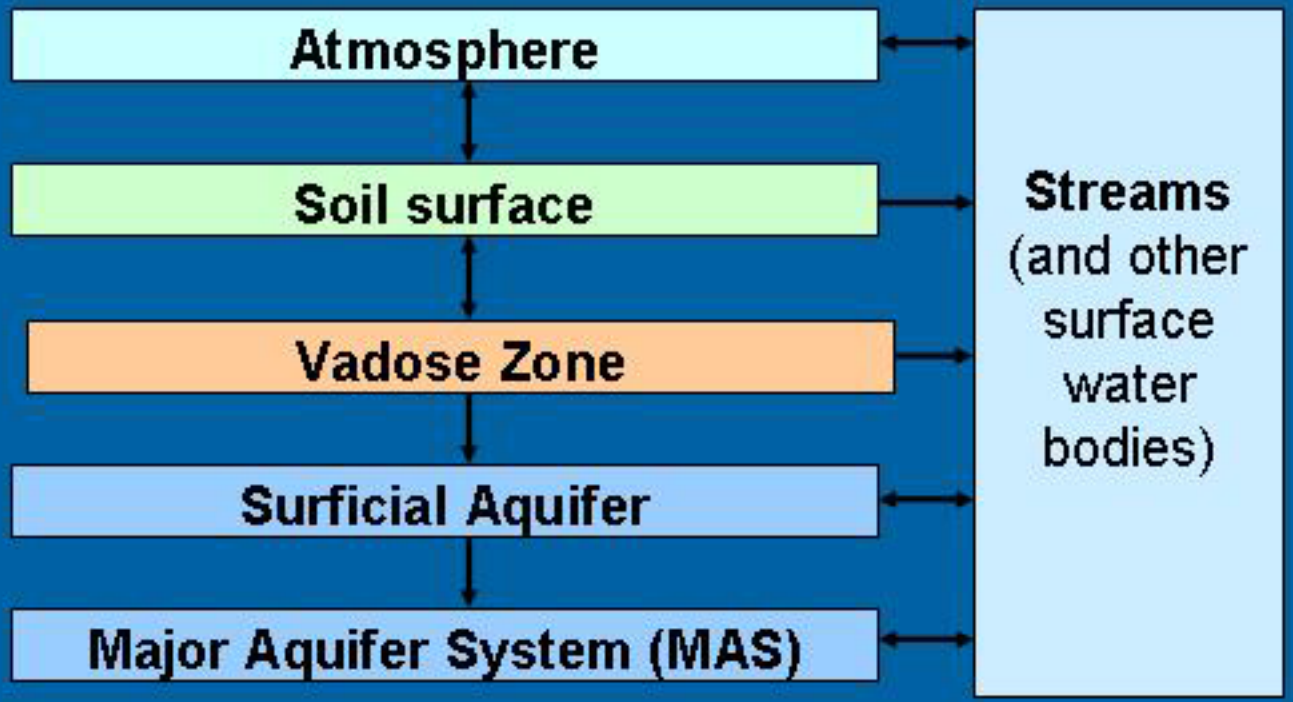
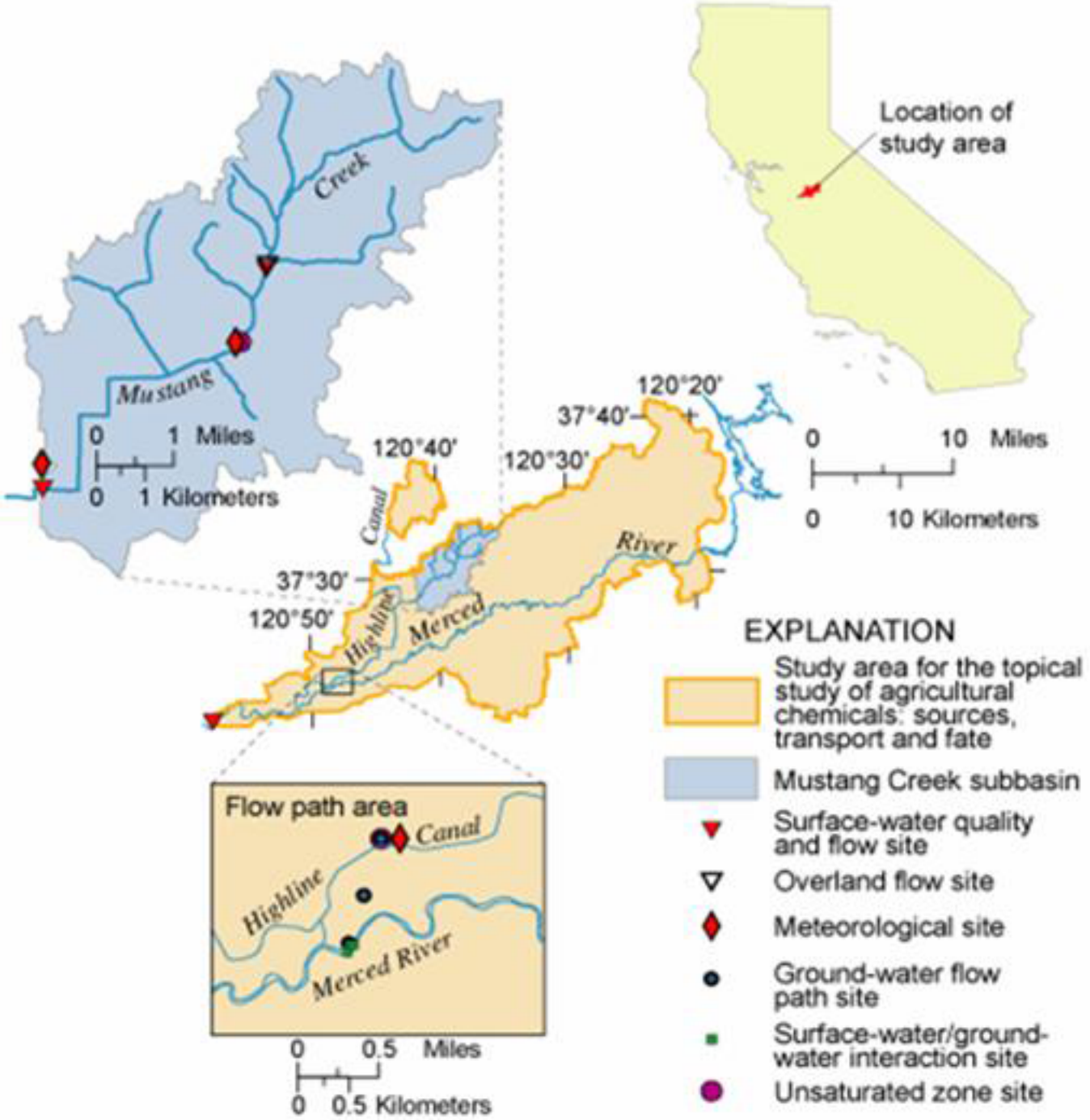
Agricultural Chemicals: Sources, Transport, and Fate (ACT)

