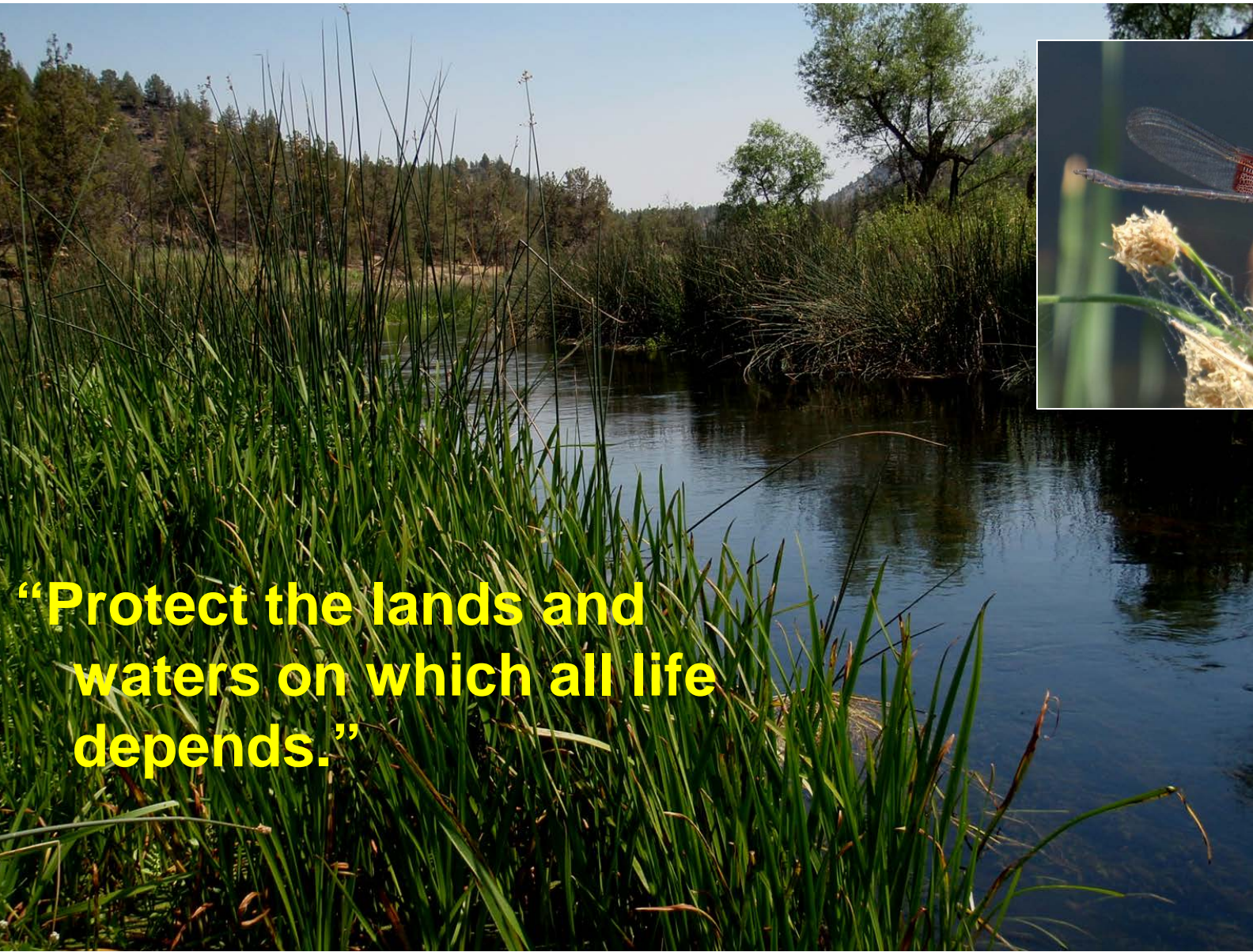




# Groundwater Management – It's not just about Overdraft



# The Nature Conservancy: Our Mission



**“Protect the lands and  
waters on which all life  
depends.”**



# The Reality of Conservation in California

- Many of Our Conservation Targets Need Water
- In California:
  - People Need Water
  - Agriculture Needs Water
  - Water is Highly Managed



## Guiding Concept for our Water Work

Water Supply for Nature is Most Dependable if  
Needs of our Communities, Cities and Farms are  
Stable and Reliable





# The Nature Conservancy Approach



Solutions for Nature  
Must work for  
People



# Why Do We Care About Groundwater?

- Groundwater Affects Fish and Wildlife
- Groundwater Conditions Affect:
  - Streams and Rivers
  - Riparian Areas
  - Wetlands

