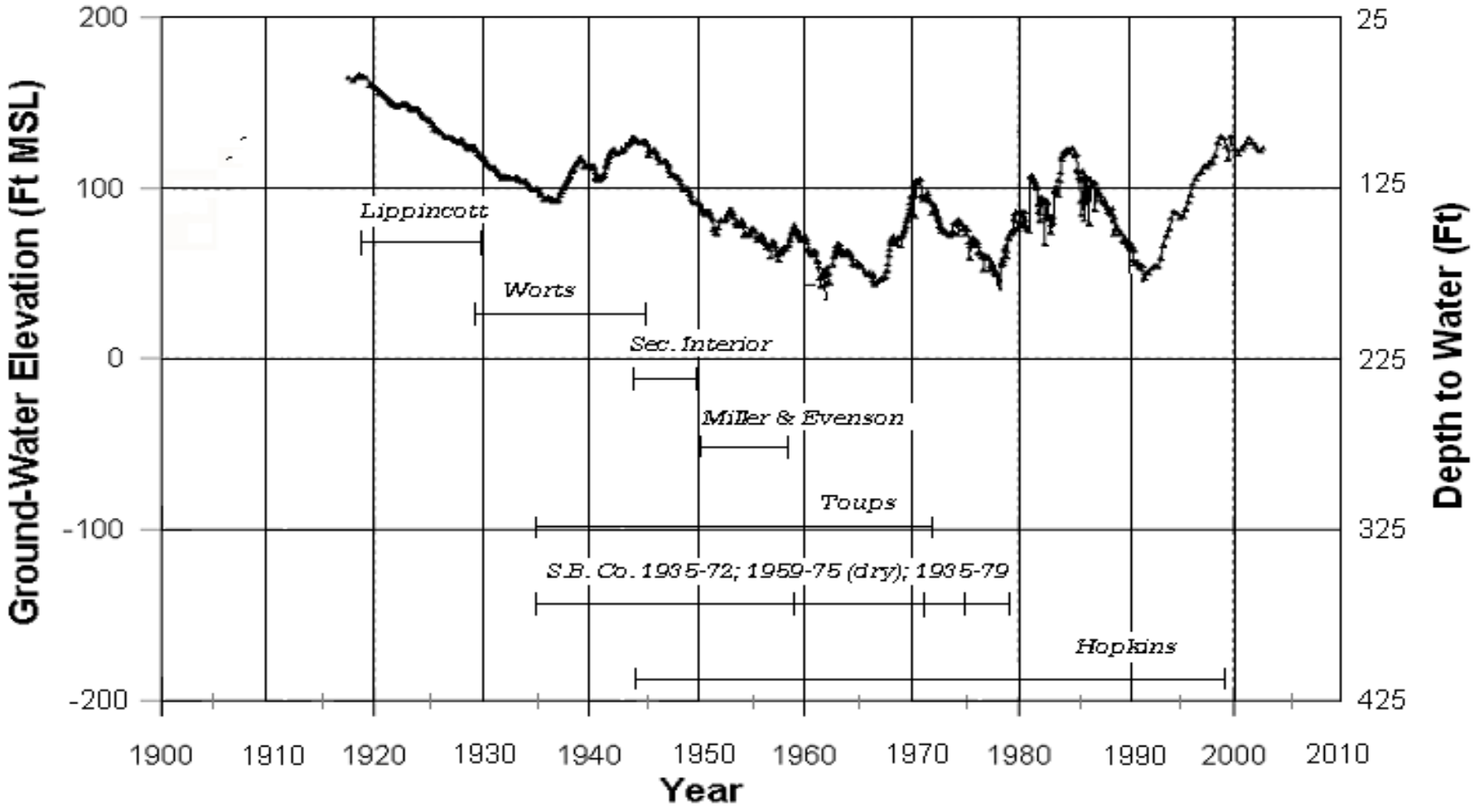
Overdraft is a condition caused by pumping in excess of safe yield plus any temporary surplus that produces undesirable result(s) such as chronic lowering of groundwater levels, inducement of seawater intrusion or other water quality degradation, land subsidence, etc.

Overdraft-Related Undesirable Result: Chronic Decline in Ground-Water Levels (San Fernando Valley)

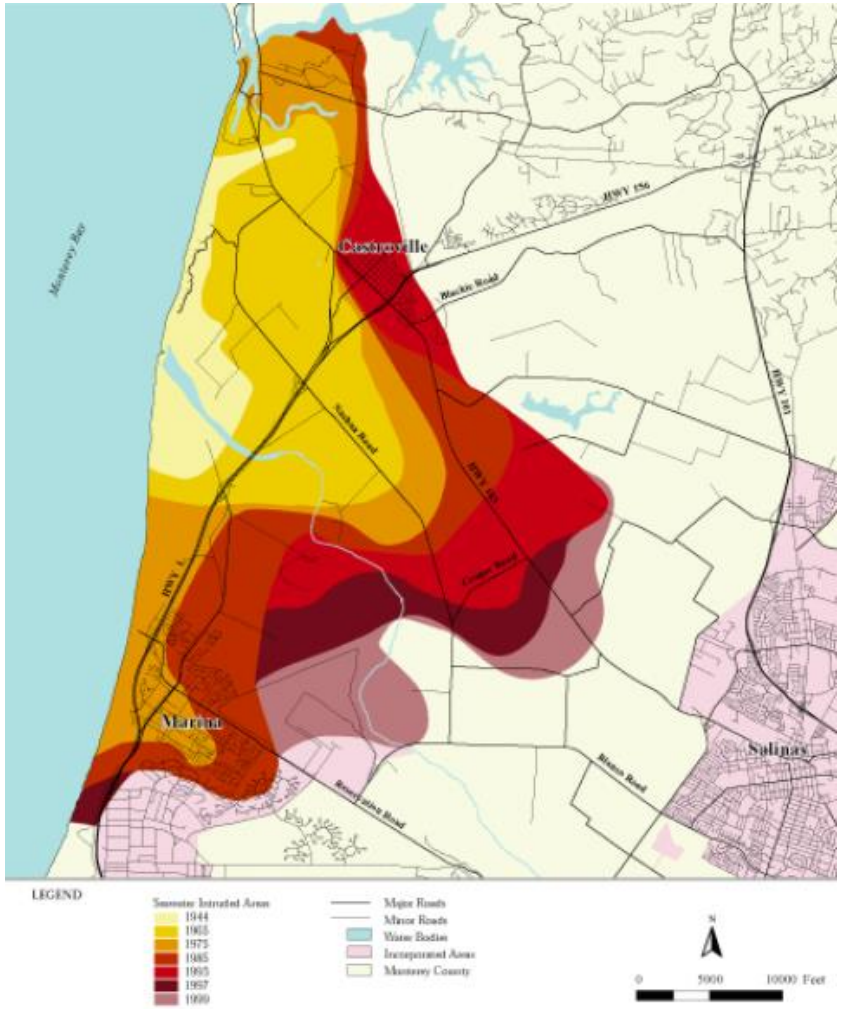


State Water Rights Board, 1962, Report of Referee, Los Angeles v. San Fernando et.al.