How do environmental processes and agricultural practices interact to affect the transport and fate of agricultural chemicals in the hydrologic system of nationally important agricultural settings, and what are the effects on water quality and implications for management of water resources?



USGS

ACT study area in Merced River Basin



USGS

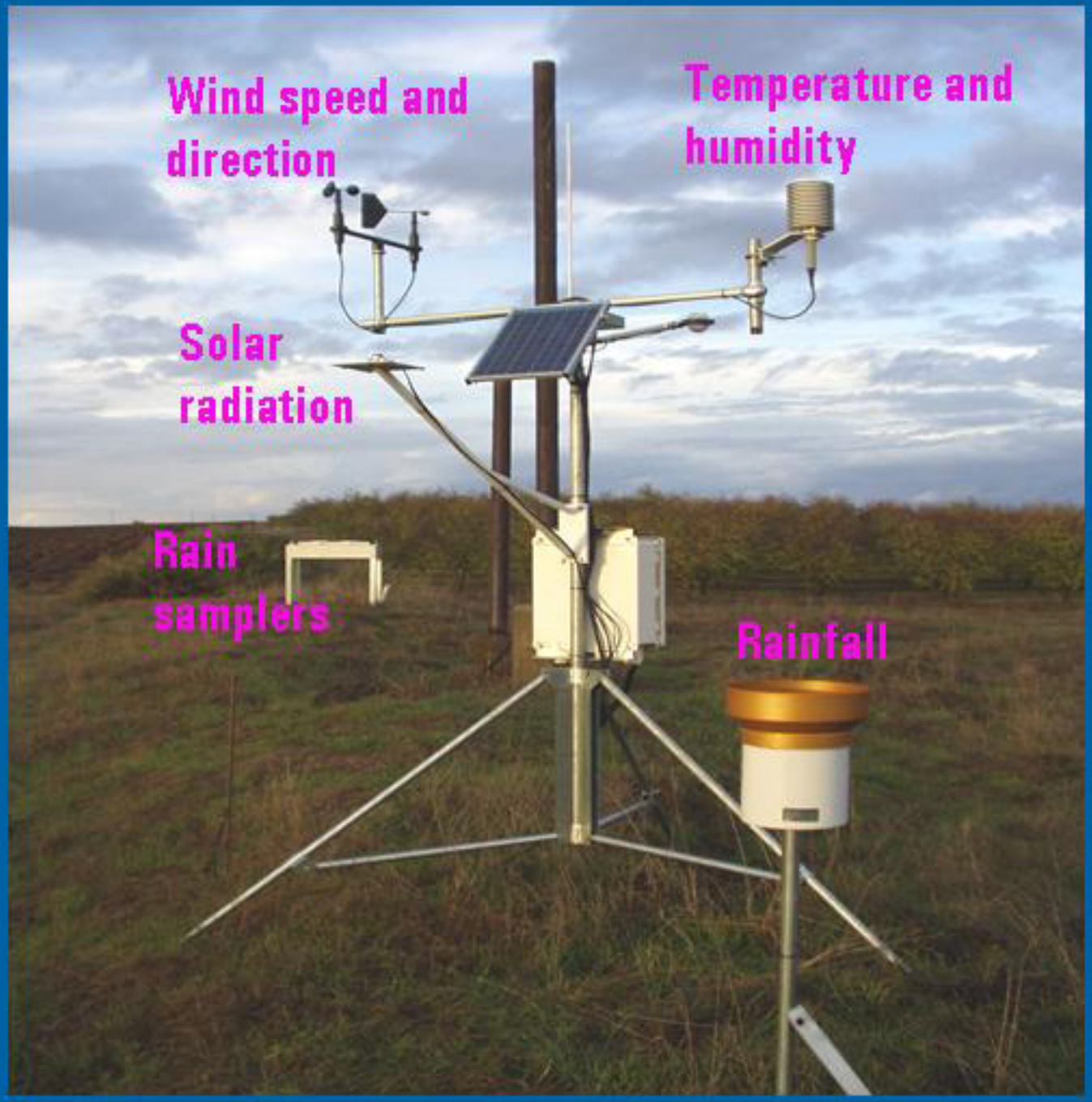
USGS

Monitoring

- **Event-based rain sampling**
  - pesticides and nutrients
- **Meteorological station and soil moisture probe**
  - rain, temperature, humidity, wind speed and direction, solar radiation, soil moisture data stored on datalogger
  - data used to calculate ET for water budget
- **Dry deposition (State-funded project)**
  - wet/dry sampler rinsed with solvent
  - soil box (1 sq. meter surface)
  - may be more important than wet deposition for some compounds, especially in dry climates like California