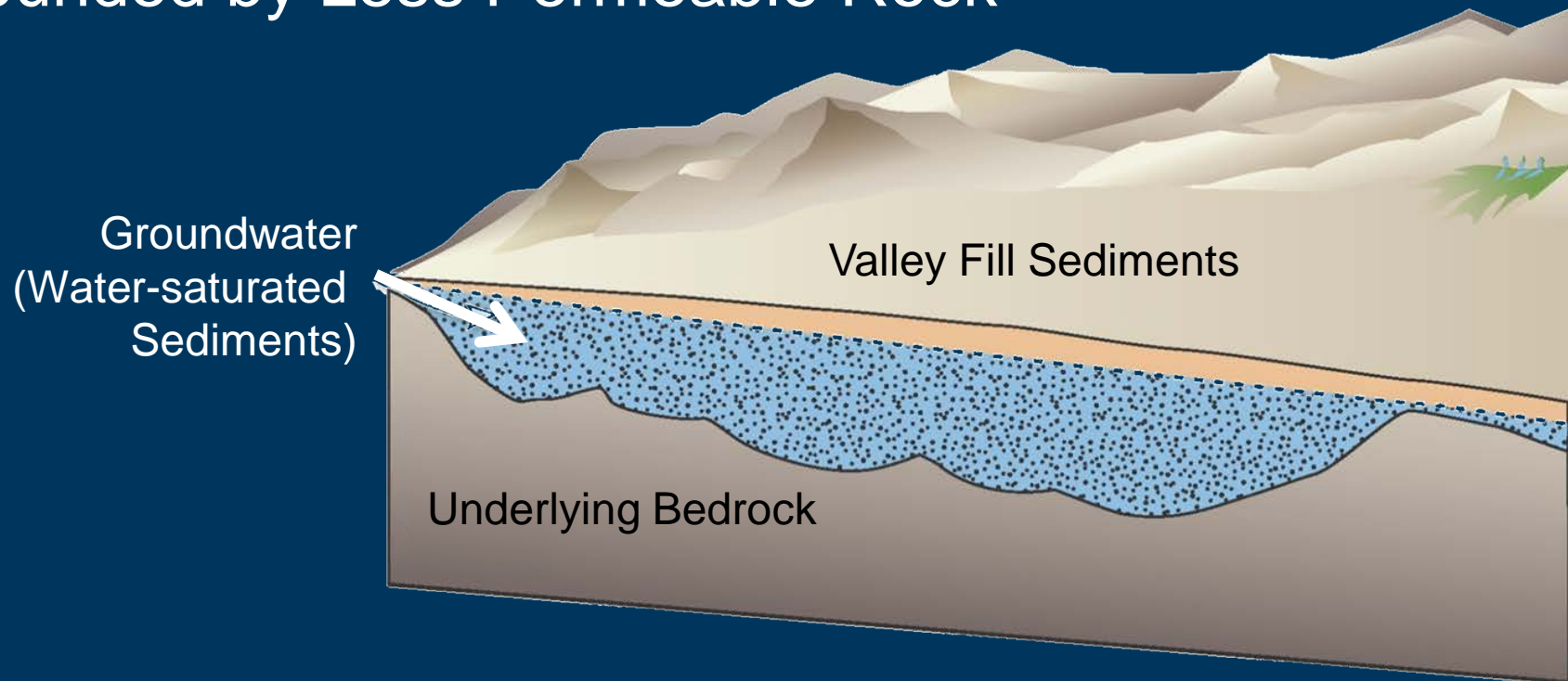




# The Nature of Aquifers

## Valley Fill Aquifers – Most of California's Aquifers

- Loose or Semi-consolidated Sediments
- Filling Valleys between Mountains or Hills
- Bounded by Less Permeable Rock