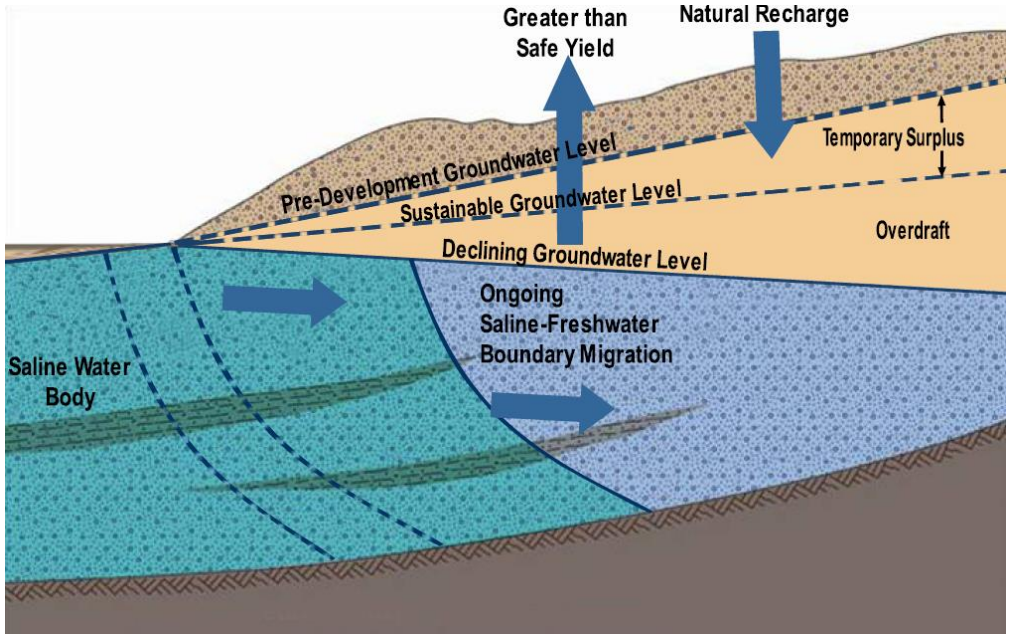
Historical Conditions in the Santa Maria Basin



Overdraft-Related Undesirable Result
Seawater Intrusion - Salinas Valley



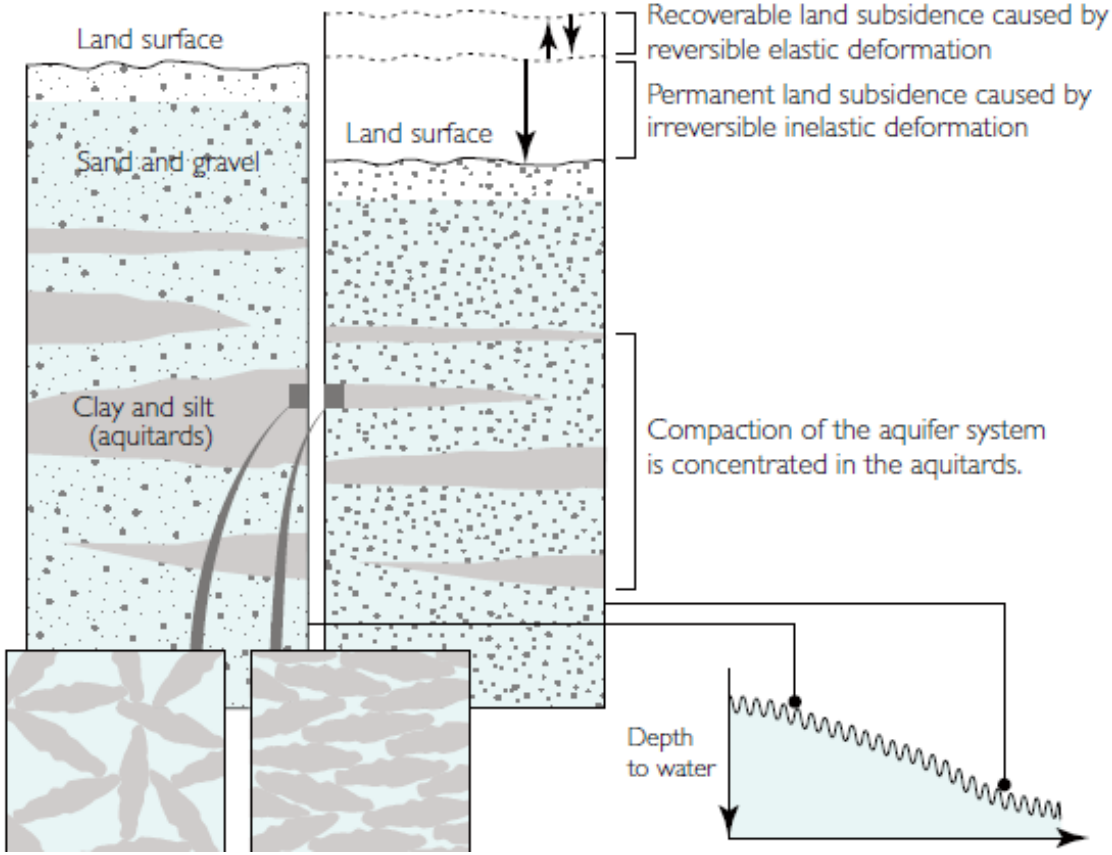
MCWRA, 2001, Salinas Valley Water Project Summary Report