USGS

Met station and rain sampler platform at site near reservoir

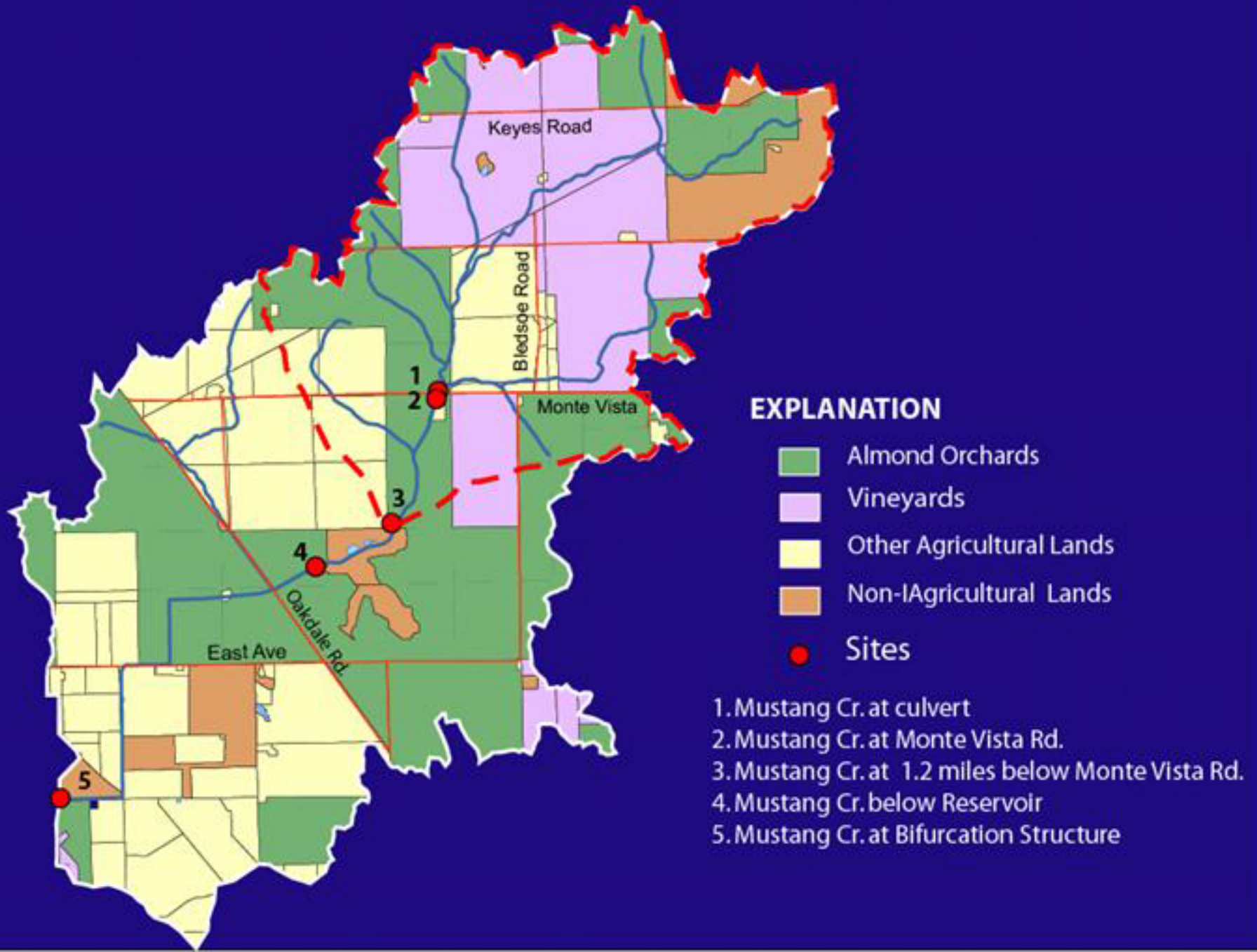


USGS

Soil moisture probe and meteorological station at head of flowpath

USGS


SURFACE RUNOFF


Keyes Road
Bledsoe Road
Monte Vista
East Ave
Oakdale Rd.
1
2
3
4
5
EXPLANATION
Almond Orchards
Vineyards
Other Agricultural Lands
Non-IAgricultural Lands
Sites
1. Mustang Cr. at culvert
2. Mustang Cr. at Monte Vista Rd.
3. Mustang Cr. at 1.2 miles below Monte Vista Rd.
4. Mustang Cr. below Reservoir
5. Mustang Cr. at Bifurcation Structure

Monitoring

- **Event-based sampling in Mustang Creek**
  - overland flow site (culvert at site 1, flume)
  - autosamplers (sites 2 and 5, weir gages)
  - pesticides, nutrients, major ions, organic carbon, suspended sediment
- **Time-of-travel dye studies**
  - from upper Mustang Creek to Merced R

USGS

Mustang Creek at Monte Vista (site 2)

