

Overview of Groundwater in Ukiah , Mendocino County Area

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Ukiah Drought Workshop
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Groundwater 101

- **Groundwater** is the water occurring beneath the earth's surface that completely fills the void space in rocks or sediment
- An **aquifer** is a body of rock or sediment that yields significant amounts of groundwater to wells or springs
- An **aquitard** is a body of rock or sediment that is typically capable of storing groundwater but does not yield it in significant or economic quantities
- A **groundwater basin** is defined as an alluvial aquifer with reasonably well-defined boundaries

Examples of Aquifer Materials



Sand & Gravel Aquifer Material



Hard Rock/Fractured Rock Aquifer Material

Examples of Aquifer Materials



Shallow core from a riverbank deposit

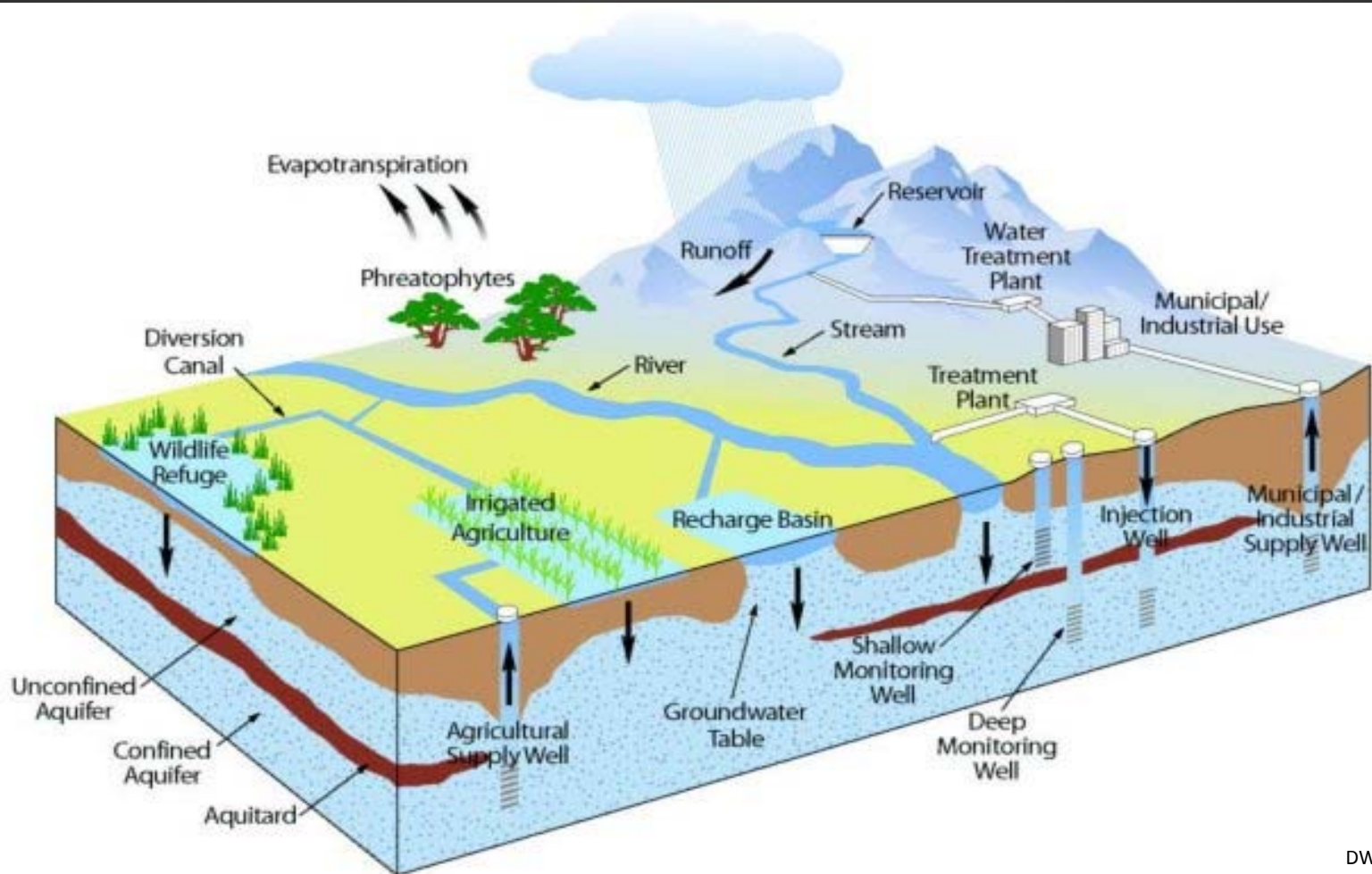


Example of fractured rock core

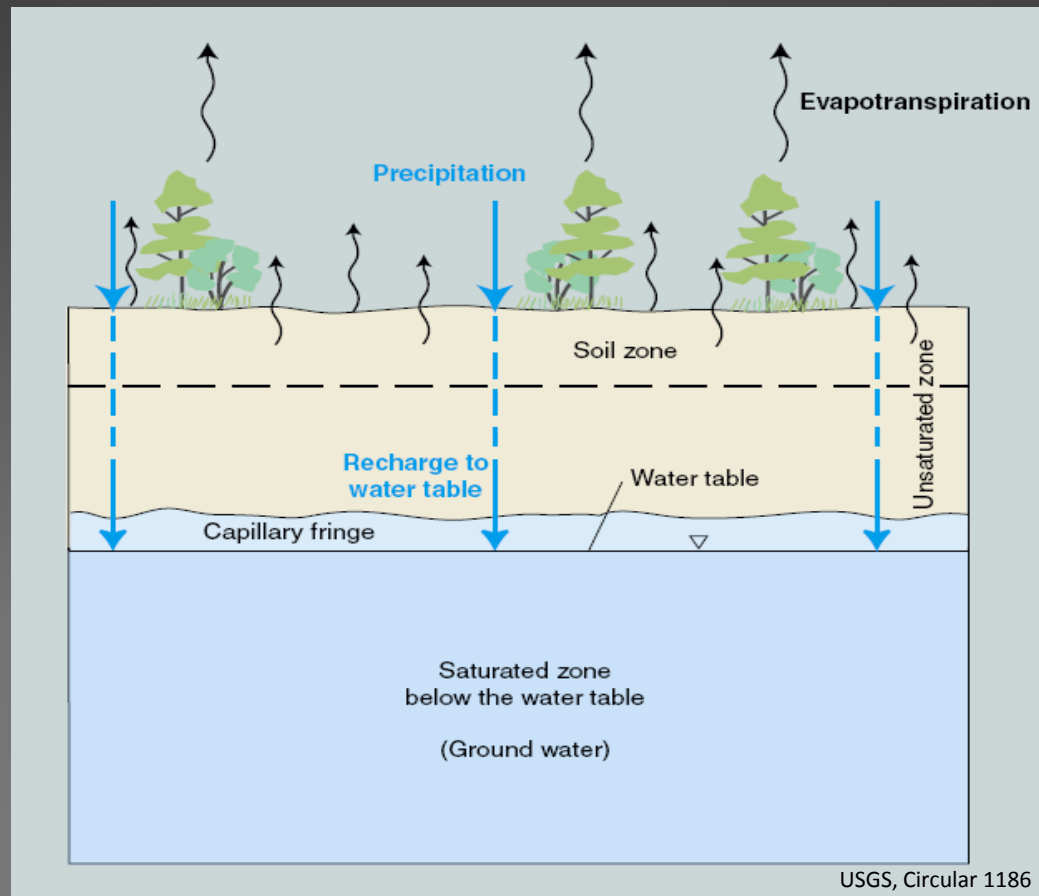


Roadside cut near San Andreas Fault

Hydrologic Cycle



General Groundwater Concept

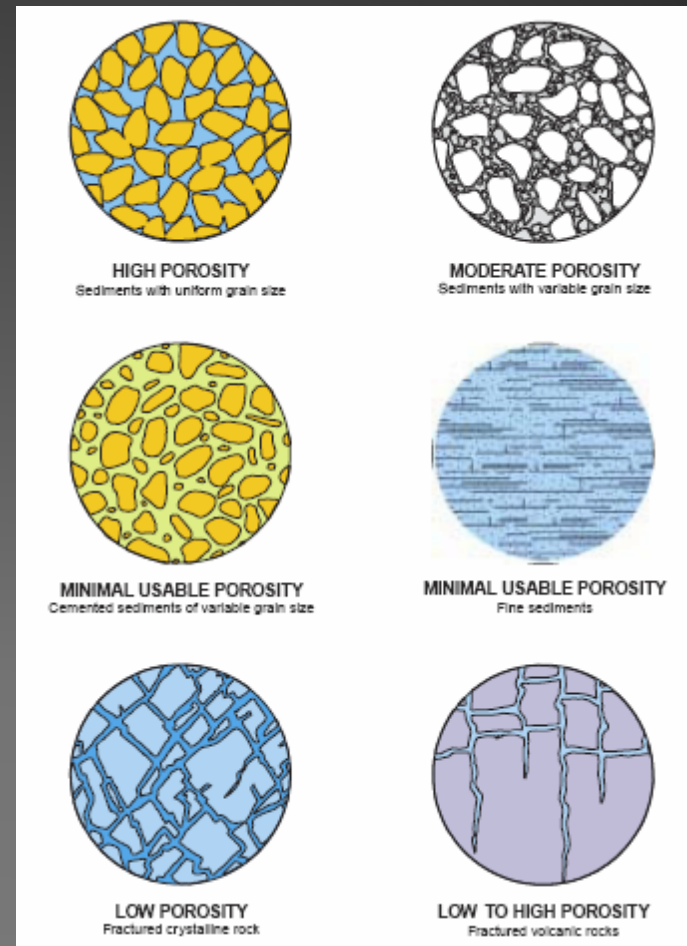


What controls the occurrence and availability of groundwater?

- **Climate** (precipitation) controls the availability of water in an area
- **Geology** (rock type and structure) controls the capacity to store groundwater
 - **Porosity** is the ability of a rock to contain water
 - **Permeability** is the ability of water to move through rock
 - A rock can be highly porous (clay), but not very permeable

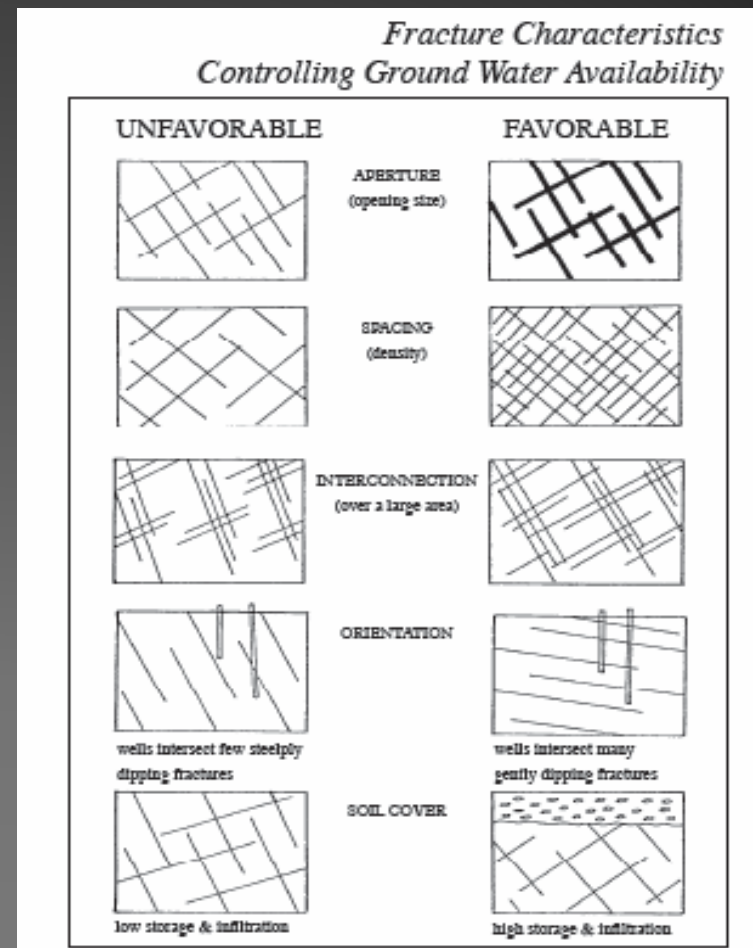
Examples of Porosity in Rocks

- Sand & gravel, well sorted: 25-50%
- Sand & gravel, mixed: 20-35%
- Glacial Till: 10-20%
- Silt: 35-50%
- Clay: 33-60%
- Fractured crystalline rock: 1-10%
- Fractured volcanic rock: variable