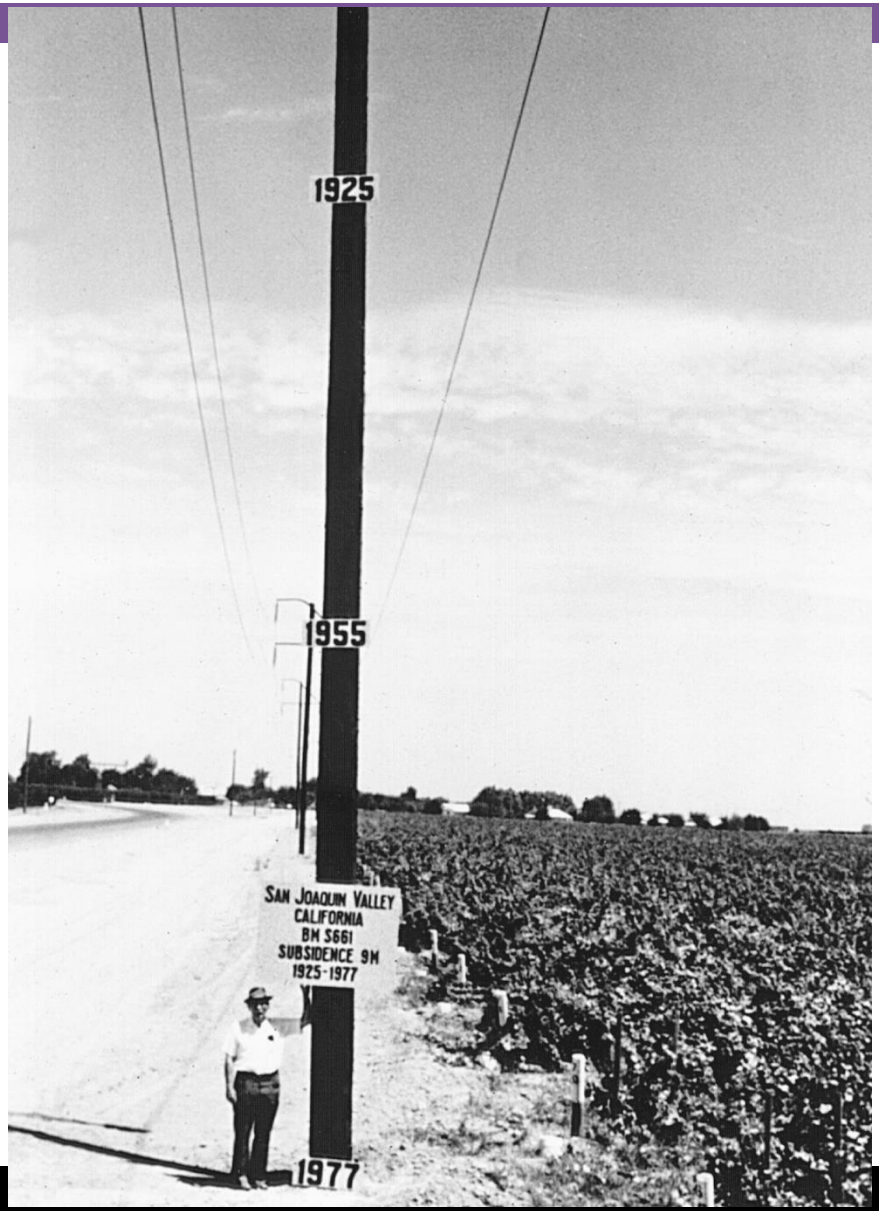
Subsidence as an Undesirable Result

"In alluvial aquifer systems, especially those that include semiconsolidated silt and clay layers aquitards) of sufficient aggregate thickness, long-term ground-water-level declines can result in a vast one-time release of "water of compaction" from compacting aquitards, which manifests itself as land subsidence."

US Geological Survey, Land Subsidence in the United States 1999



Overdraft-Related Undesirable Effect: Land Subsidence (Mendota Area, San Joaquin Valley)



Source: Water Education Foundation Layperson's Guide to Groundwater (2003)

Important Concepts

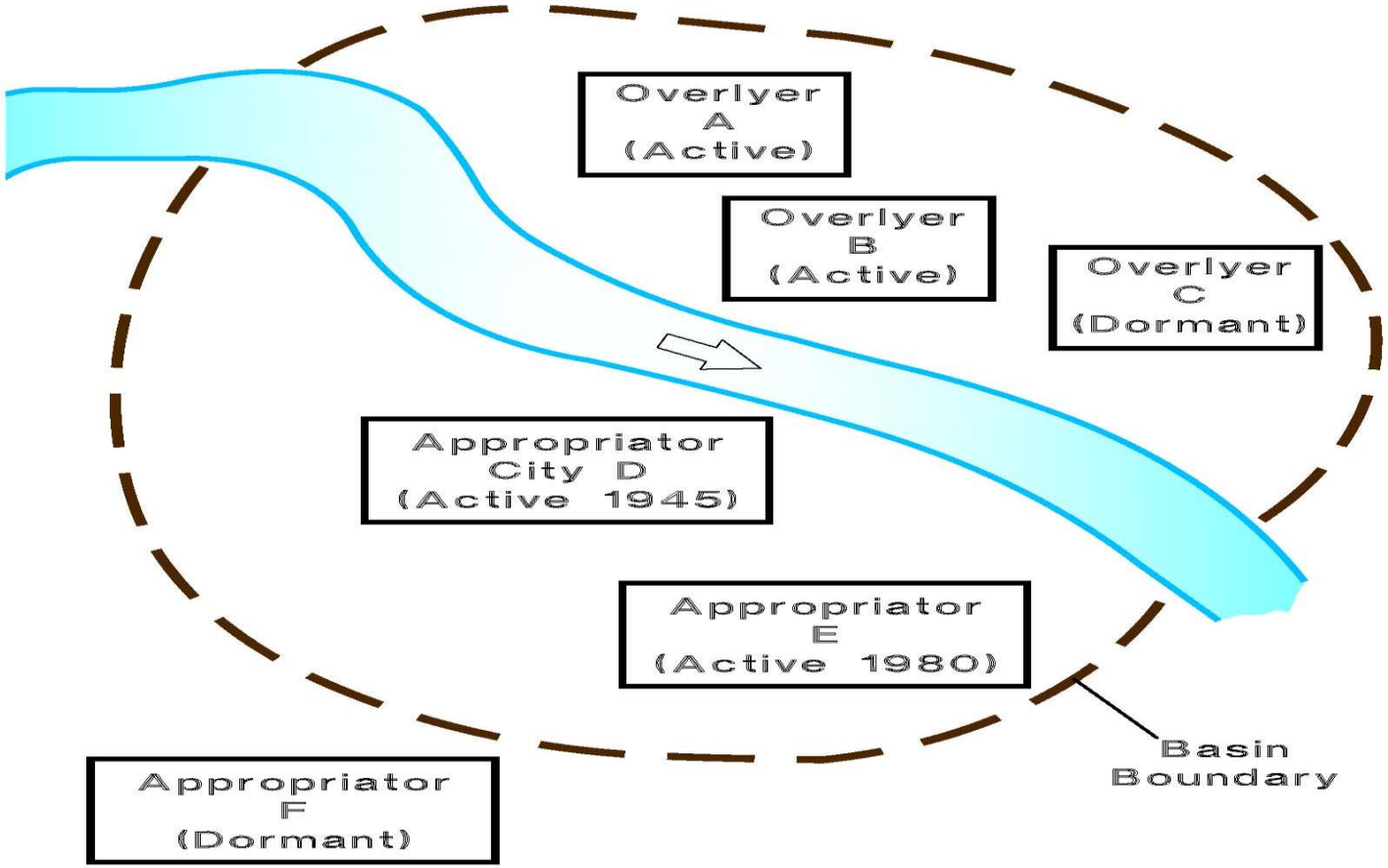
- Lowering of groundwater levels to “activate” a basin is **not** overdraft
- Cyclic fluctuations in groundwater levels are **not** overdraft
- Groundwater basin yield can be increased by management