USGS

Weir and Flume Installations

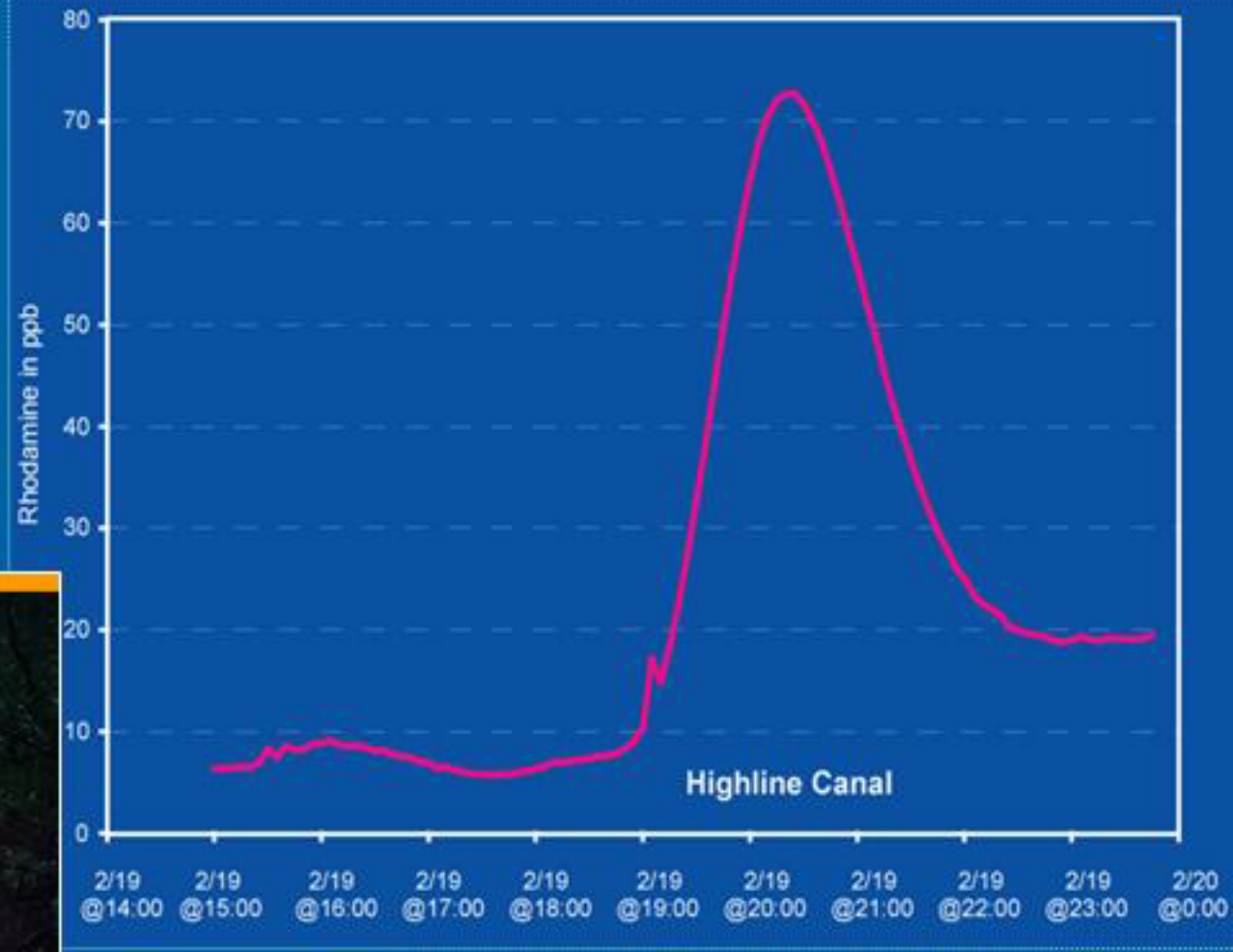
USGS

High flows on Mustang Creek at Monte Vista

USGS

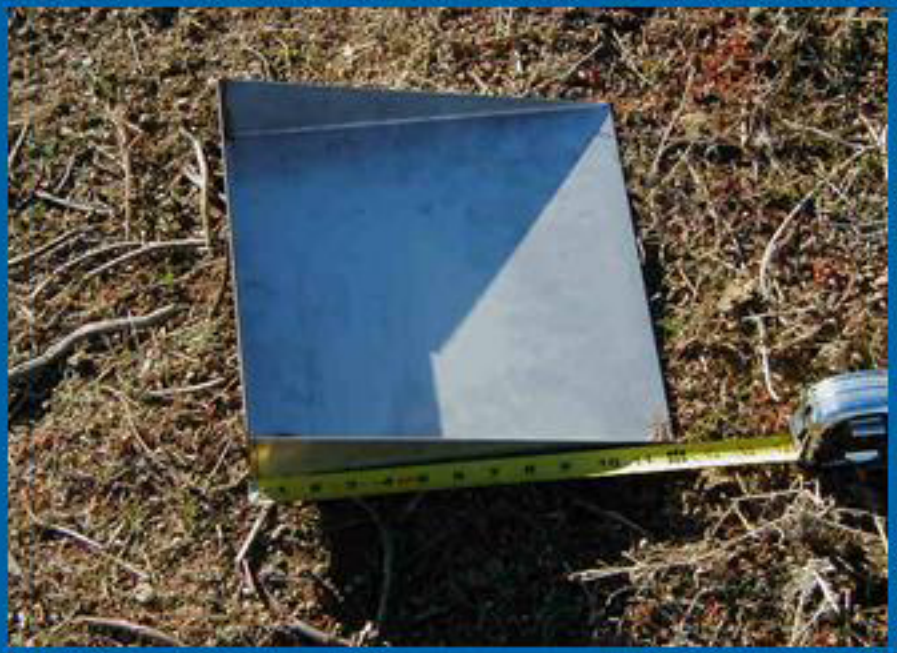
USGS

Dye study with manual sampling



Dye study with automatic sampler

USGS



VADOSE ZONE

USGS

Monitoring

- **Sample suction and pan lysimeters in April, August, and October (and after storms and irrigation as $ allows)**

  - pesticides, nutrients, major ions, and isotopes

- **Bromide tracer**

  - potassium bromide added to surface to monitor transport of conservative tracer

- **Soil moisture and heat dissipation probes**

  - collect data every 4 hours to measure water flux (stored on datalogger)

USGS

Head of flow path site

USGS

Installing suction lysimeters

USGS

Sampling lysimeters

USGS

Heat dissipation probes

USGS

GROUND WATER

USGS

Monitoring

- Water samples from 15 monitoring wells on flowpath and 1 monitoring well off flowpath