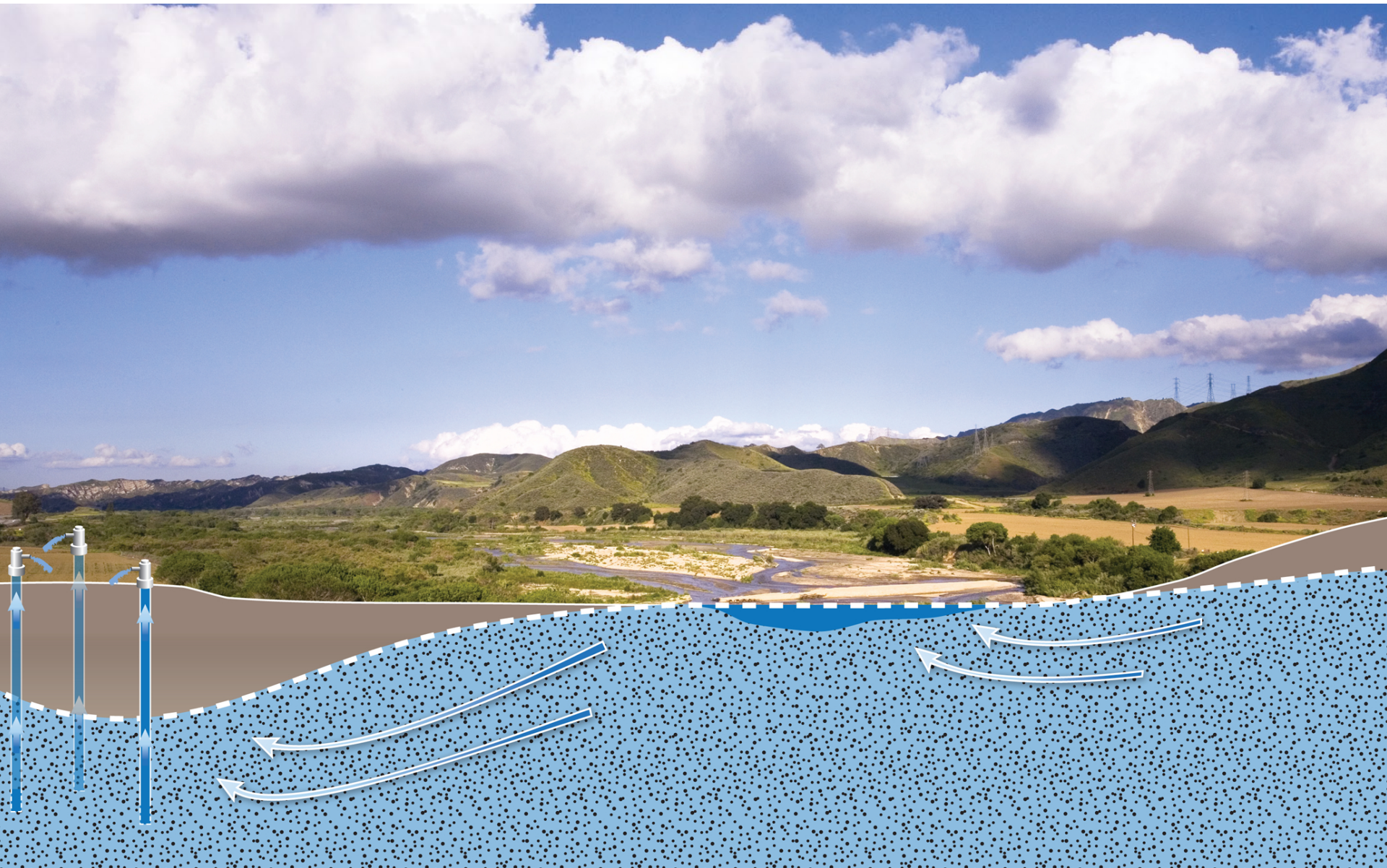
# California's Aquifers

- Refer to these as “Basins”
- Often Subdivided into Sub-basins





# Valley Fill Aquifers and Rivers



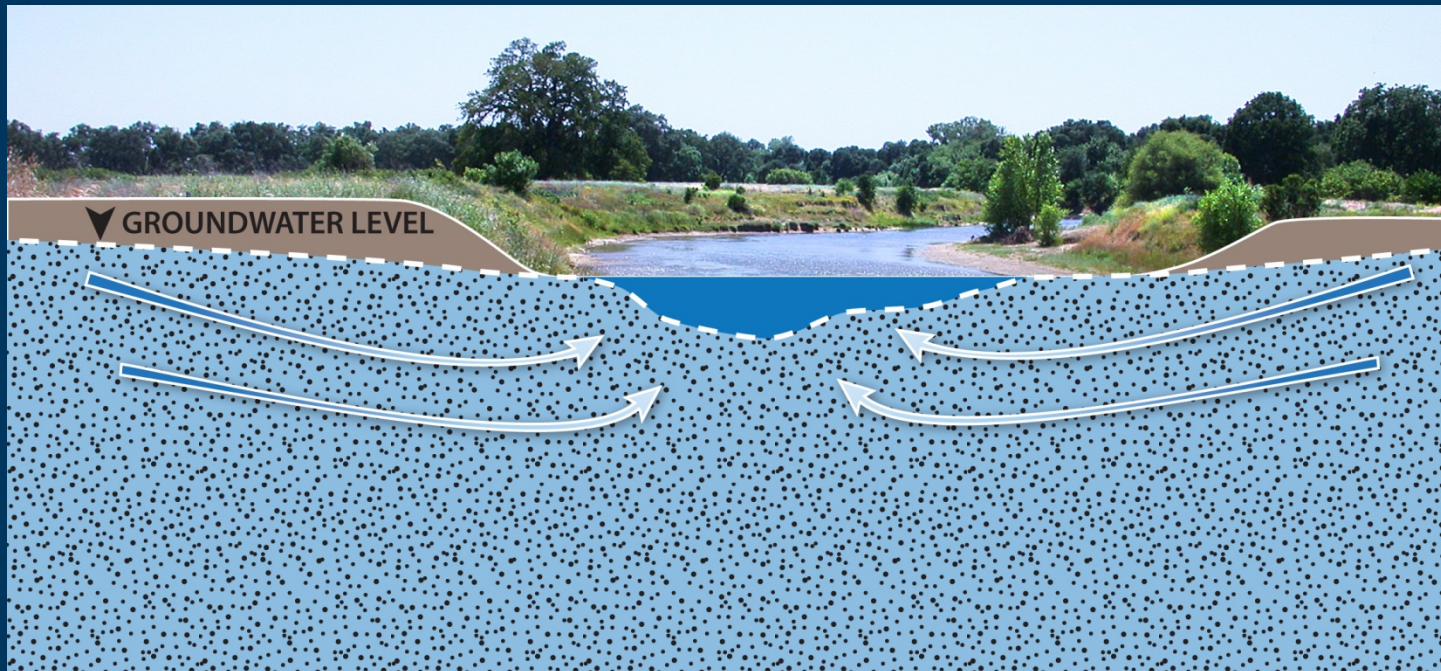


## Groundwater Affects Stream Flow



## Groundwater Affects Stream Flow

“Gaining Stream”