California Law of Groundwater Rights

Types of Groundwater Rights

- Overlying
- Appropriative
- Pueblo
- Prescriptive

Groundwater Rights



Priority Rules

- Overlying vs. Overlying
- Overlying vs. Appropriative
- Appropriative vs. Appropriative
- Prescriptive

An Important Rule

Public use of groundwater is generally not deemed an overlying use. Use of groundwater by cities, counties, special districts and CPUC-regulated utilities is generally deemed an appropriative use. Exceptions in cases of public use of groundwater on publicly-owned lands such as city parks.

Dormant Overlying Rights

"Although we do not address the question here, *Wright* does suggest that, in theory at least, a trial court could apply the *Long Valley* riparian right principles to reduce a landowner's future overlying water right use below a current but unreasonable or wasteful usage, as long as the trial court provided the owners with the same notice and due process protections afforded the riparian owners under the Water Code."

(*Mojave*, 23 Cal.4th at 1249, fn. 13)

PRESCRIPTIVE RIGHTS AND SELF-HELP

Prescriptive Rights

- A permanent right to use water when the elements of adverse possession are met.
- Measured by the extent and manner of use at the time the right accrued and entitles the prescriptive user to use the water for a specific purpose and in a specific quantity
- May be lost by non-use.

Question

City X pumps water from a basin that has been in overdraft for several decades. Phil holds overlying rights in the basin. City X's pumping continues for more than five years. Phil fails to pump any water during the five-year period. Smith now claims an exclusive prescriptive right to the water from the basin by open, notorious and continuous adverse use. What water rights do City X and Phil possess?

Answer

- Because Phil failed to pump at all during the five-year period, City X holds a prescriptive right for the full amount of water pumped. (See *City of Pasadena v. City of Alhambra* (1949) 33 Cal.3d 908, 932.)

Self-Help

In the context of water rights, “self-help” describes the process whereby the original owners of water rights retain a right to continue to take water in the future by pumping during the prescriptive period.

Question

City X pumps water from an overdrafted groundwater basin above which Phil owns an overlying property, e.g., Phil holds overlying rights in the water from the basin, for a period of 5 years. Phil continued to pump water during the prescriptive period. City X now claims an exclusive prescriptive right to the water from the basin by open, notorious and continuous adverse use. What water rights do City X and Phil possess?

Answer:

City X acquires a prescriptive right to continue to take water, but its rights are limited to the extent that Phil retained or acquired rights by his pumping. (*City of Pasadena v. City of Alhambra* (1949) 33 Cal.2d 908, 932.)

Adjudications, Groundwater Management Alternatives, and CASGEM

Management by Adjudication

- An adjudication is a civil action in which all who claim a right to basin water are joined as parties. Principal purpose is to determine and quantify rights to the basin water supply ("safe yield").
- Adjudications result in a judgment listing all rights to basin water.
- Cases are often resolved through stipulated judgments.
- The court often appoints a Watermaster to administer the judgment.

Number of Adjudicated Basins

- There are approximately 20 adjudicated basins in California (19 in Superior Court, 1 in federal court).

- 16 resulted in court judgments which limit the amount of groundwater that can be extracted.

Common Issues in Adjudications

- What are the boundaries of the basin?
- Are there sub-basins that should be separately adjudicated?
- What is the safe yield of the basin?
- Is or has the basin been in overdraft?

Common Elements of Judgments

- Definition and quantification of rights to basin water (may include pumping restrictions)
- Allocation of cost of physical solution (where applicable)
- Appointment of Watermaster to administer the judgment (E.g., http://www.seasidebasinwatermaster.org/)
- Continuing jurisdiction by the court

Advantages of Adjudications

- Certainty as to nature and extent of water rights.
- Court oversight and enforcement.
- Certain cost allocation mechanisms may be outside Prop. 218.

Disadvantages of Adjudications

- Length and expense of adjudication process. Money could be used instead to build infrastructure.
- Expense of ongoing administration of judgment.
- Loss of local control over groundwater management.

Groundwater Management Alternatives

Groundwater Management Defined

Groundwater management can be considered to be a set of integrated actions related to groundwater pumping and groundwater recharge (natural, artificial, and incidental to the uses of water) to achieve long-term sustainability of the resource.