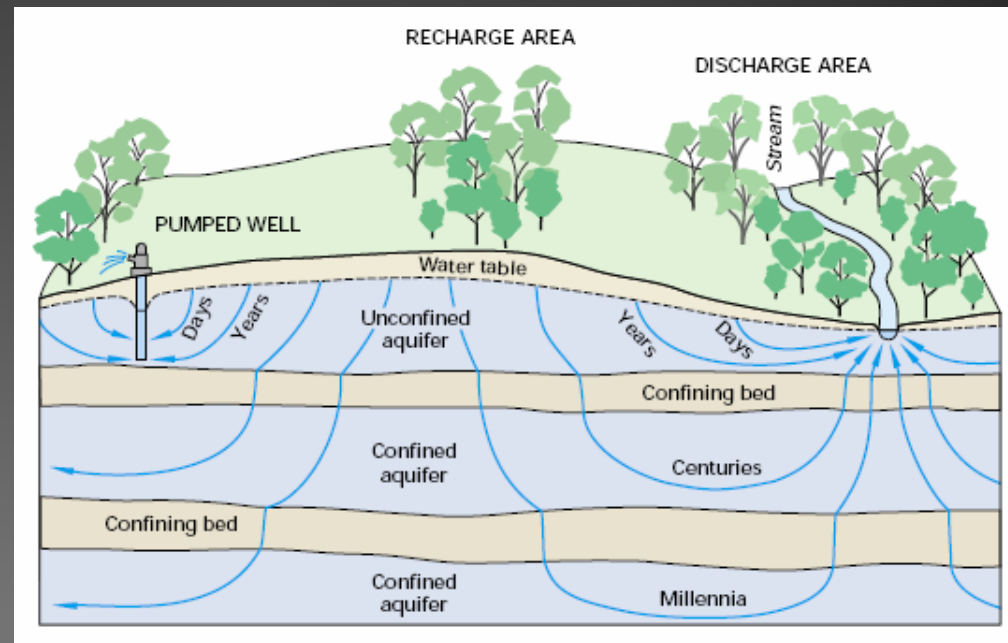
Examples of Permeability in Rocks

- Sands & gravels are highly permeable
- Silt & clay have low permeability
- Fractured rock is variable
- Weathered rock is commonly clayey, with relatively low permeability

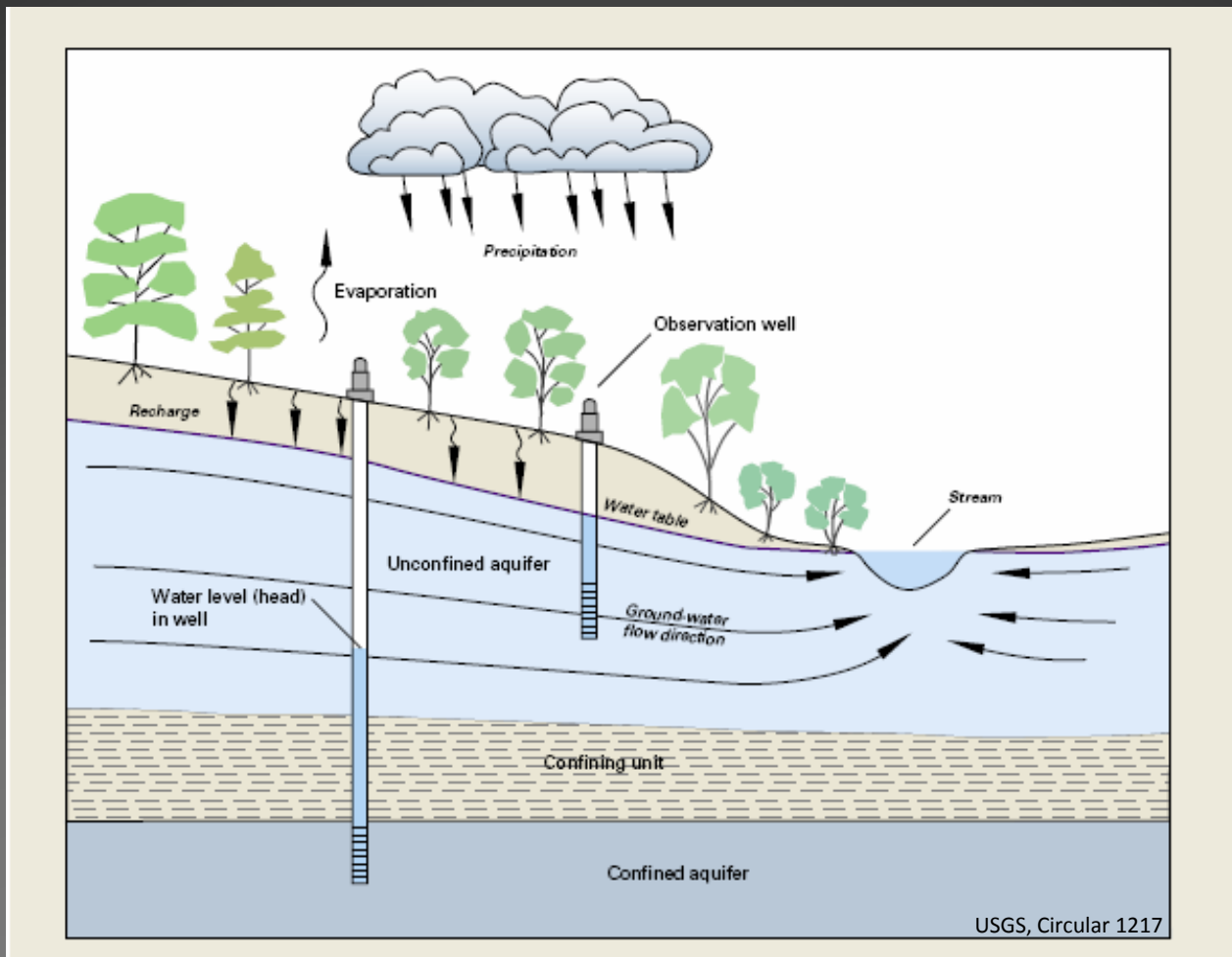


Groundwater Flow Paths

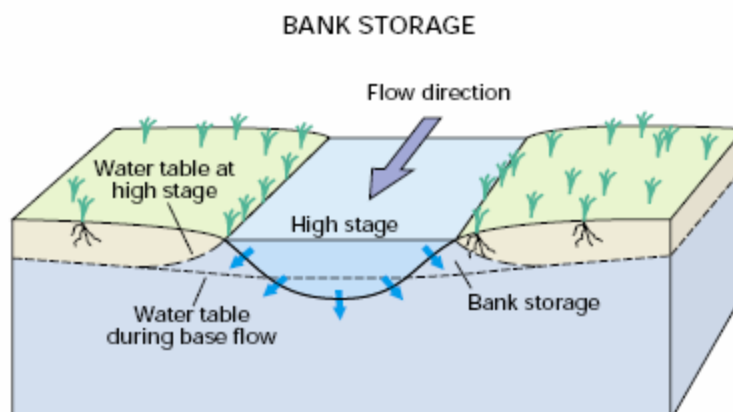
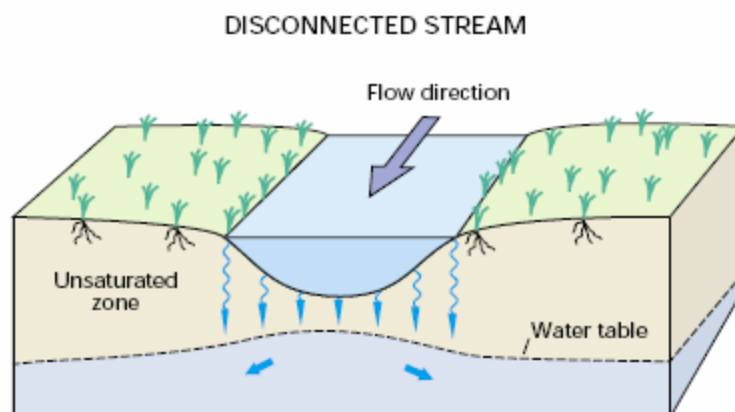
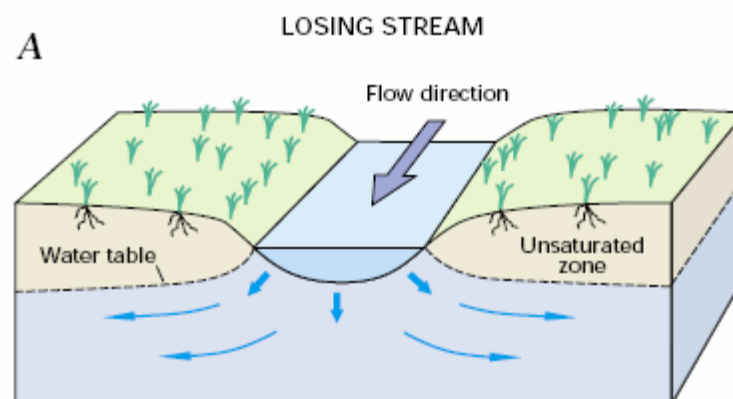
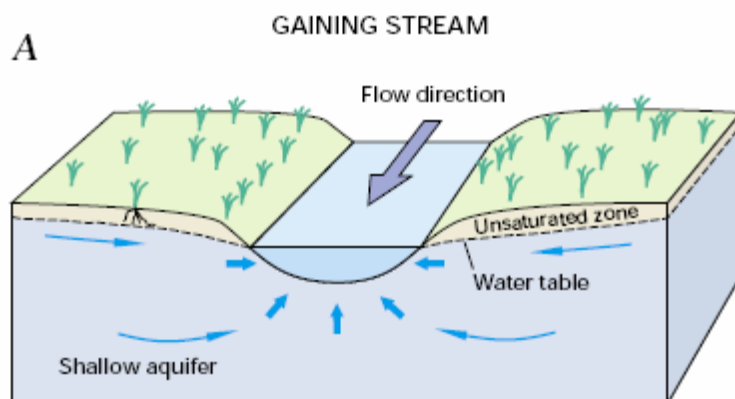
- Groundwater flow paths vary greatly in **length**, **depth** and travel time
- Groundwater pumped from wells can be **days** old or hundreds of **years** old



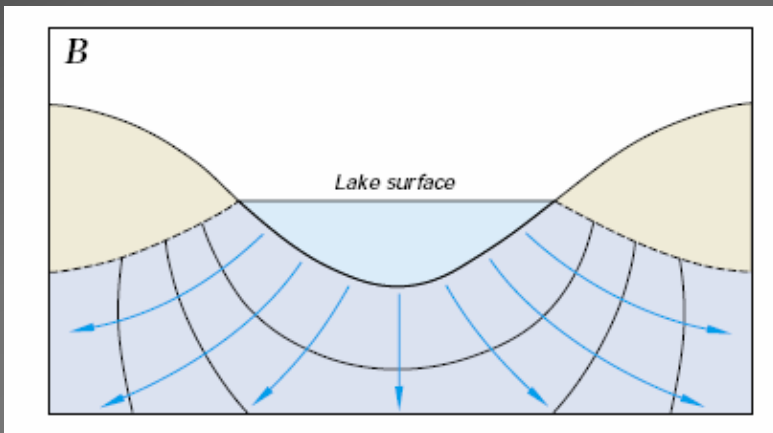
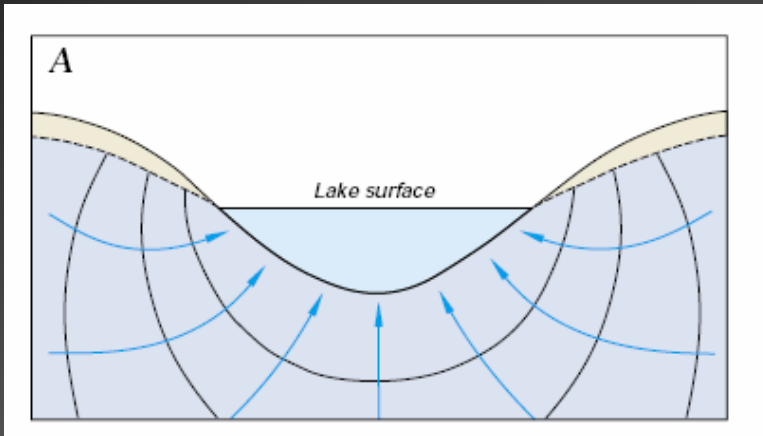
Unconfined vs. Confined Aquifers