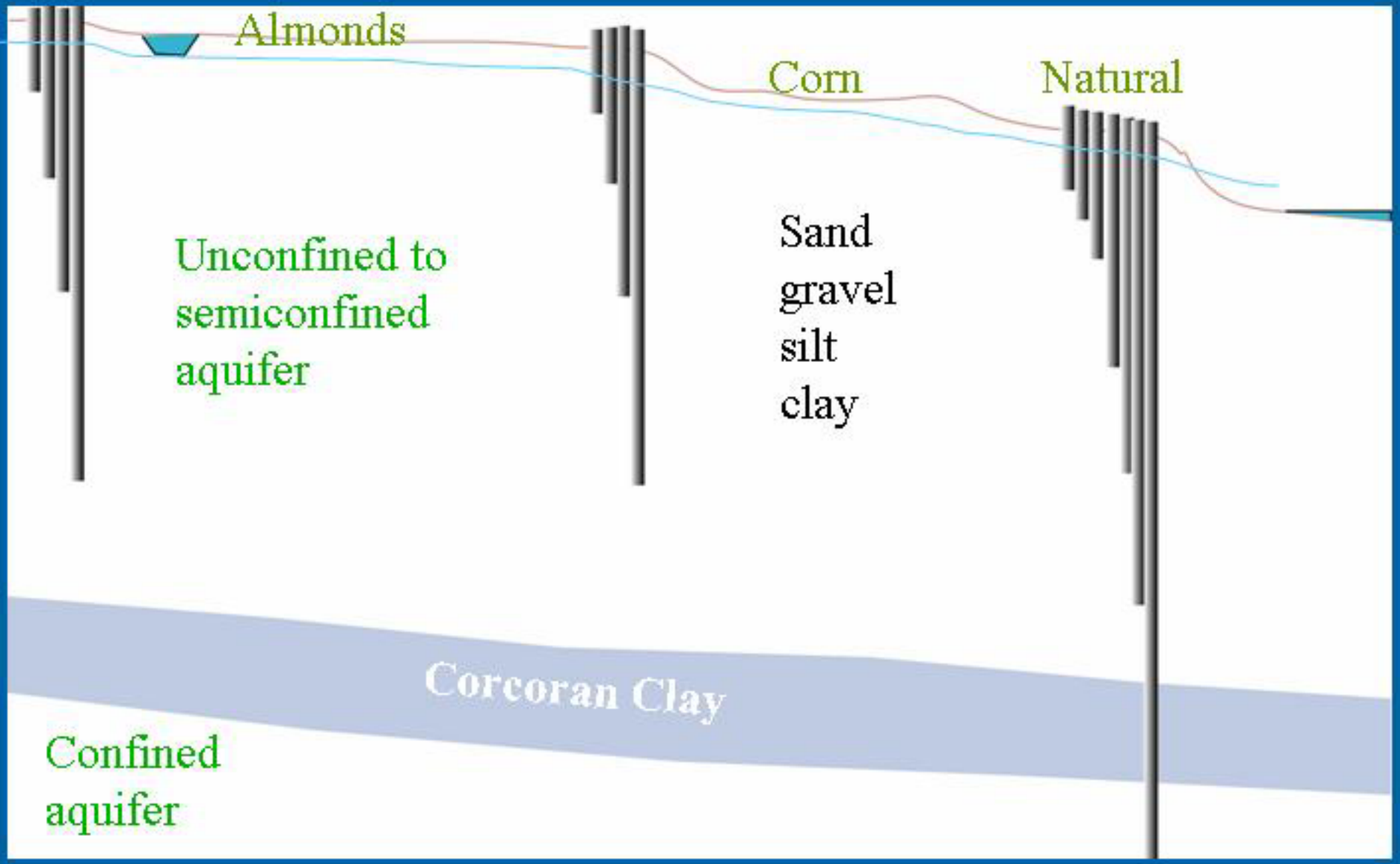
  - April, August, and October

  - pesticides, CFC age dating, and dissolved gases (August only); major ions, nutrients, and isotopes (O, H, N)

- Core samples from saturated zone (10)

  - analyzed for bulk density, particle size analysis, iron/sulfide minerals, pesticides and carbon, and mineralogy

USGS


Almonds
Corn
Natural
Unconfined to
semiconfined
aquifer
Sand
gravel
silt
clay
Corcoran Clay
Confined
aquifer

USGS

Equipment Installed

- 20 screened piezometers
- 32 temperature loggers
- 20 drive point tips
- 10 pressure transducers
- 3 multi-parameter meters