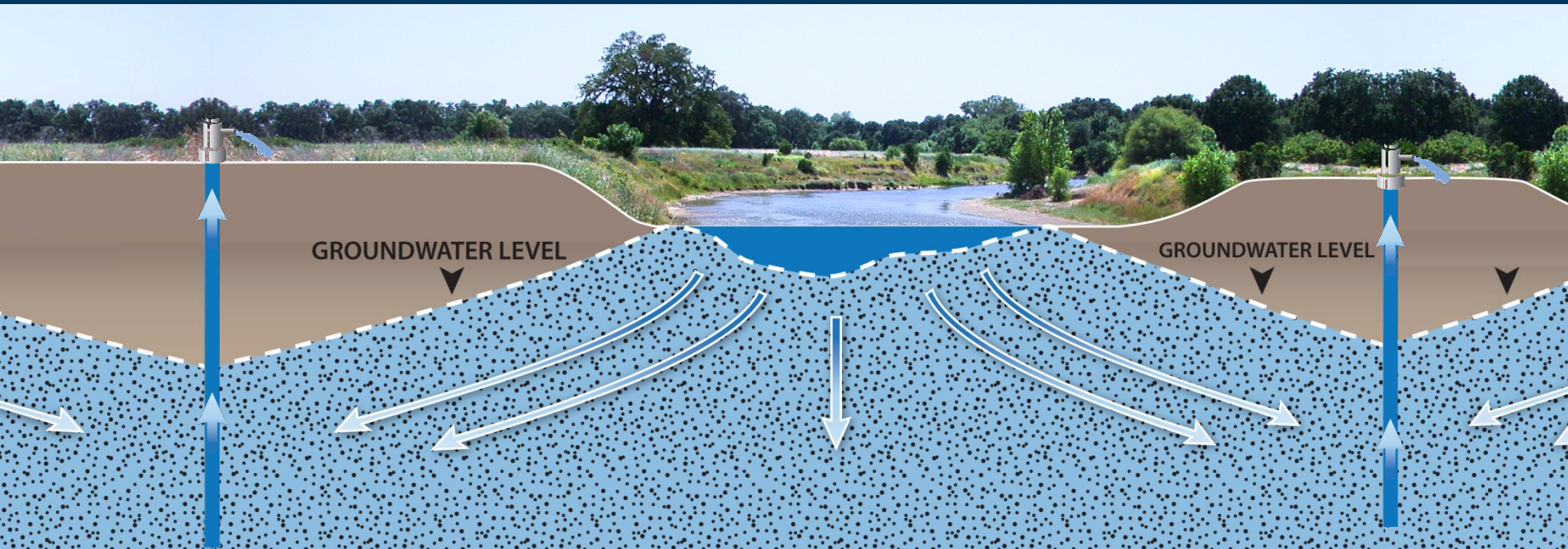


High Groundwater Levels  
Groundwater Maintains Stream Flow



## Groundwater Affects Stream Flow

“Losing Stream”

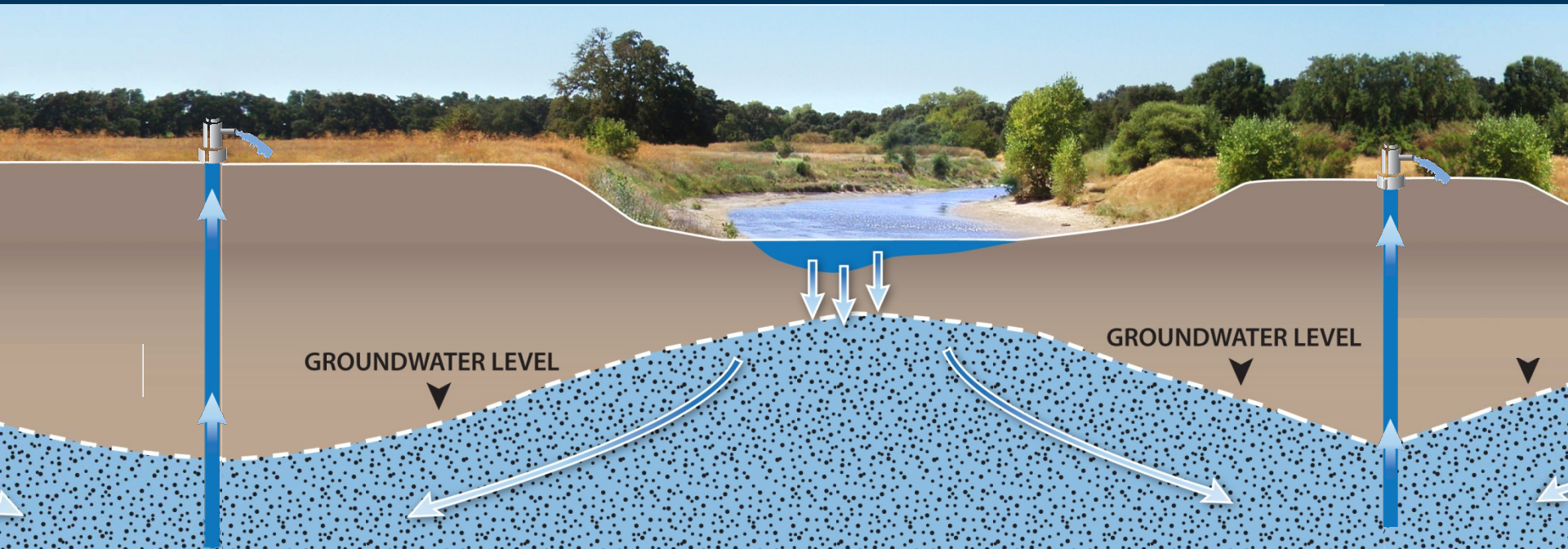


Pumping Lowers Groundwater Levels  
Stream Loses Flow to Groundwater

## Groundwater Affects Stream Flow

“Losing Stream”