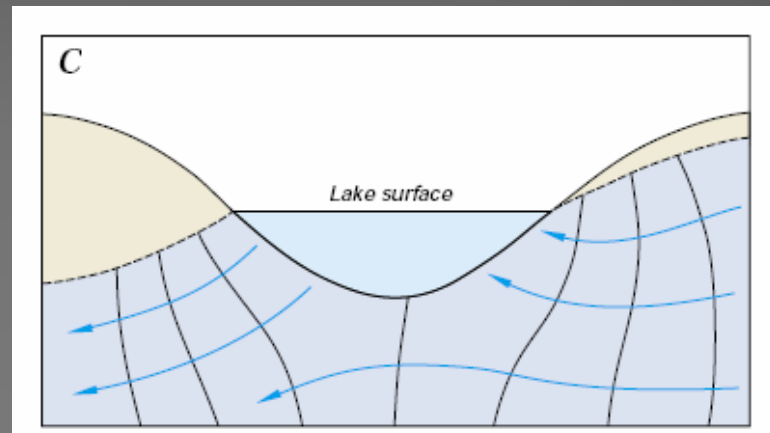
Groundwater Interactions with Streams



Groundwater Interactions with Lakes

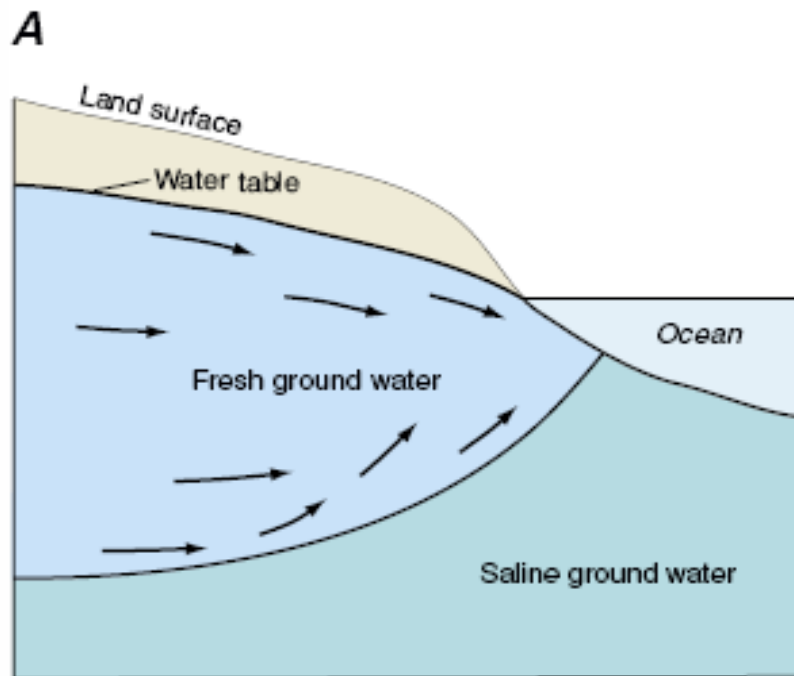


- A - Lakes can **receive** groundwater inflow
- B - Lakes can **lose** water as seepage to groundwater
- C - Or both



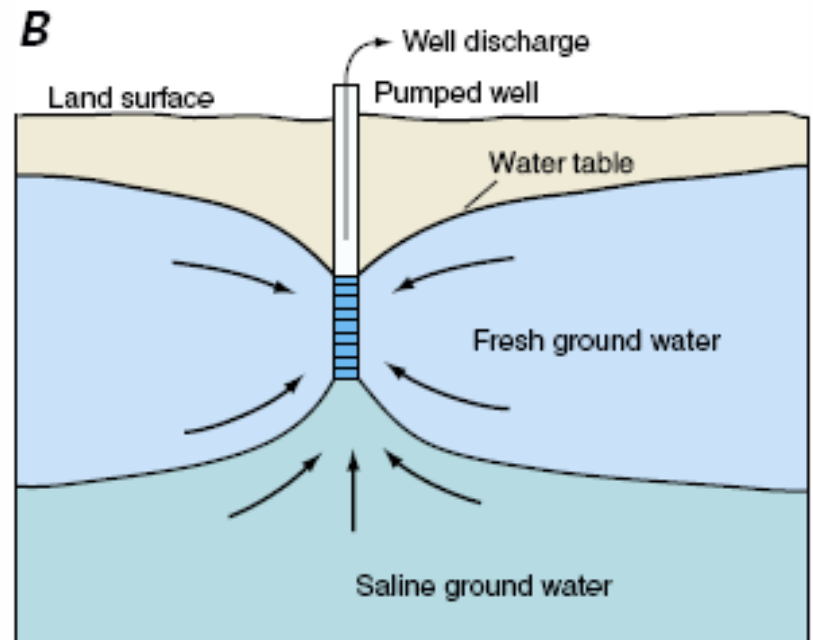
Saltwater Intrusion

Coastal Areas



USGS, Circular 1186

Coastal and Inland Areas



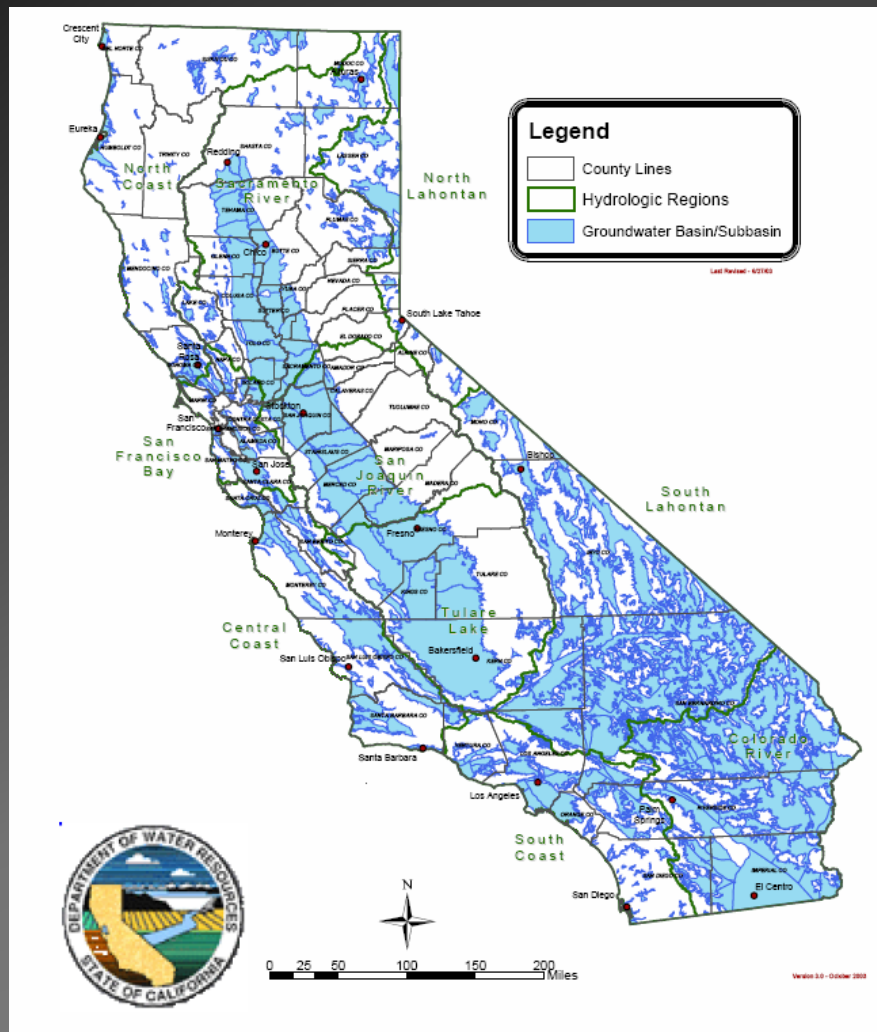
USGS, Circular 1186

California's Groundwater

- Bulletin 118 – Update 2003
- In California, groundwater provides:
 - About 30% of water supply in normal years
 - More than 40% in dry years



California's Groundwater Basins



- 431 Groundwater Basins
 - 108 Sub-basins
- Underlies 40% of the surface of California
- Mostly alluvial-filled valleys
- Provide most of the State's groundwater storage

North Coast Hydrologic Region

Chapter 7 | North Coast Hydrologic Region

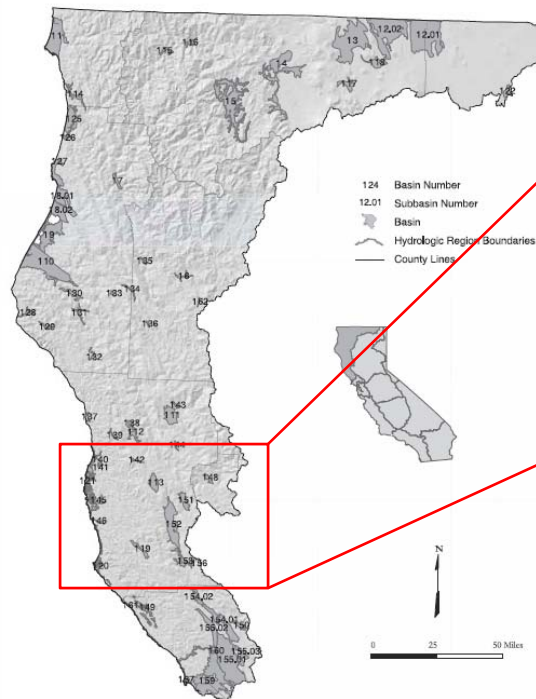
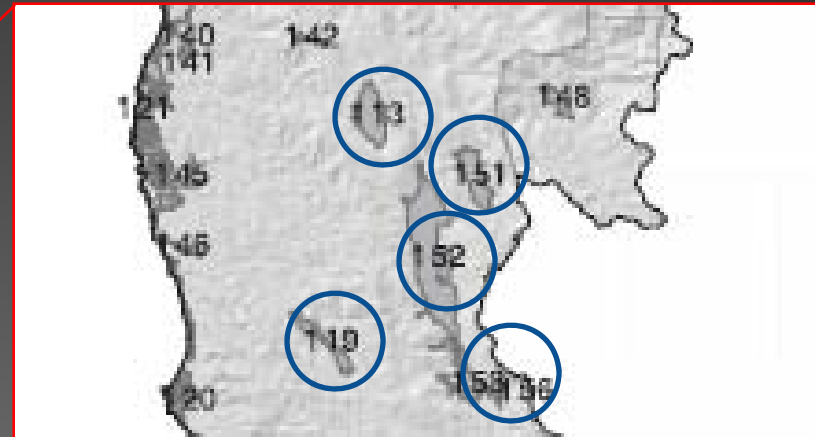