Three Methods of Groundwater Management

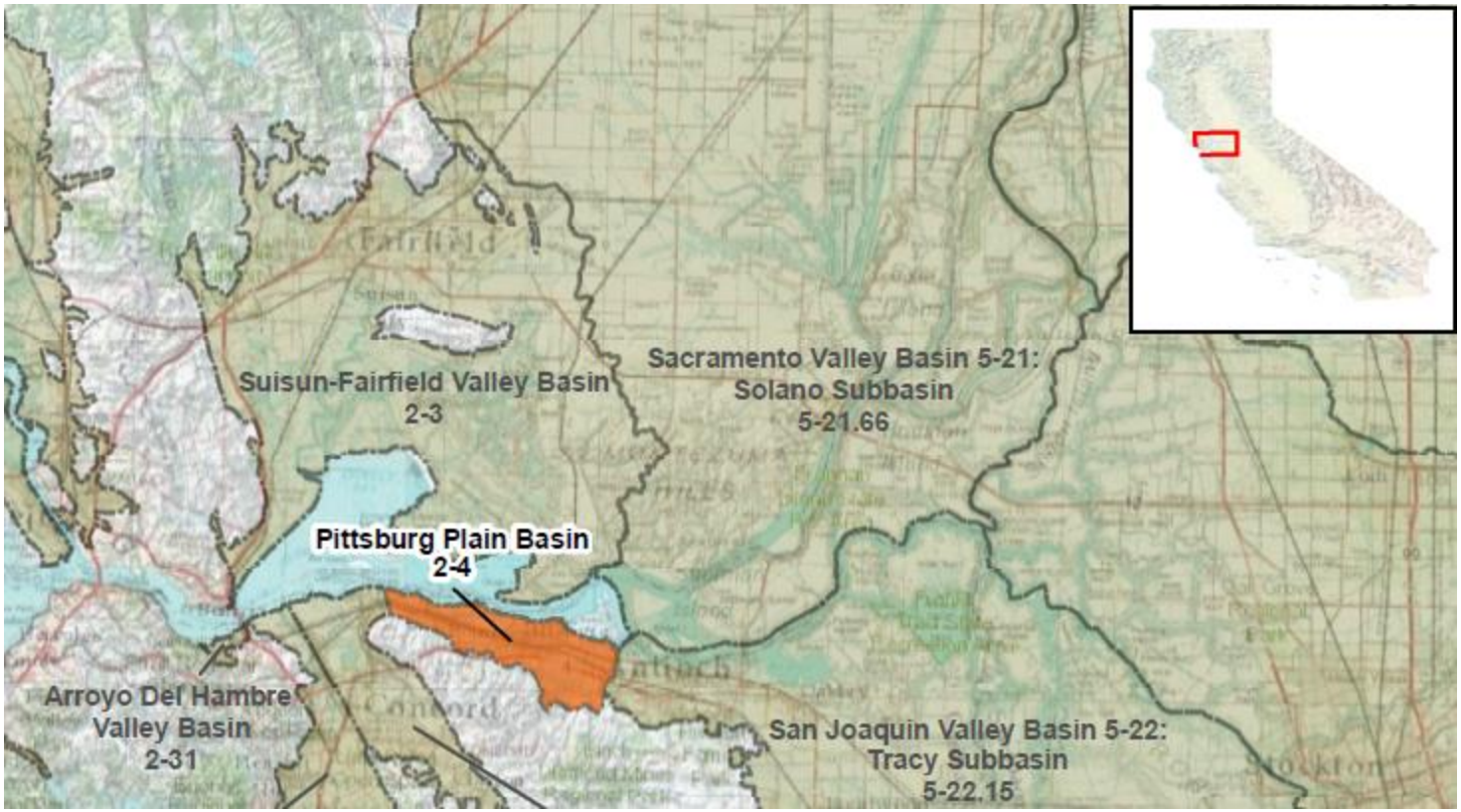
1. Adjudication
2. Authority granted to local agencies
3. Local groundwater ordinances

Authority Granted to Local Agencies: AB 3030

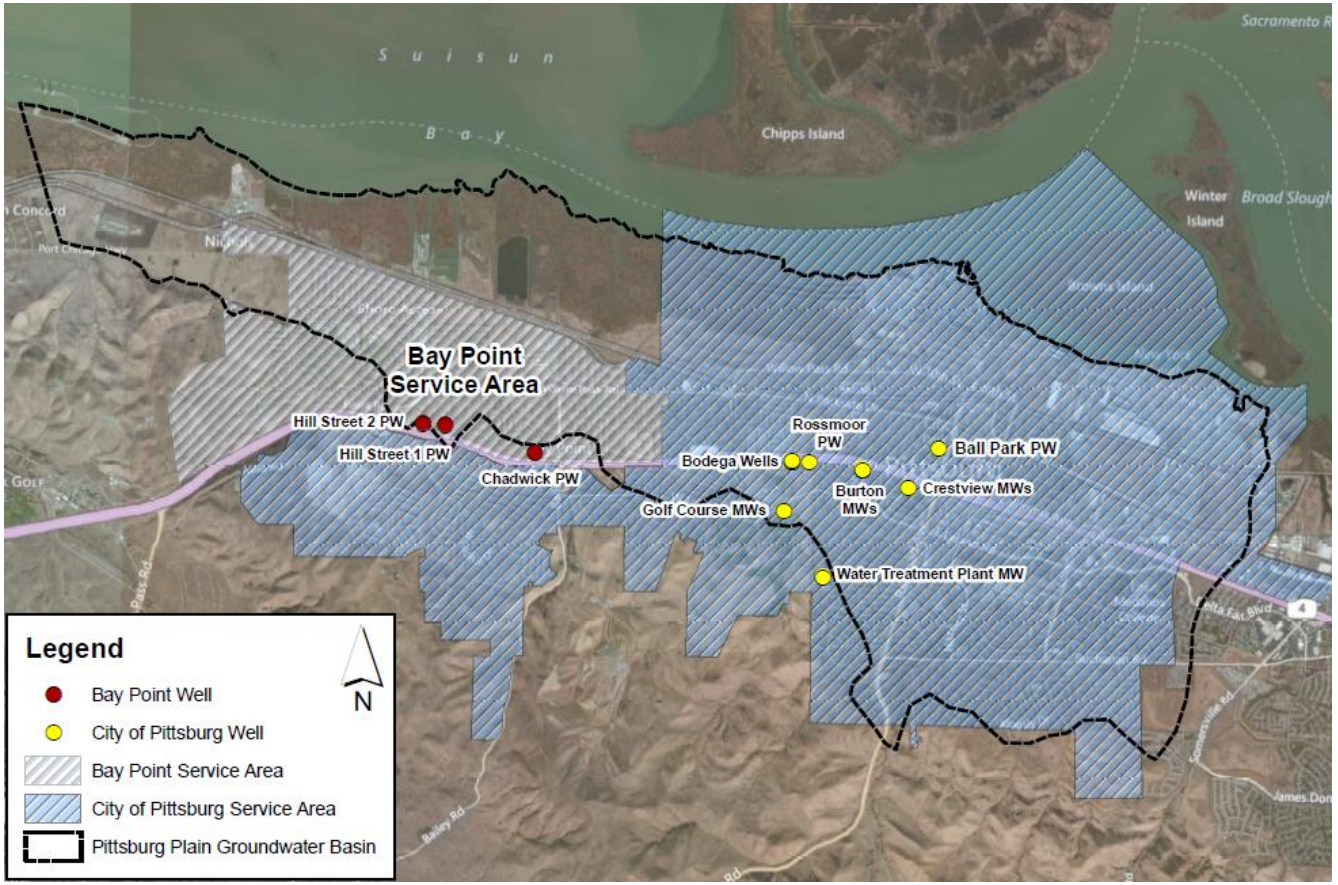
Water Code Section 10753 et seq.
AB 3030 Groundwater Management Plans