Groundwater Levels Below Stream Channel



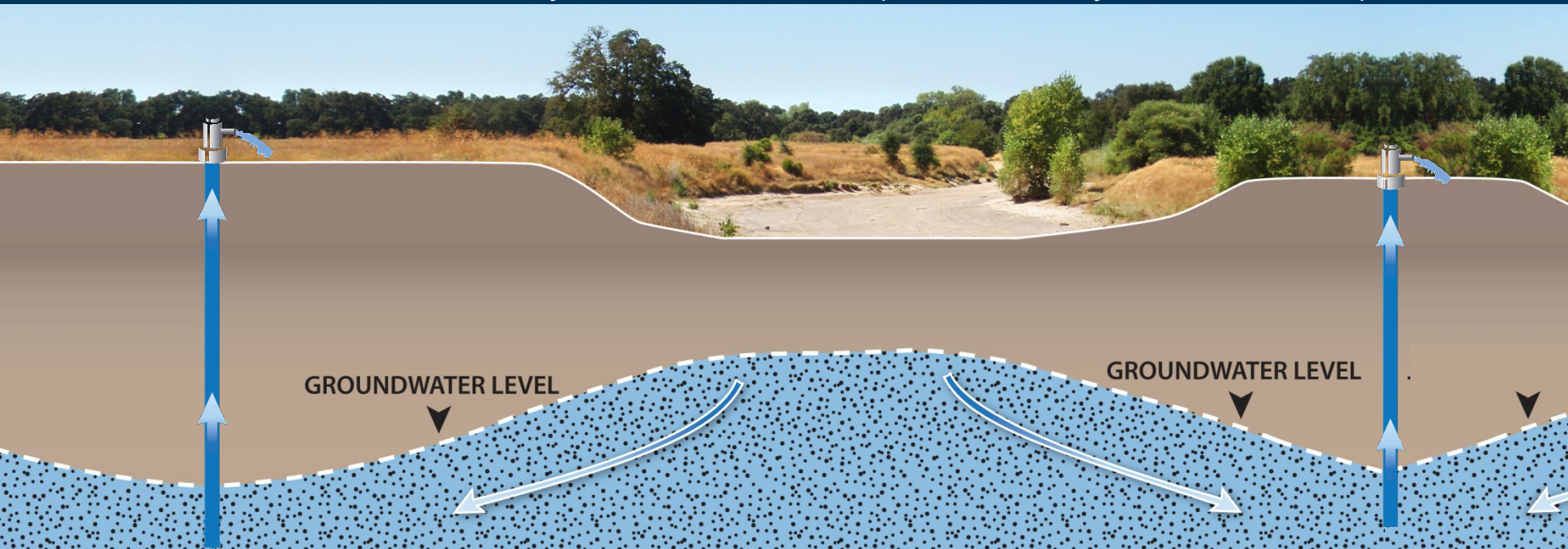
Pumping Lowers Groundwater Levels  
Stream Loses Flow to Groundwater



## Groundwater Affects Stream Flow

### Dry Stream

Seepage to Groundwater Exceeds Stream Flow  
Dry Stream Channel (Intermittently or Year-round)



Pumping Lowers Groundwater Levels  
Stream Loses Flow to Groundwater

# Stopping or Avoiding Overdraft

## All about the Water Balance

Overdraft = Groundwater Levels Getting Lower

Pumping  $>$  Recharge  
(Over an Extended Time)

### To Stop Overdraft

1. Reduce Pumping
2. Increase Recharge

### To Avoid Overdraft

- Proactively Manage
- Maintain:

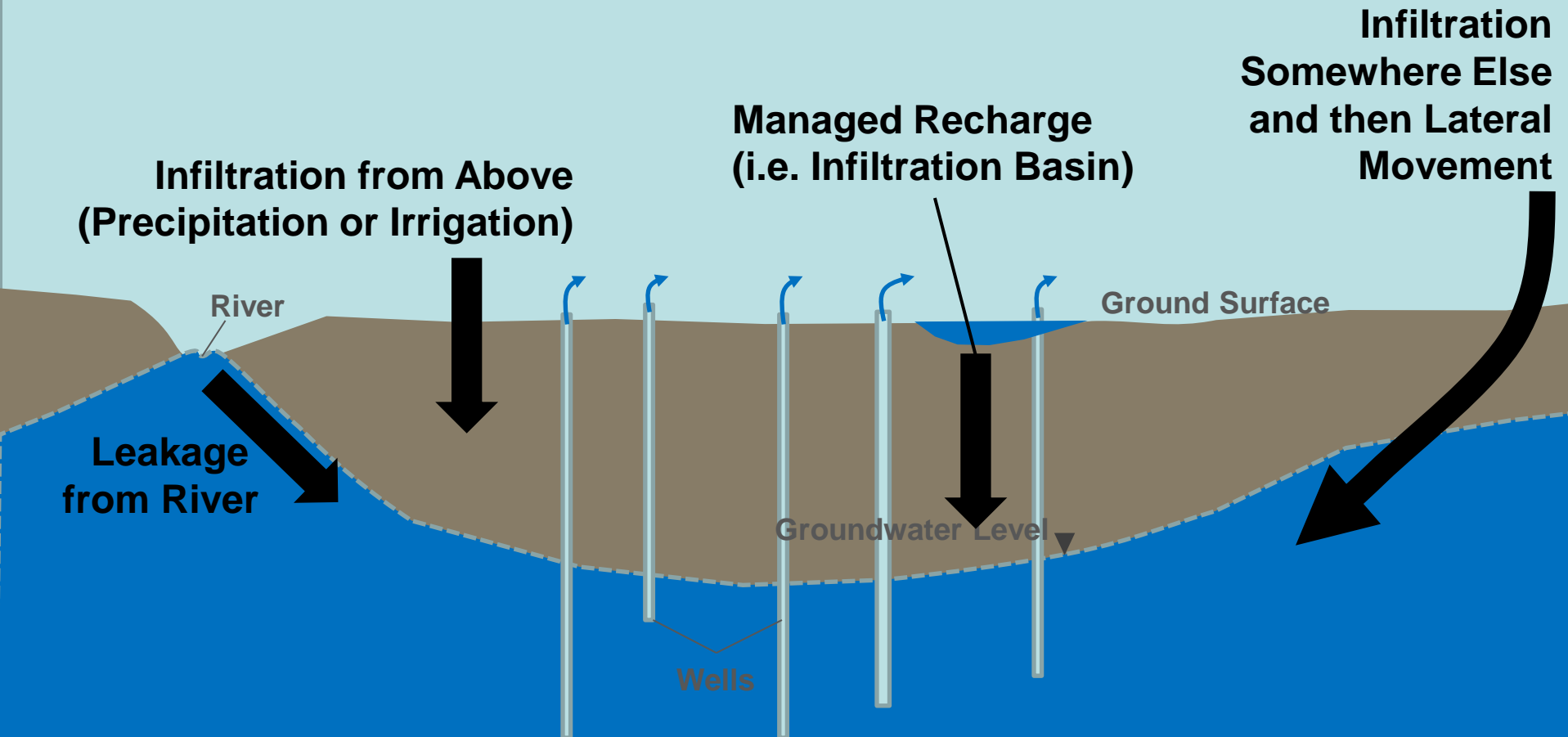
Pumping = Recharge  
(Over the long term)