Figure 25 North Coast Hydrologic Region

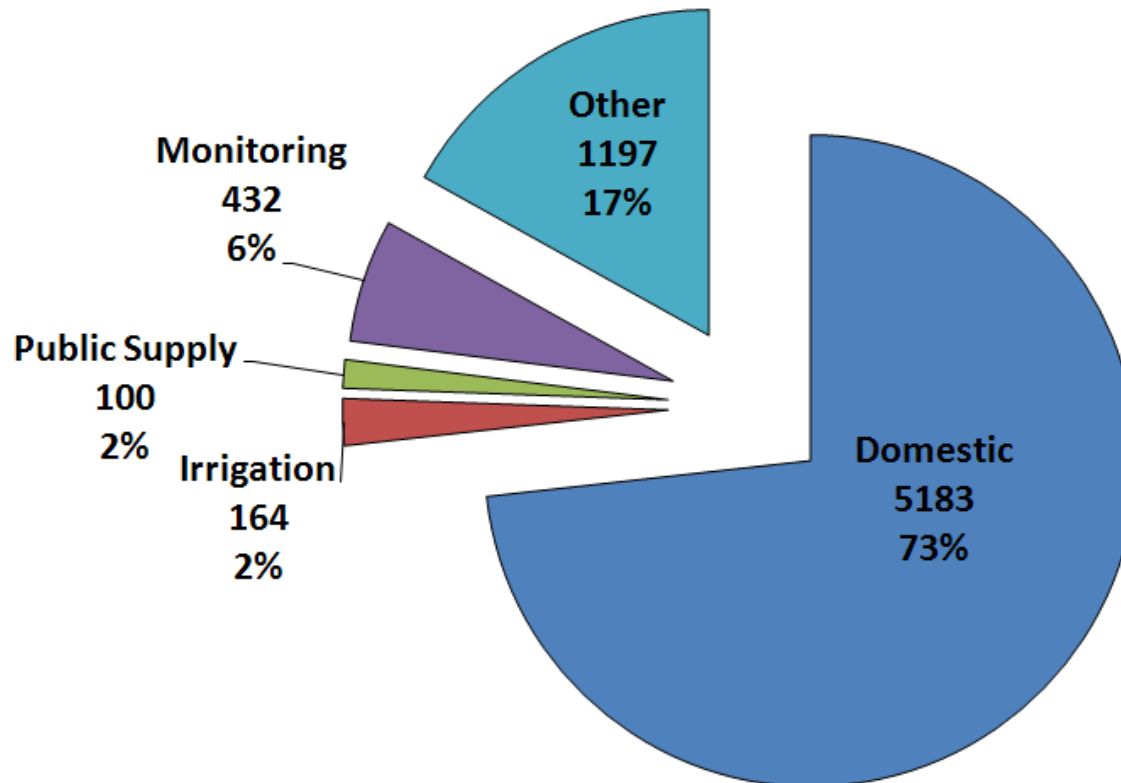


Bulletin 118-03: California's Groundwater

- 1-13 Little Lake Valley
- 1-51 Potter Valley
- 1-52 Ukiah Valley
- 1-19 Anderson Valley
- 1-53 Sanel Valley
- 1-56 McDowell Valley