1. AB 3030 Groundwater Management Act (1992) provides a procedure for existing local agencies to develop a groundwater management plan.
2. SB 1938 (2002) requires public agencies seeking state funds for construction of groundwater projects or groundwater quality projects through DWR to implement a groundwater management plan with specified components.

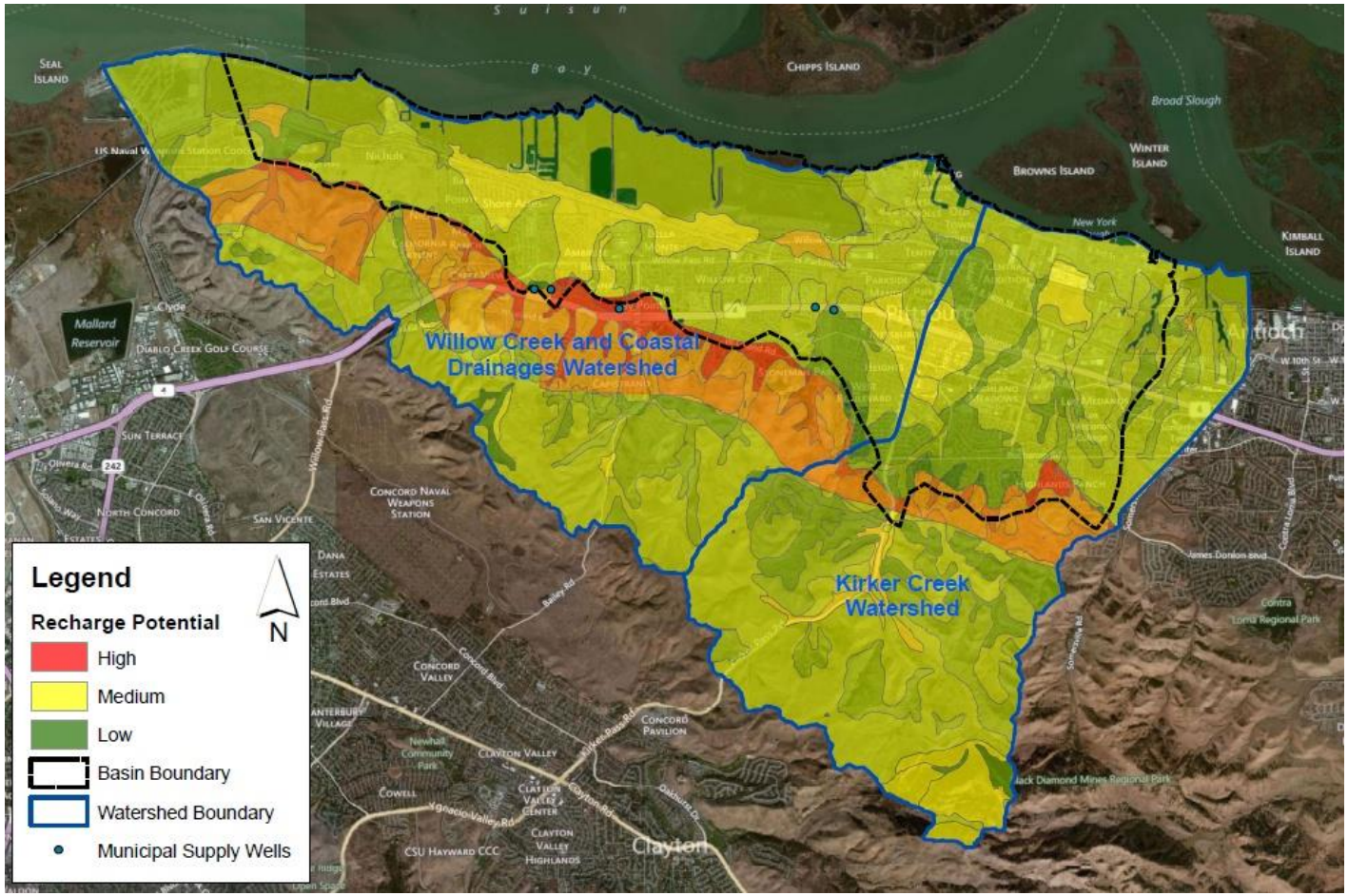
Key Concepts: Map Basin according to DWR Bulletin 118



Key Concepts: Basin Area as a Priority over Service Area



Key Concepts: Identify (Map) Recharge Areas



AB 3030: Recommended Components of Plan

- Control of saline water intrusion
- Wellhead and recharge area protection
- Regulation of contamination migration
- Well abandonment and destruction program
- Mitigation of overdraft
- Groundwater recharge (recharge area map req'd under AB 359)
- Monitoring of groundwater levels and storage
- Facilitating conjunctive use operations
- Well construction policies
- Contamination cleanup, recharge, and extraction projects
- Relationships with state and federal agencies
- Land use plans to assess risk of groundwater contamination

Implementation of Groundwater Management Plans

- Statement describing how interested parties may participate
- Local agency may appoint technical advisory committee
  - AB 134 specifies formation and makeup of Advisory Council
- Contingency for DWR-administrated funding for groundwater projects:
  - prepare groundwater plan, or basin-wide plan, or other integrated regional water management plan
  - include management components re water levels, water quality, subsidence and surface flows
  - provisions to work with other entities in basin
  - mapping in accordance with Bulletin 118
  - monitoring protocols re water levels, water quality, land subsidence, and surface flows