# Sources of Recharge



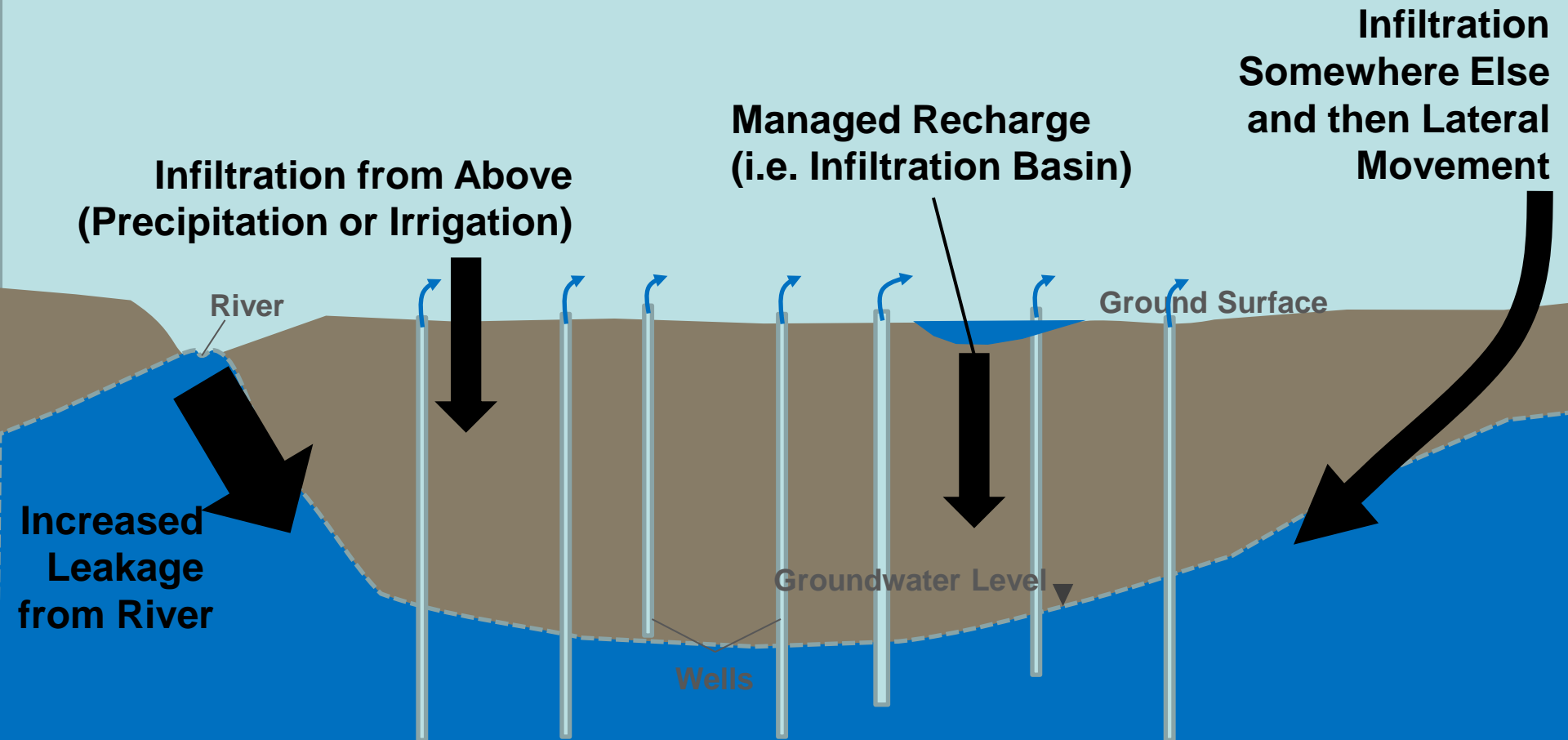
**Recharge Sources**



# Sources of Recharge



**Recharge Sources**





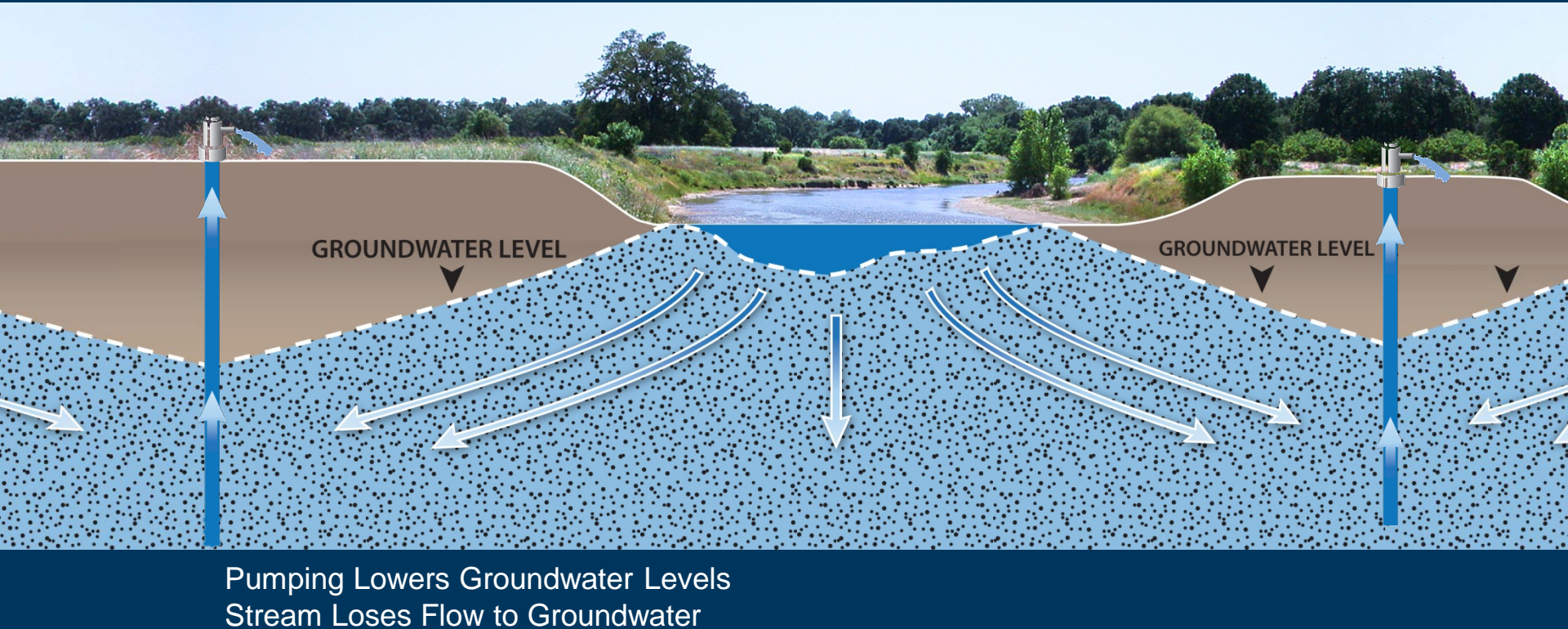
# Stopping (or Avoiding) Overdraft

## Either Way Requires Proactive Management

- Understanding the Whole Water Balance
  - Groundwater Level Monitoring
  - Understand and Manage the Pumping
  - Understand and Manage the Recharge
- Not Just Groundwater
- Groundwater AND Surface Water