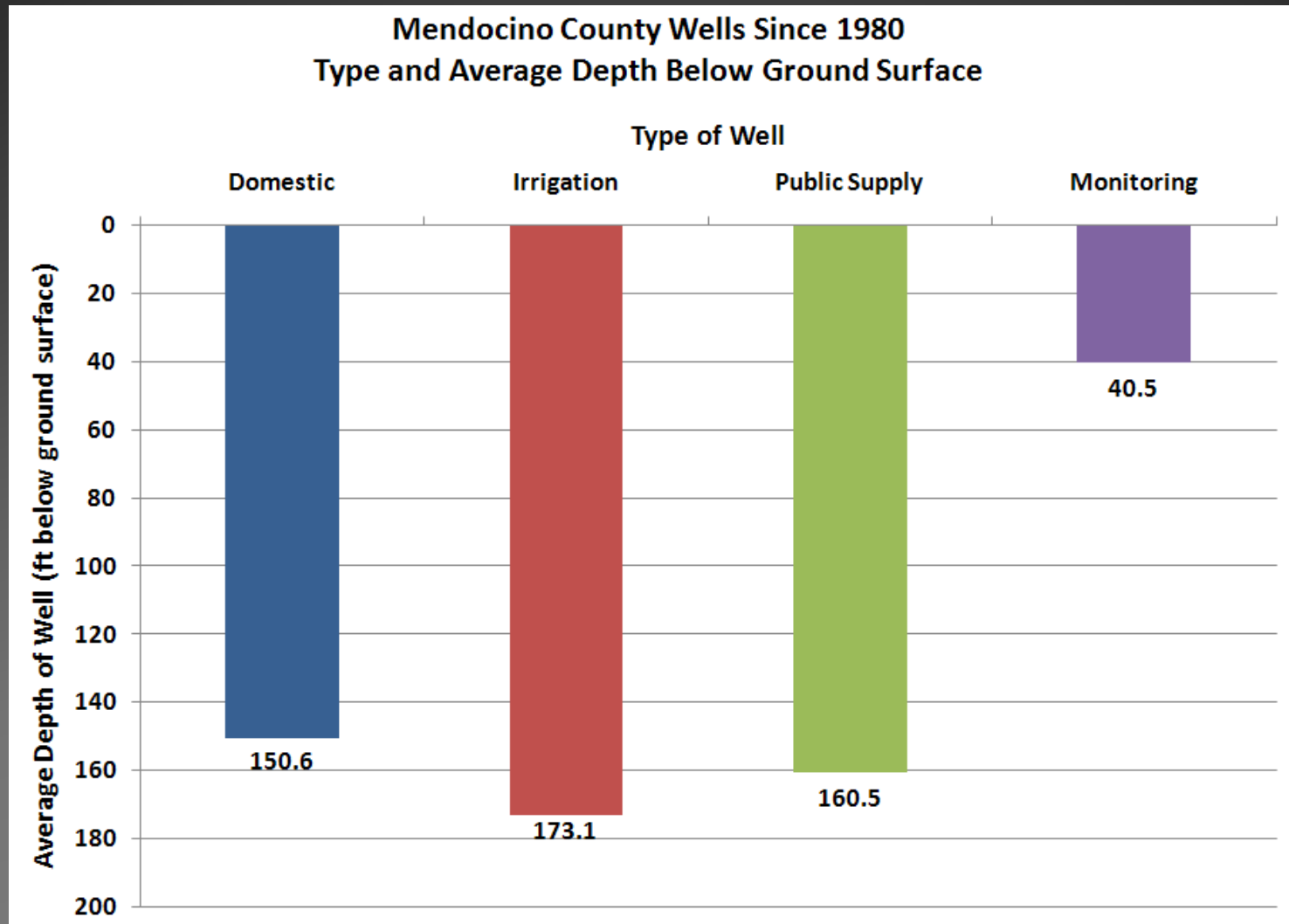
Mendocino County Groundwater

**Mendocino County Wells Since 1980
(Type, Number, % Total)**



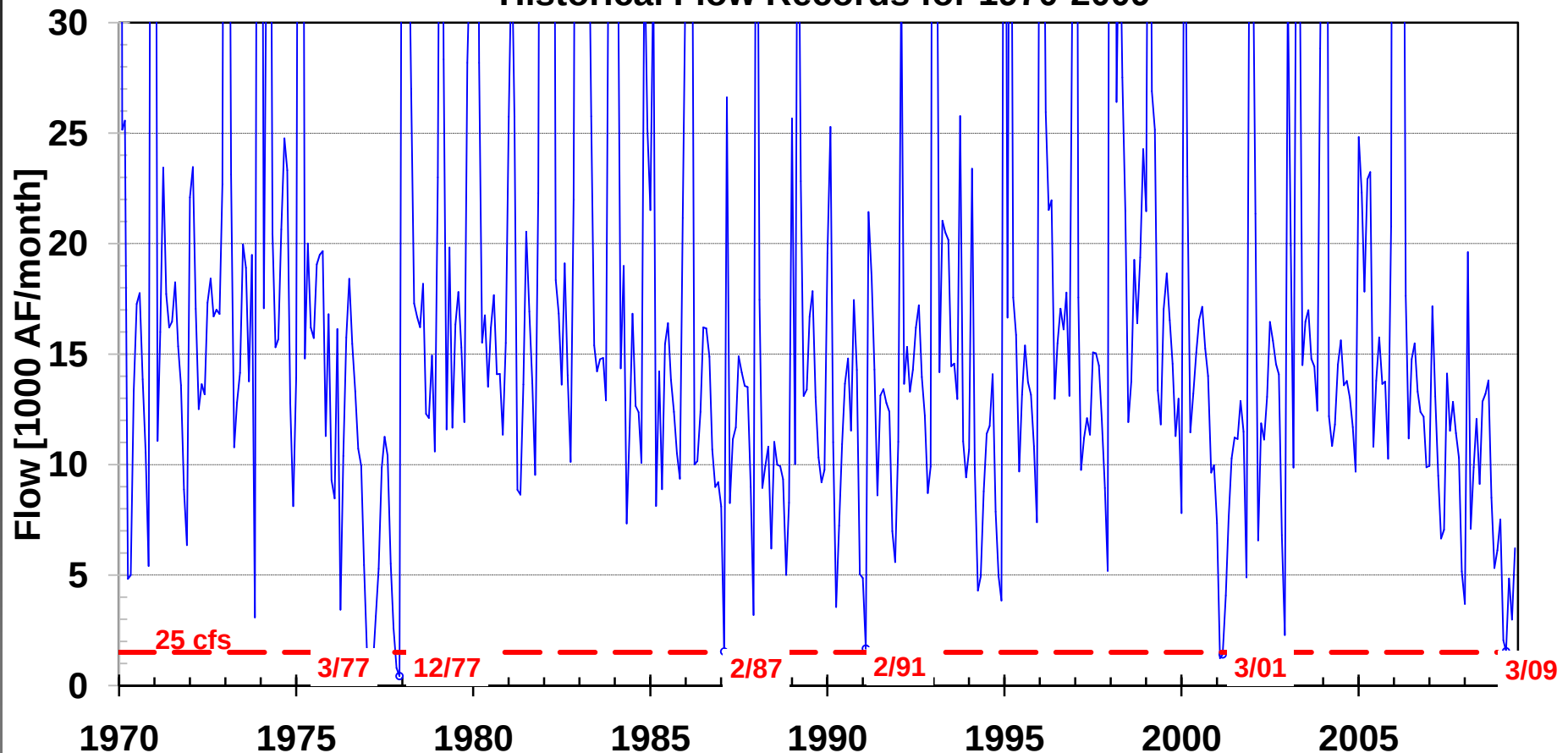
7,076 wells on
file with DWR

Mendocino County Groundwater

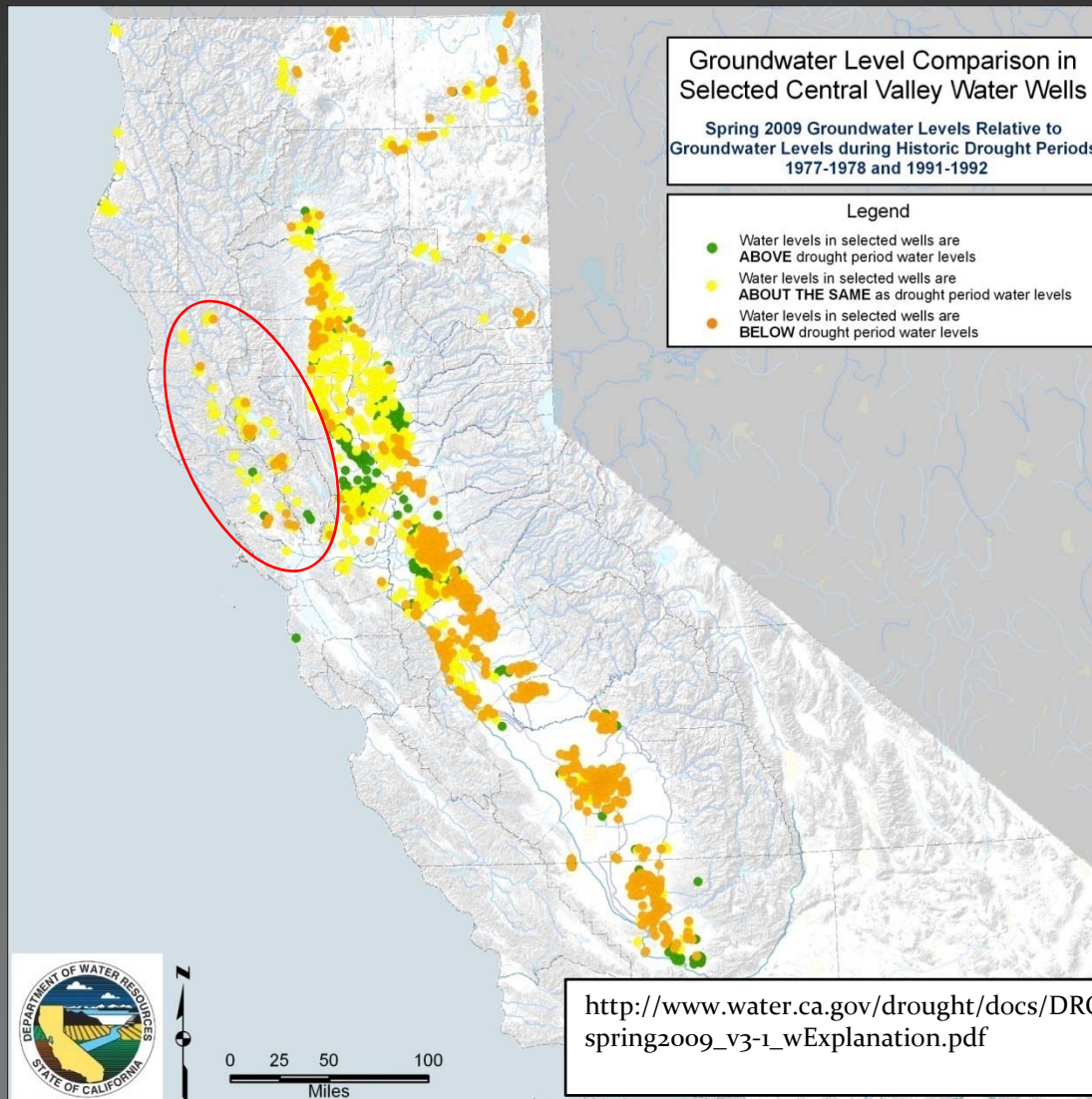


East Fork Russian River near Ukiah

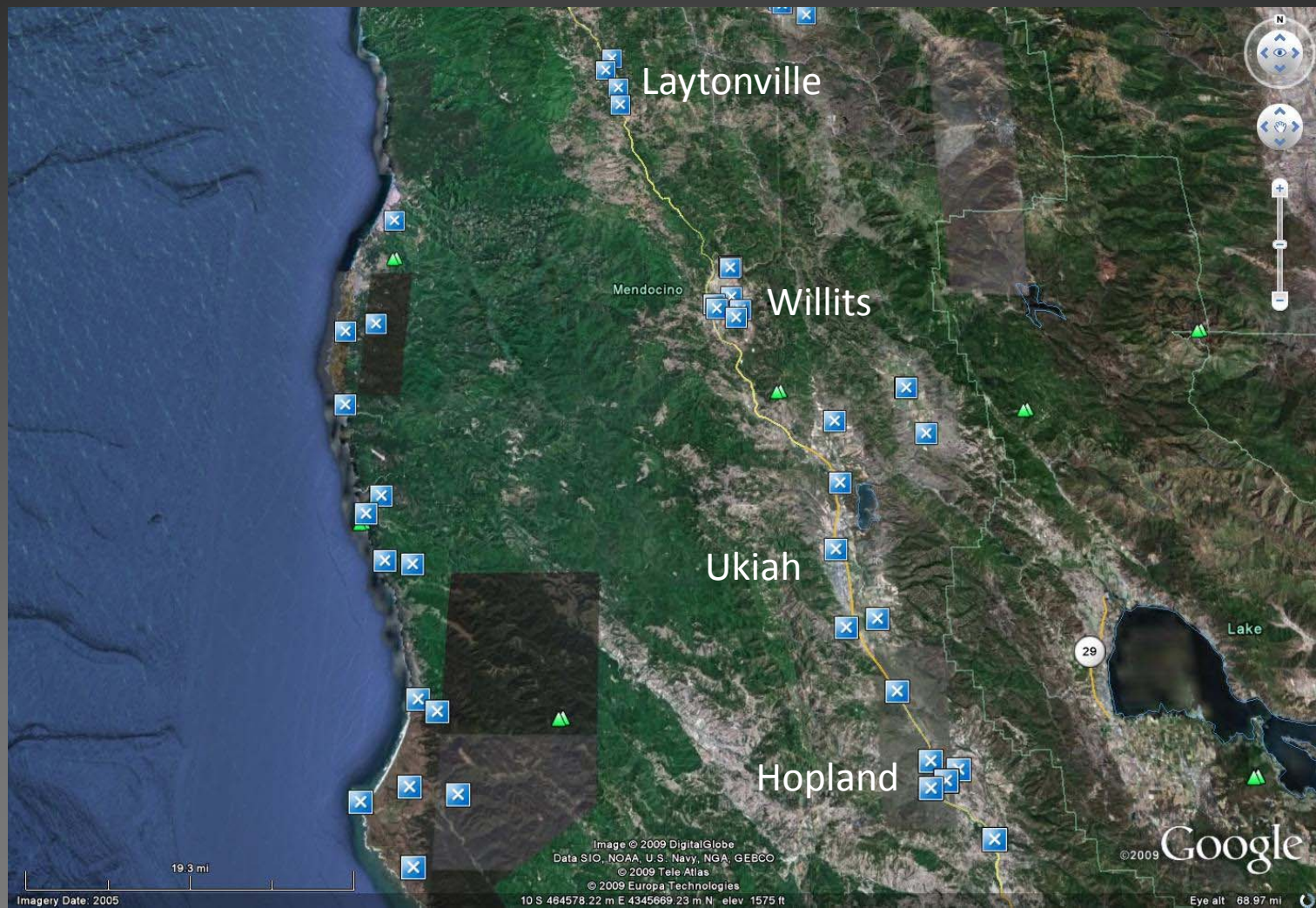
East Fork Russian River near Ukiah (USGS #11462000)
Historical Flow Records for 1970-2009



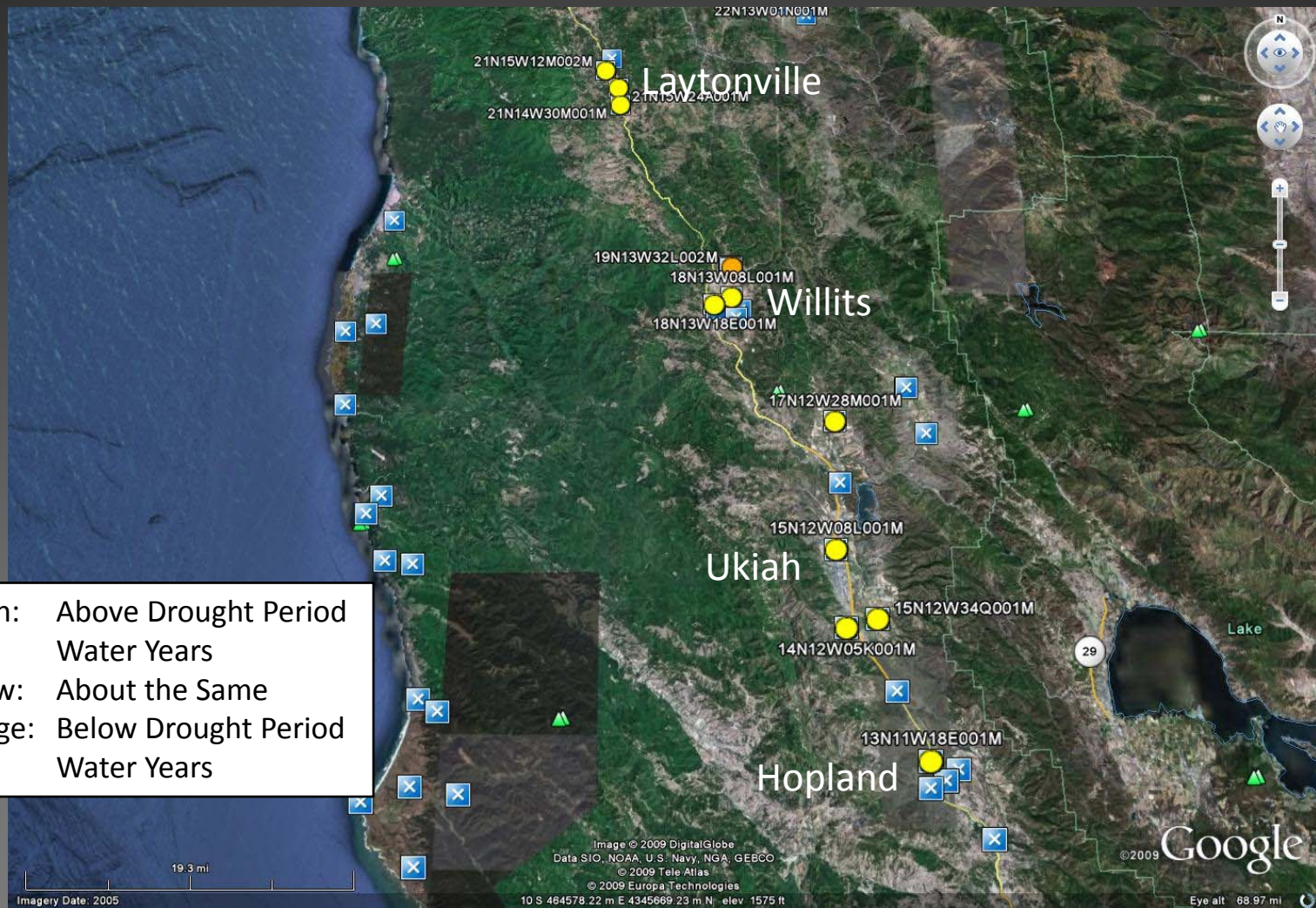
DWR's Drought "Dot Map"