Management Plan Content

Introduction

Management Objectives (Goals) for the Basin

Groundwater Basin Conditions

Historical and Projected Water Requirements and Supplies

Elements of the Groundwater Management Plan

Primary Plan Elements

Monitoring of Groundwater Levels and Quality

Monitoring of Surface Water Flows and Quality

Determination of Basin Yield and Avoidance of Overdraft

Regular and Dry Year/ Emergency Yield

Continuation of Conjunctive Use Operations

Long-Term Salinity Management

Integration of Recycled Water

Control and Cleanup of Groundwater Contamination

Local, State and Federal Agency Relationships

Groundwater Management Reports

CALIFORNIA STATEWIDE GROUNDWATER MONITORING REQUIREMENTS (CASGEM)

CASGEM

- In accordance with the passage of SBx7-6, DWR developed the California Statewide Groundwater Elevation Monitoring (CASGEM) program.
- The intent of the CASGEM program is to establish a permanent, locally-managed program of regular and systematic monitoring of California's 515 groundwater basins and subbasins DWR's Bulletin 118.

CASGEM – Monitoring Entities

Definition:

A local agency that voluntarily takes responsibility for monitoring groundwater levels and data reporting for a groundwater basin

- Parties seeking to assume groundwater elevation monitoring responsibilities were required to notify DWR on or before January 1, 2011. (Wat. Code, § 10928.)
- Parties accepted by DWR and deemed Monitoring Entities must begin reporting seasonal groundwater elevation measurements by January 1, 2012. (Wat. Code, § 10932.)

Water Transfers Involving Groundwater

Water Transfers

- Water transfers are an increasingly important element of water resource management, especially in drought years.

- Water transfers can occur through several mechanisms including (1) temporary fallowing, (2) releases of water from reservoirs, and (3) “groundwater substitution” whereby groundwater is pumped and substituted for surface water and the surface water is transferred.

The “No Injury” Rule

“Before permission to make such a change [in place or purpose of use, or point of diversion] is granted the petitioner shall establish, to the satisfaction of the board, and it shall find, that the change will not operate to the injury of any legal user of the water involved.” Cal. Water Code § 1707

Potential “Injury”

Well Impacts

- “interference”