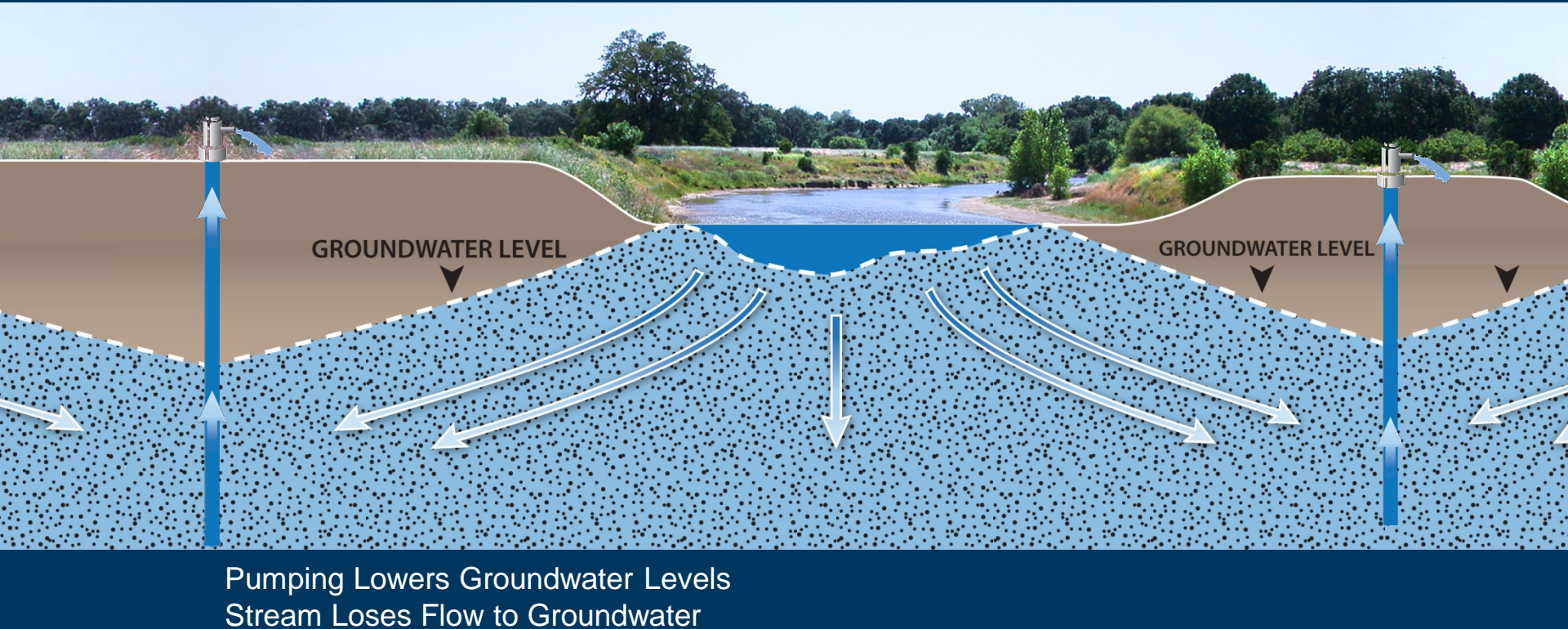
## Groundwater Management Affects Stream Flows:

- for Fish
- for Surface Water Supplies





## Groundwater Management Affects Stream Flows: **Not Just When and Where Overdraft Occurs**



# Rift in California's Water Policy

- Surface Water

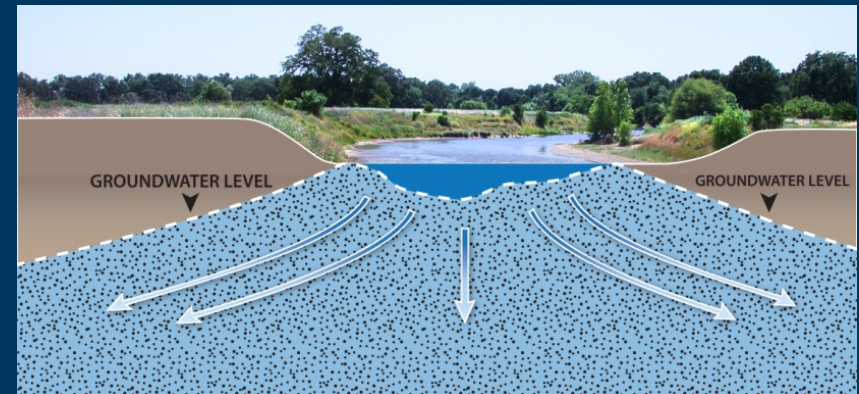
- Quantified Allocations
- Priority System
- Reporting of Use

- Groundwater

- Local Control
- ??
- ??

## Physical Reality:

- Groundwater and Surface Water are Inseparable





# Local Groundwater Management

- Does Happen
- Can Work



- Response to Problems or Conflict
  - Unique Local Motivation
  - After Surface Flows and Ecosystems Already Degraded
- Do we want to wait until:
- Conflicts are severe
  - Ecosystems are further degraded



## Now is the Time

- Proposals taking shape
  - Definition of “Sustainable Groundwater Management”
  - Local management entities
    - Develop strong groundwater management plans
    - Implement plans
    - Meet scheduled milestones
  - State provide authorities
  - State backstop



# Fixing the Rift in California Water

## We Need Proactive Groundwater Management to

- Avoid Overdraft
- Avoid Sea Water Intrusion
- Protect Surface Water Supplies
- Protect Stream Flows for Fish
- Protect Drinking Water Quality
- Support Riparian Habitat
- Facilitate Conjunctive Use
- Support Groundwater Storage
- Allow True Integrated Water Management