- 12 seepage meters (temporary)

USGS

Monitoring

- **Sample drive point tips (April, Aug, and Oct)**

  - pesticides, dissolved gases, and CFC age dating (August only); nutrients, major ions, and isotopes

- **Drive point synoptics (April and October)**

  - hydraulic, temperature, and dissolved oxygen gradients; samples for nitrate and sulfide below streambed

- **Seepage meters (April, Aug, and Oct)**

- **Continuous water quality and temperature**

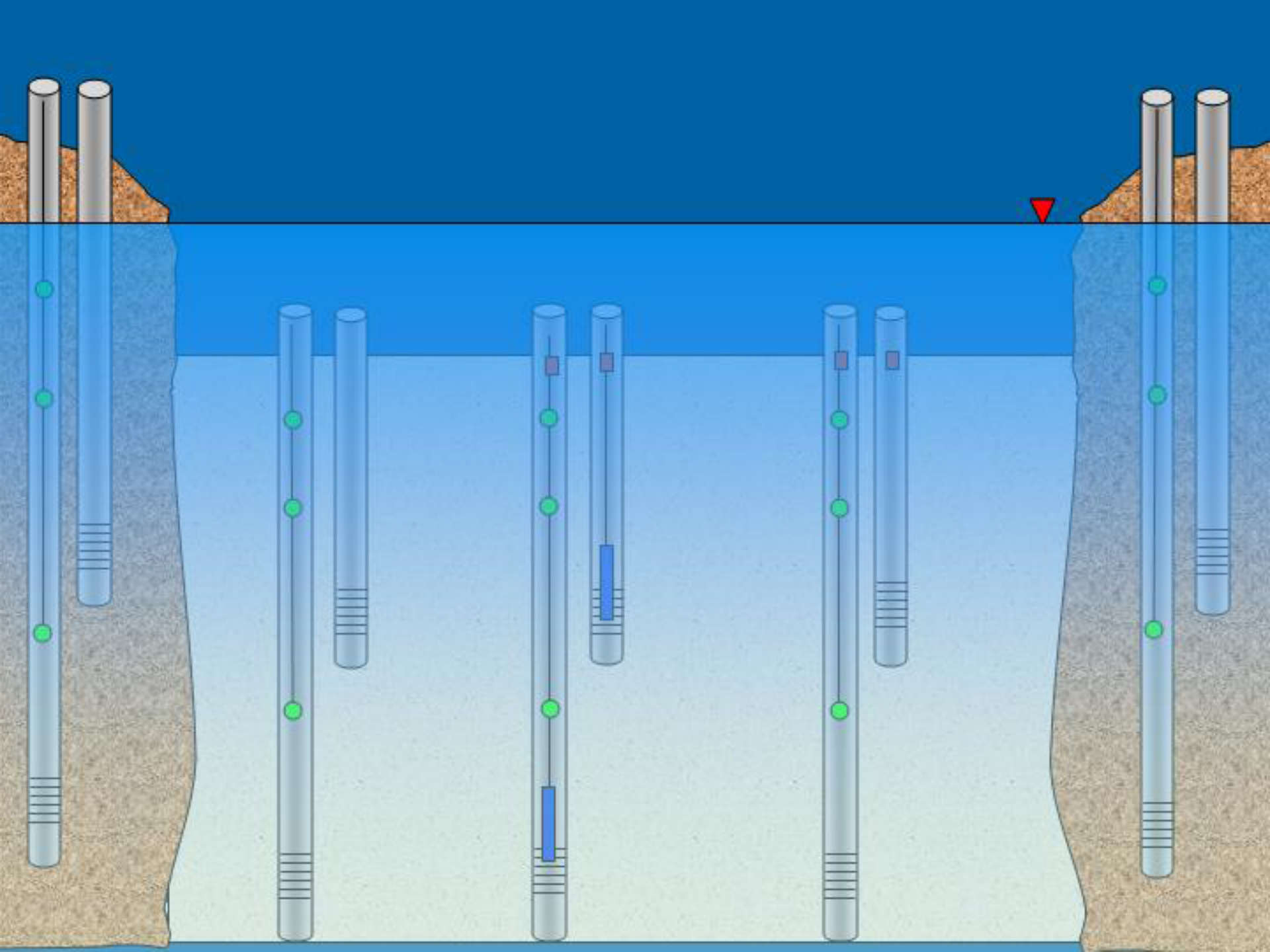
  - download data from temperature loggers below streambed and water quality monitors in river and below streambed every 2 months