Surface Water/Ground Water Interaction

- stream depletion

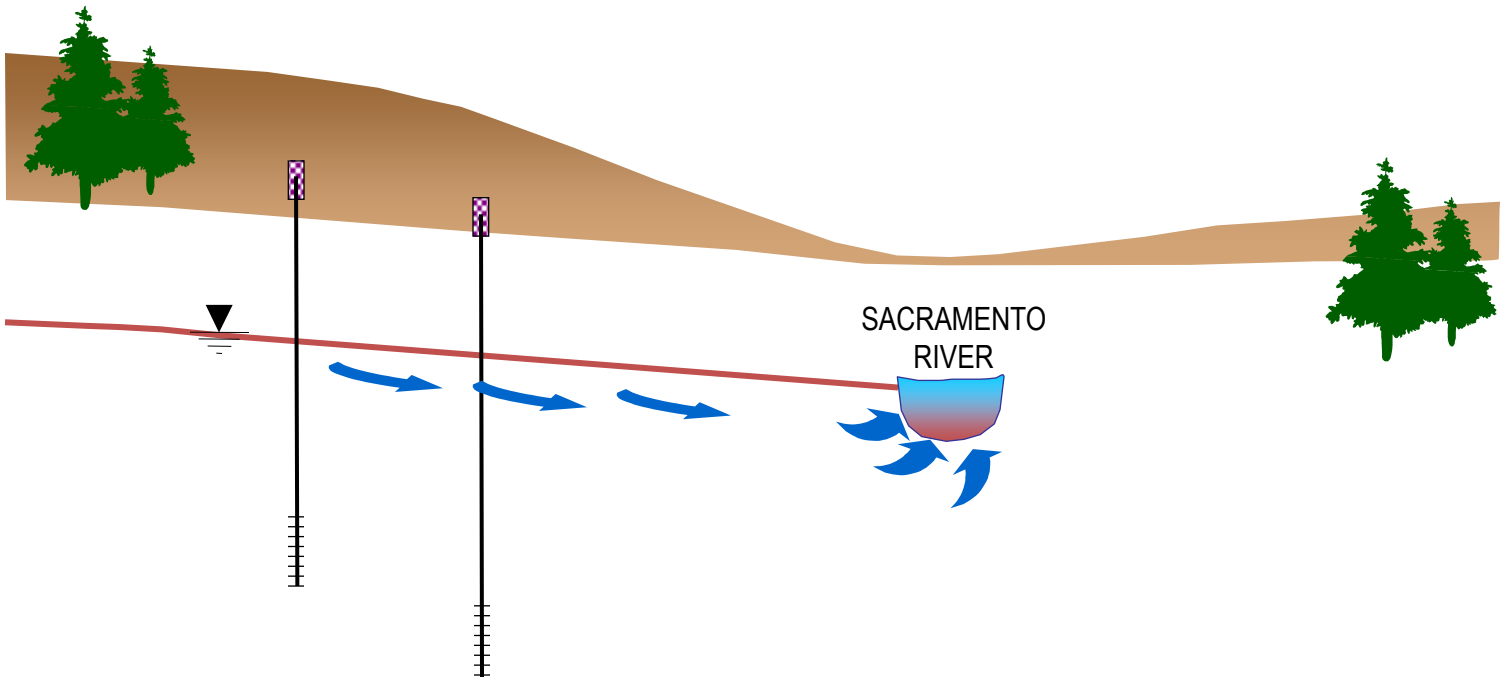
Habitat

- shallow groundwater levels

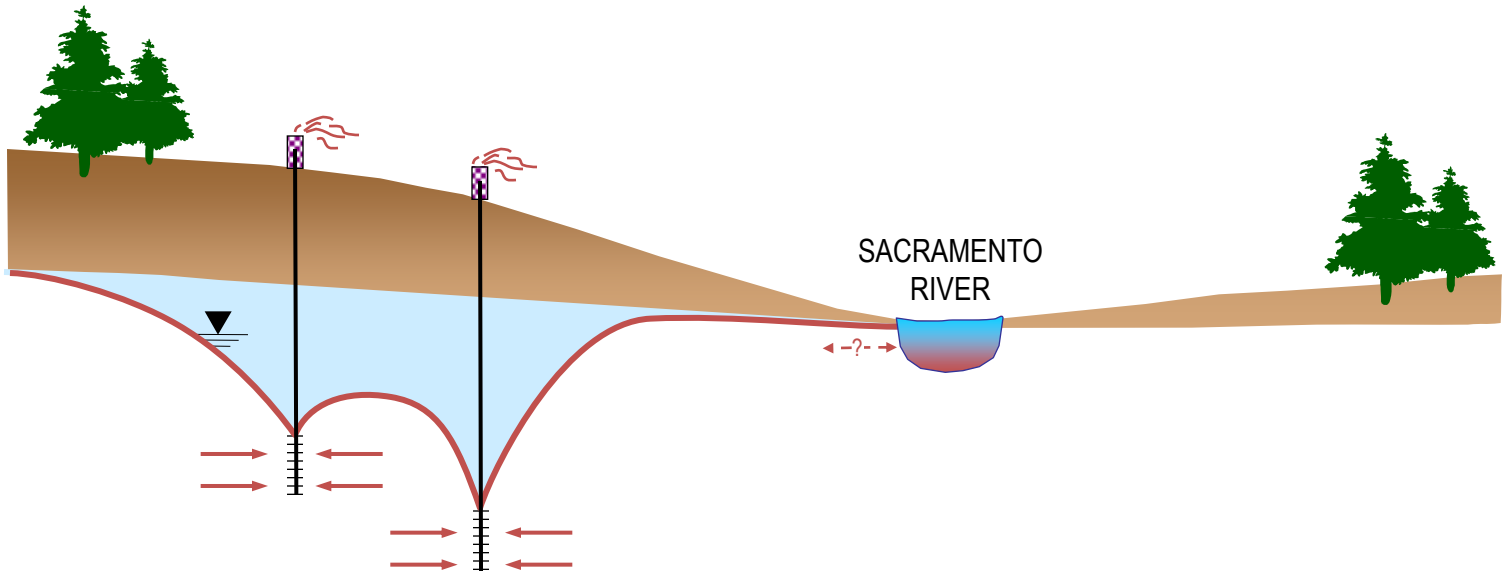
Groundwater Basin

- recharge
- subsidence

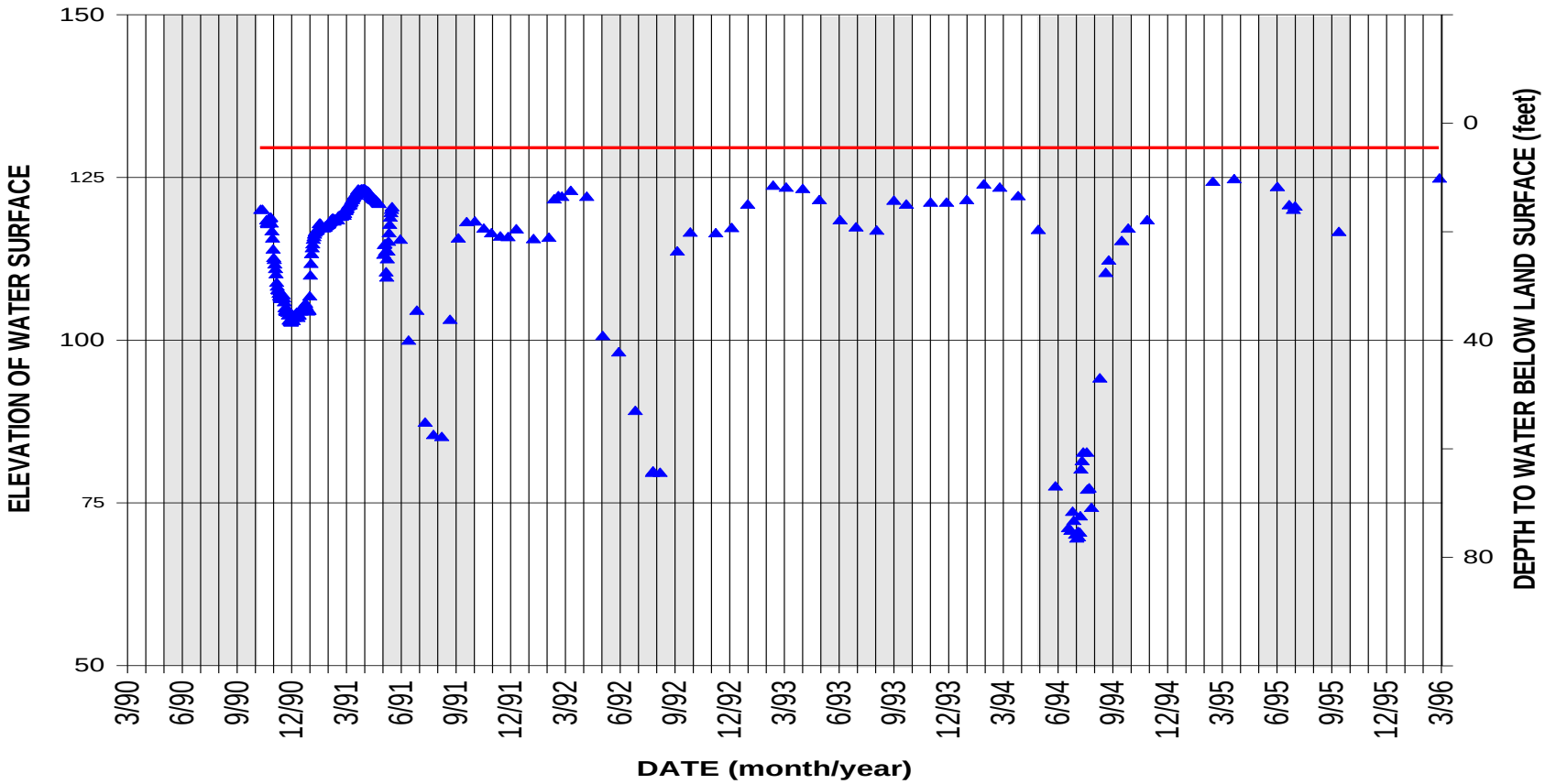
Prior to Irrigation Season



Projects in Operation



Example of Aquifer Refill: (Butte Basin)



County Regulation of Water Transfers

- *Baldwin v. County of Tehama*
- Nature and extent of County police power authority
- Unresolved issues
- Practical and political considerations