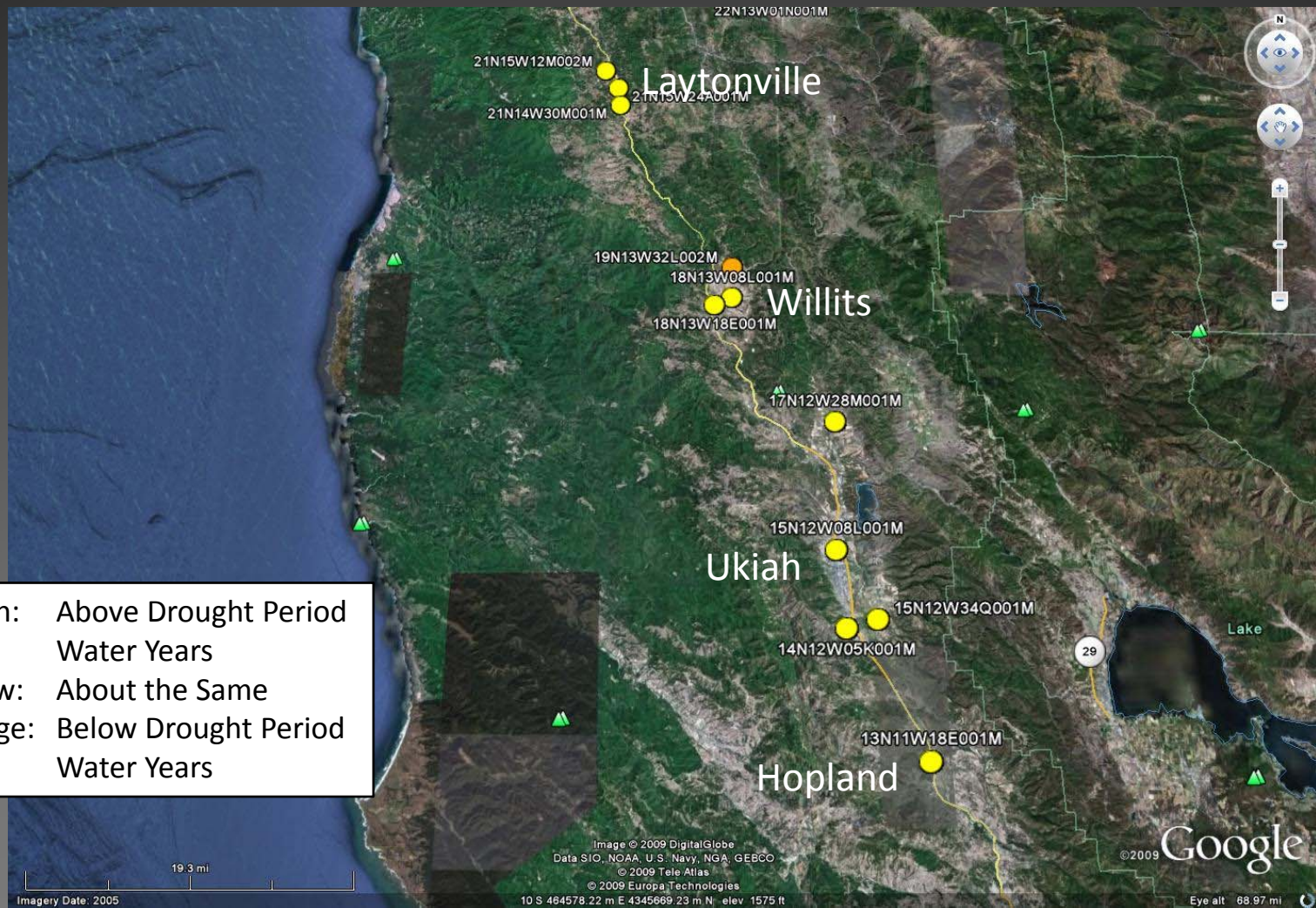
DWR Groundwater Monitoring Wells



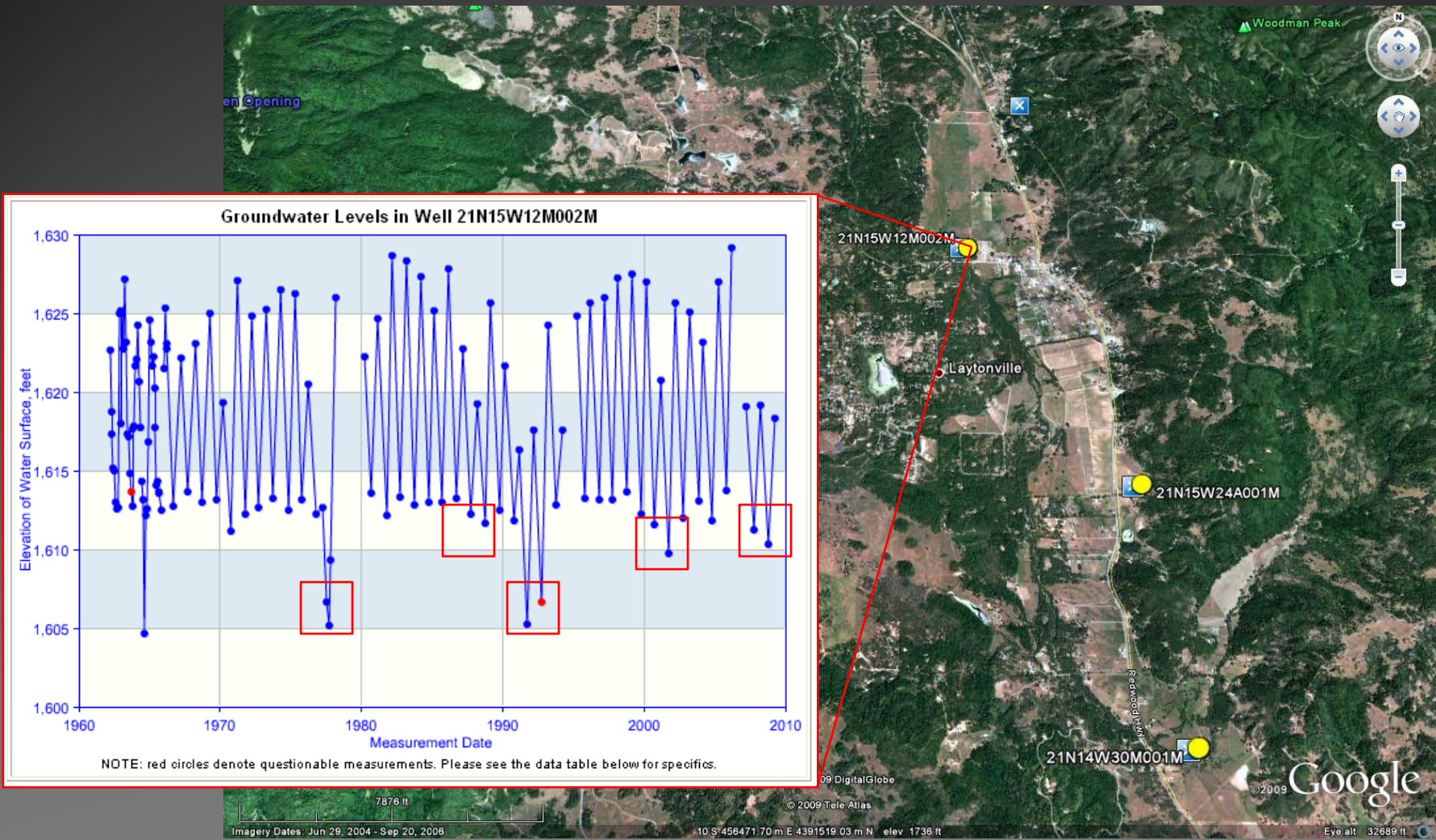
DWR Groundwater Monitoring Wells



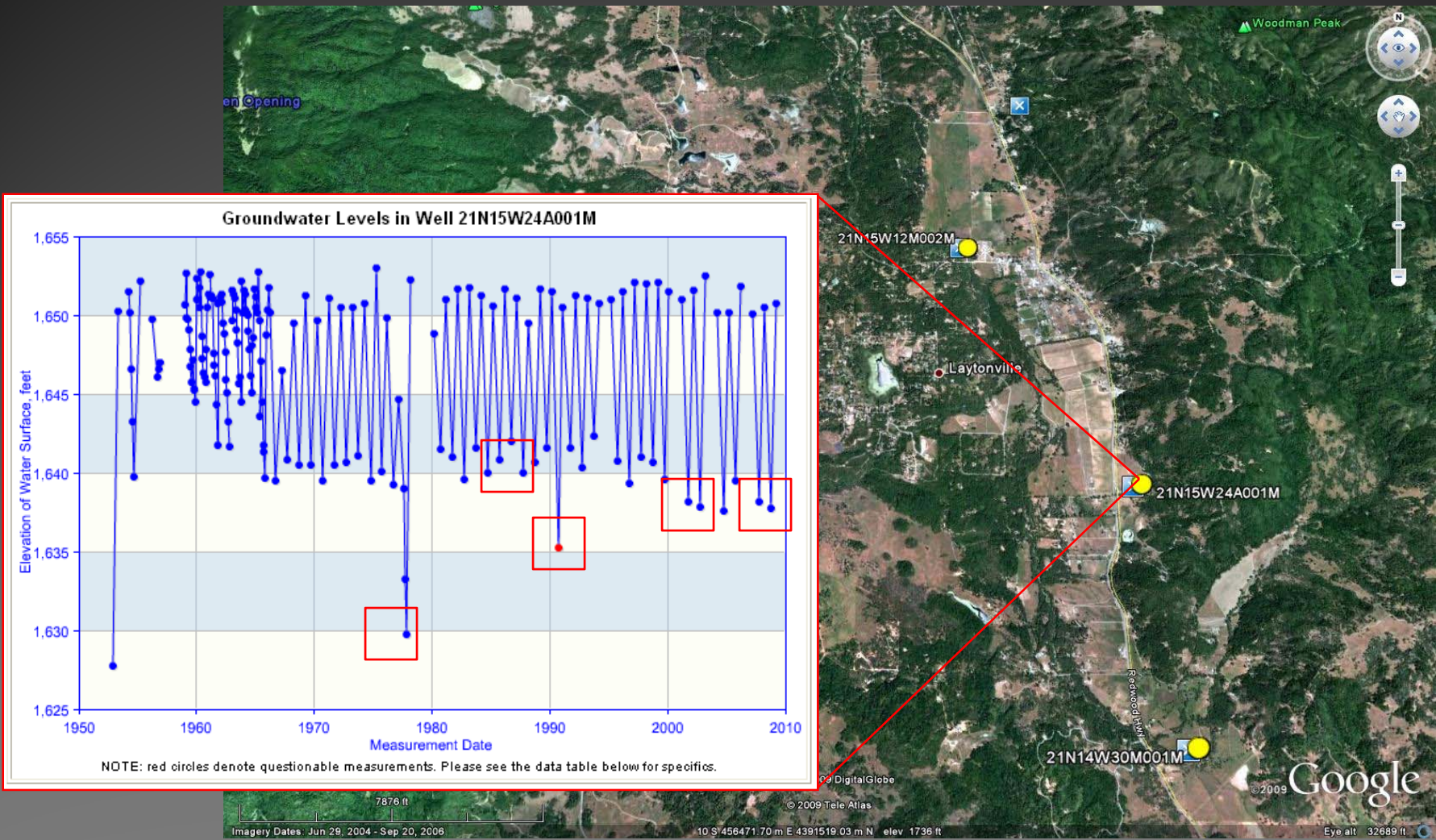
DWR Groundwater Monitoring Wells



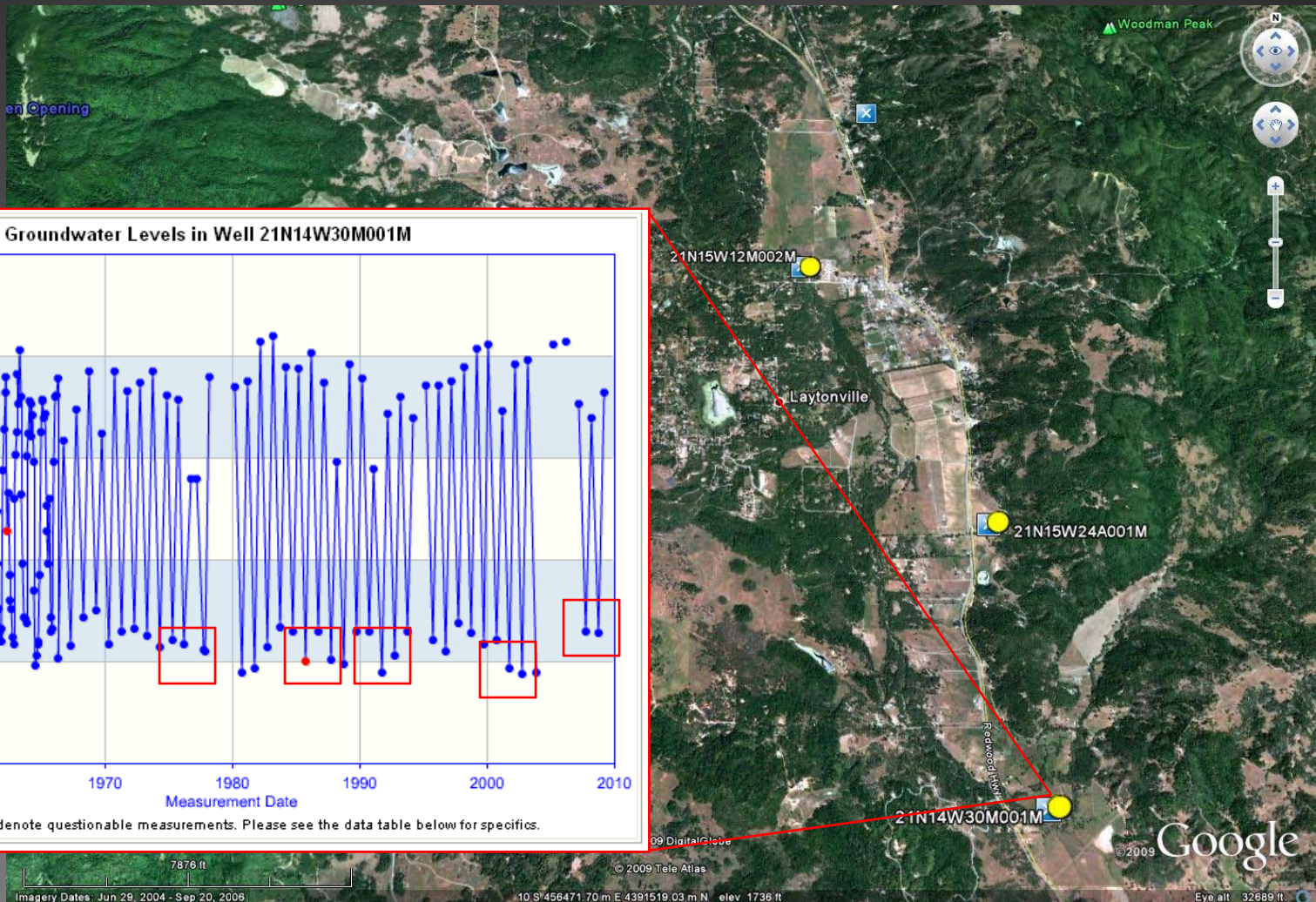
DWR Monitoring Wells – Laytonville Area



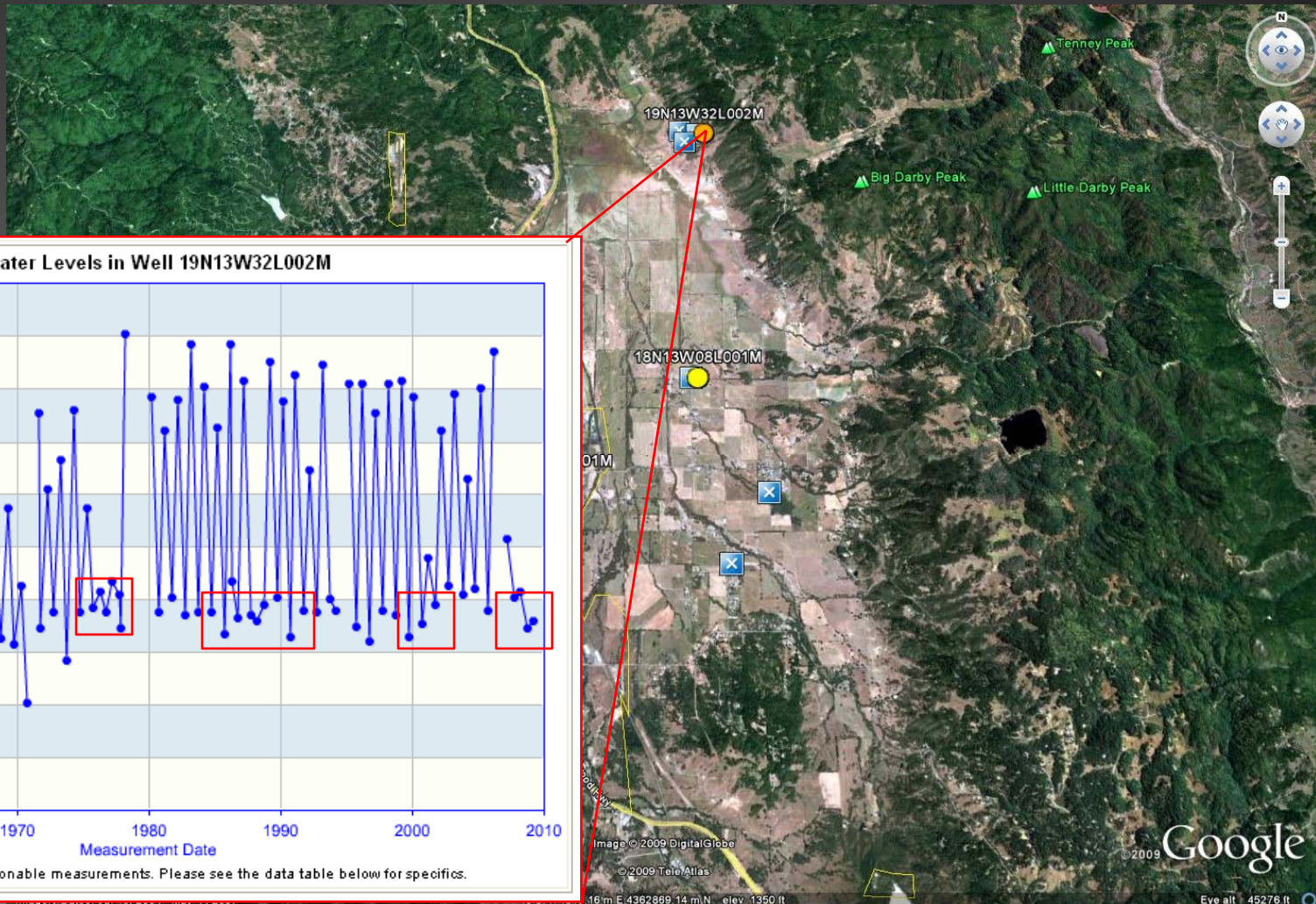