- **Sediment core samples (6)**

  - analyzed for same constituents as flowpath cores

USGS

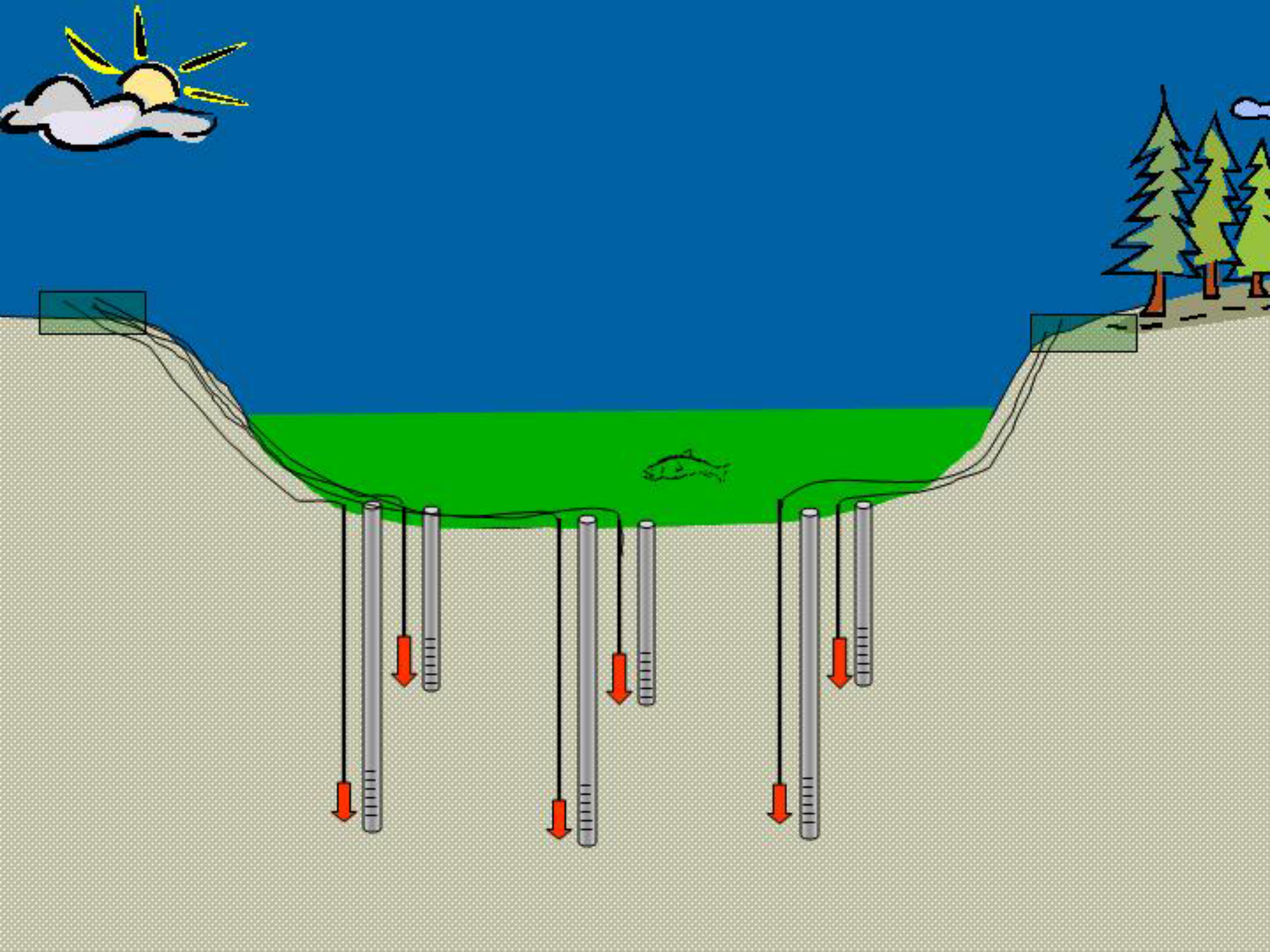
Piezometer Installation



USGS

Drive Points

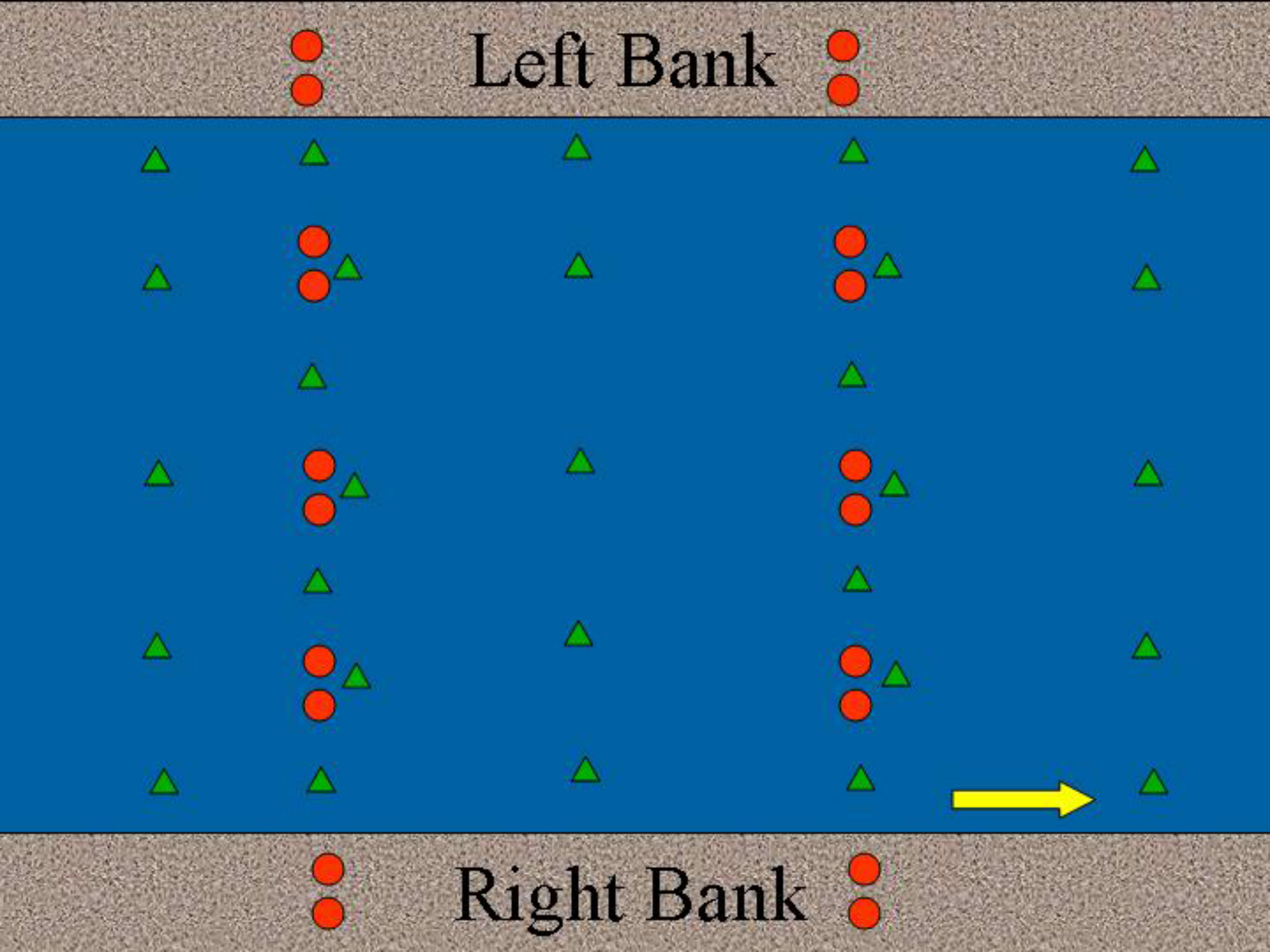
USGS



USGS

Drive point synoptic in Merced River

USGS


Left Bank
Right Bank

Seepage Meter
(a direct measurement method)

USGS