DWR Monitoring Wells – Laytonville Area



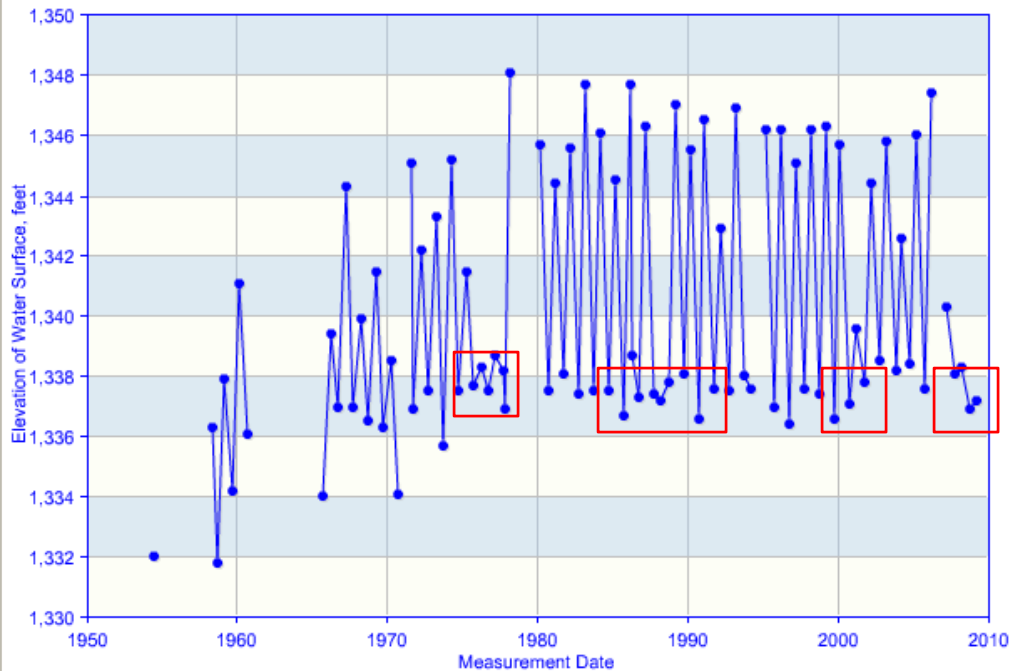
DWR Monitoring Wells – Laytonville Area



DWR Monitoring Wells – Willits Area

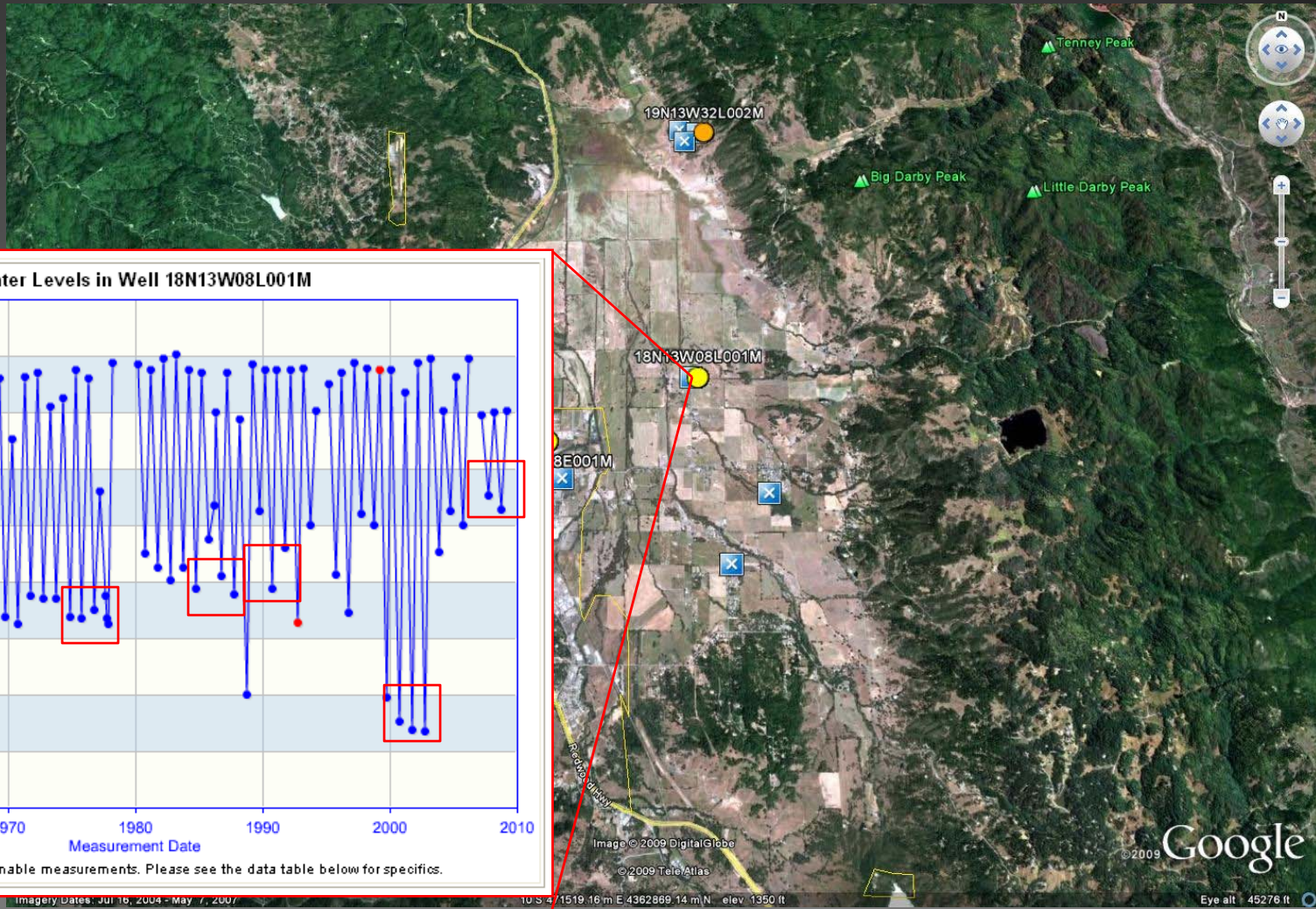


Groundwater Levels in Well 19N13W32L002M

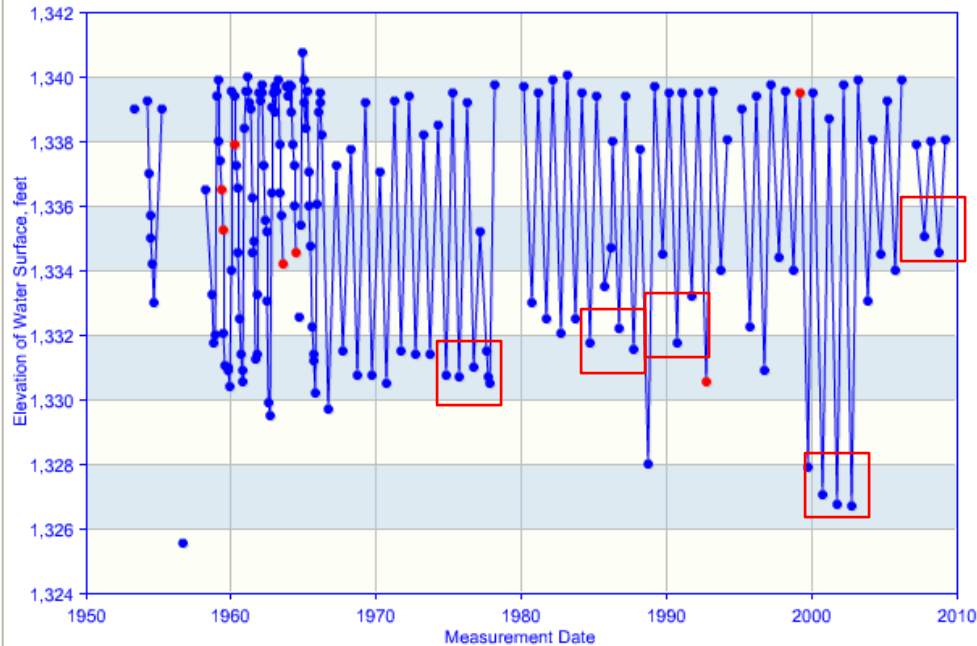


NOTE: red circles denote questionable measurements. Please see the data table below for specifics.

DWR Monitoring Wells – Willits Area

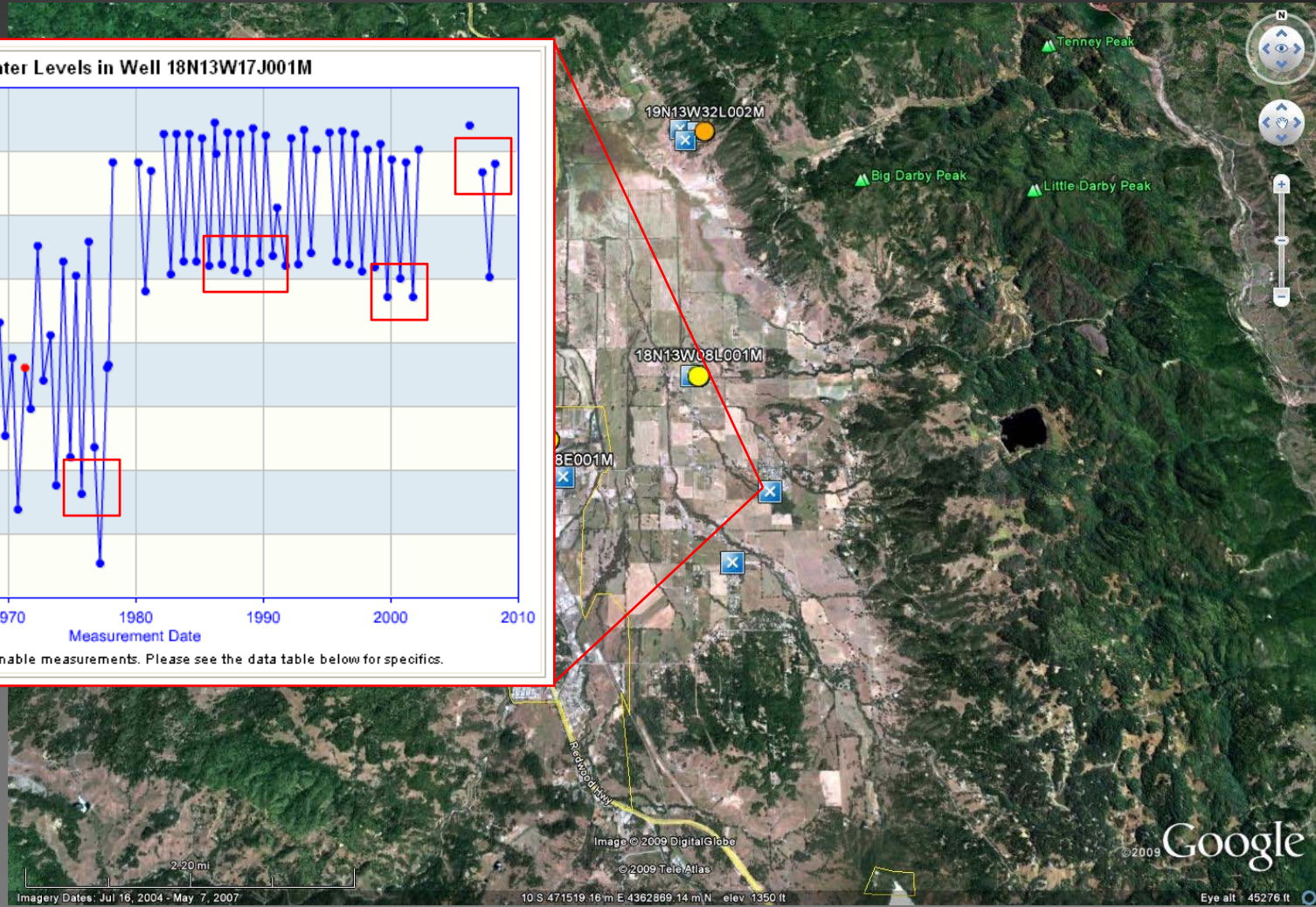
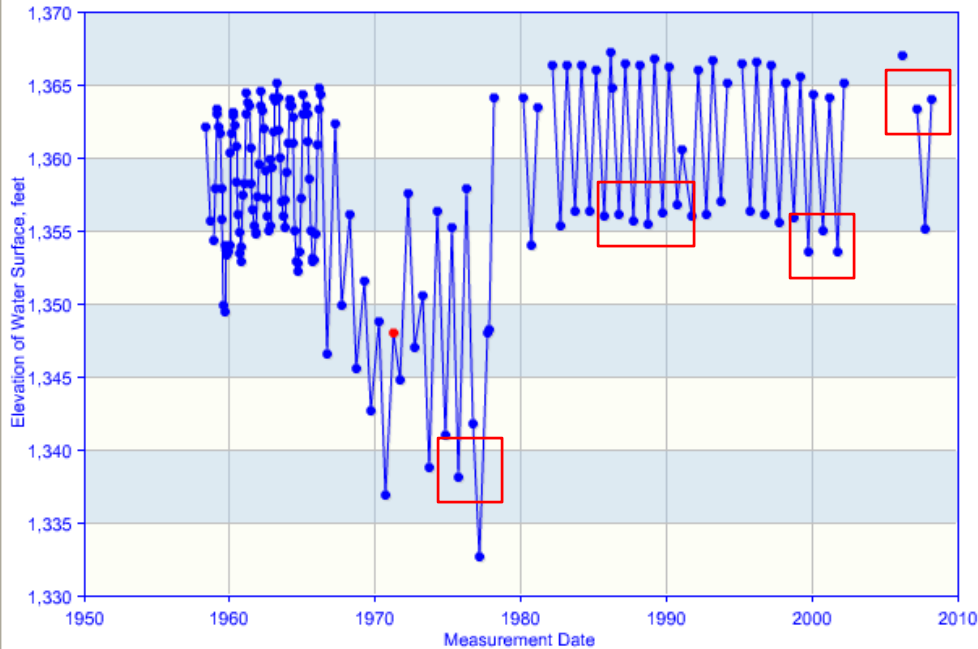


Groundwater Levels in Well 18N13W08L001M

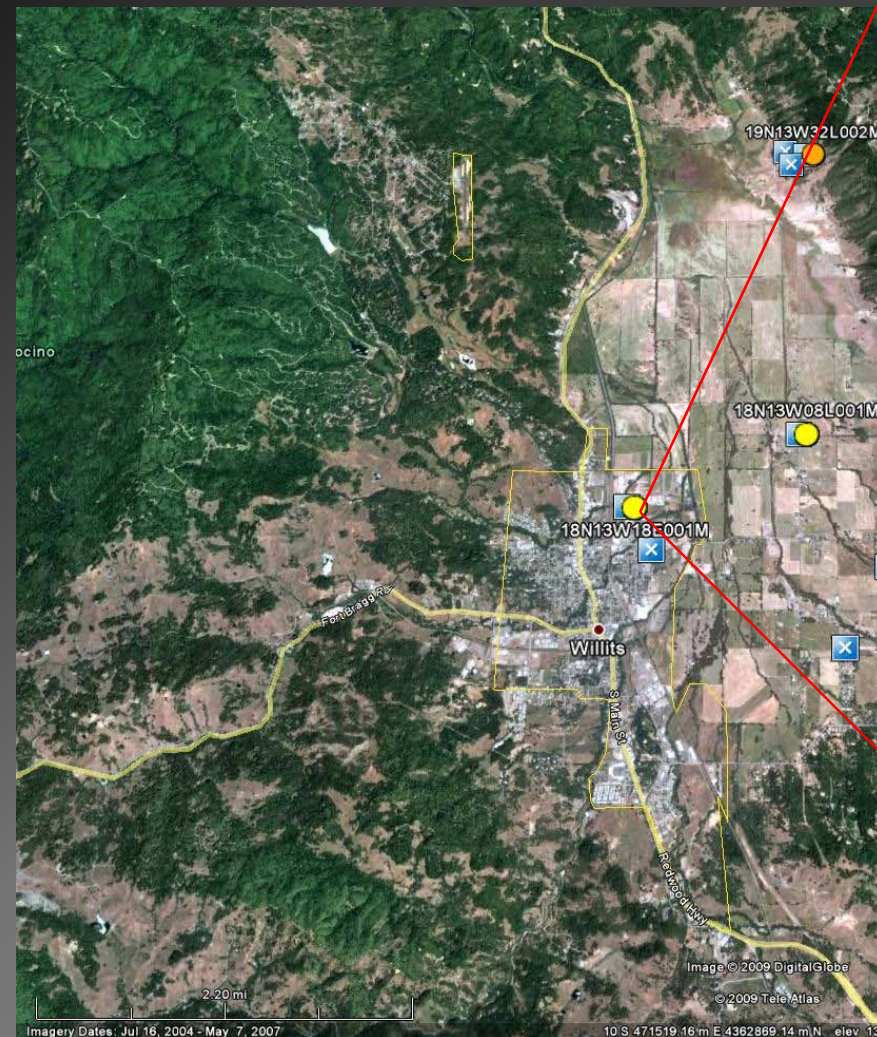


DWR Monitoring Wells – Willits Area

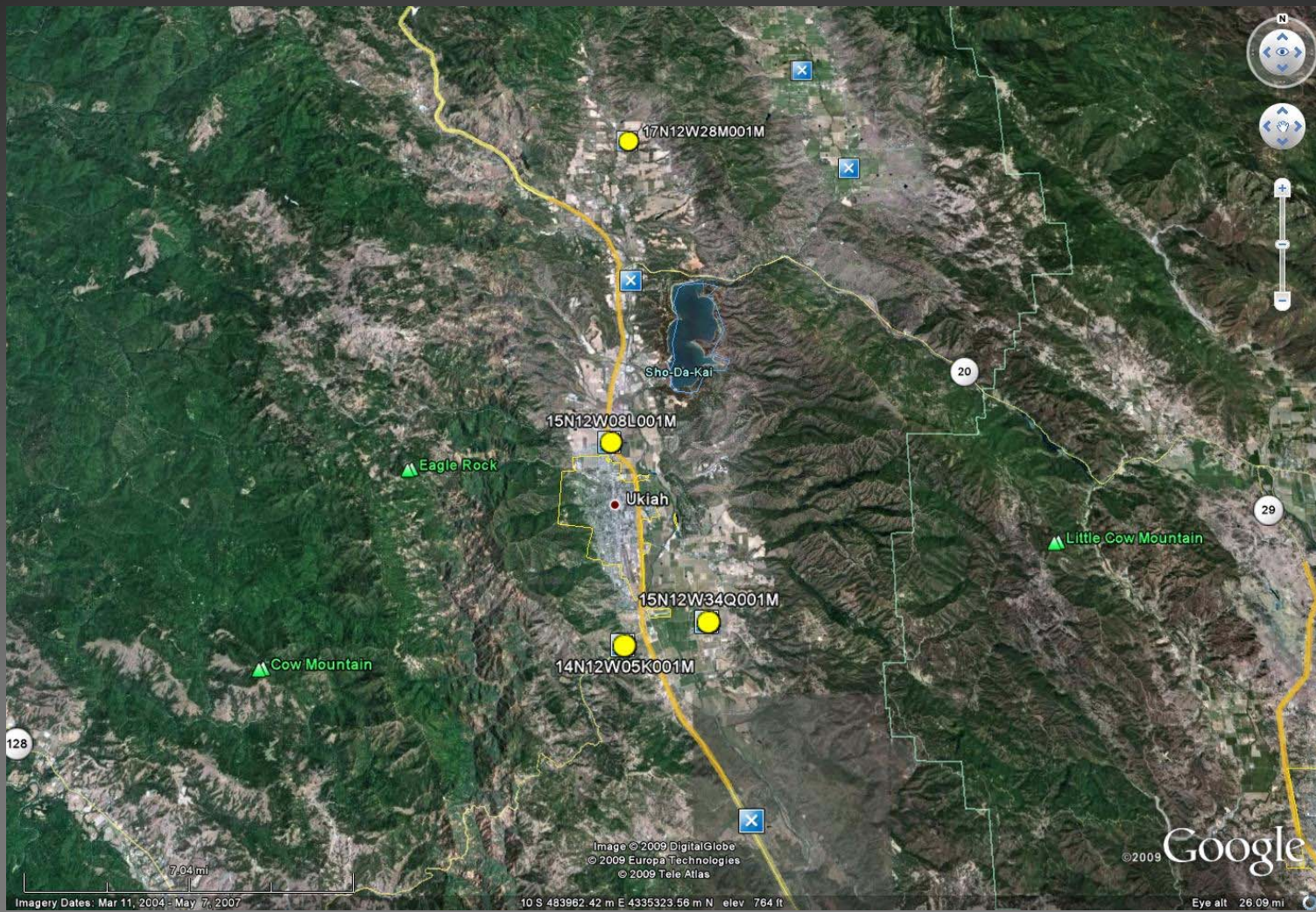
Groundwater Levels in Well 18N13W17J001M



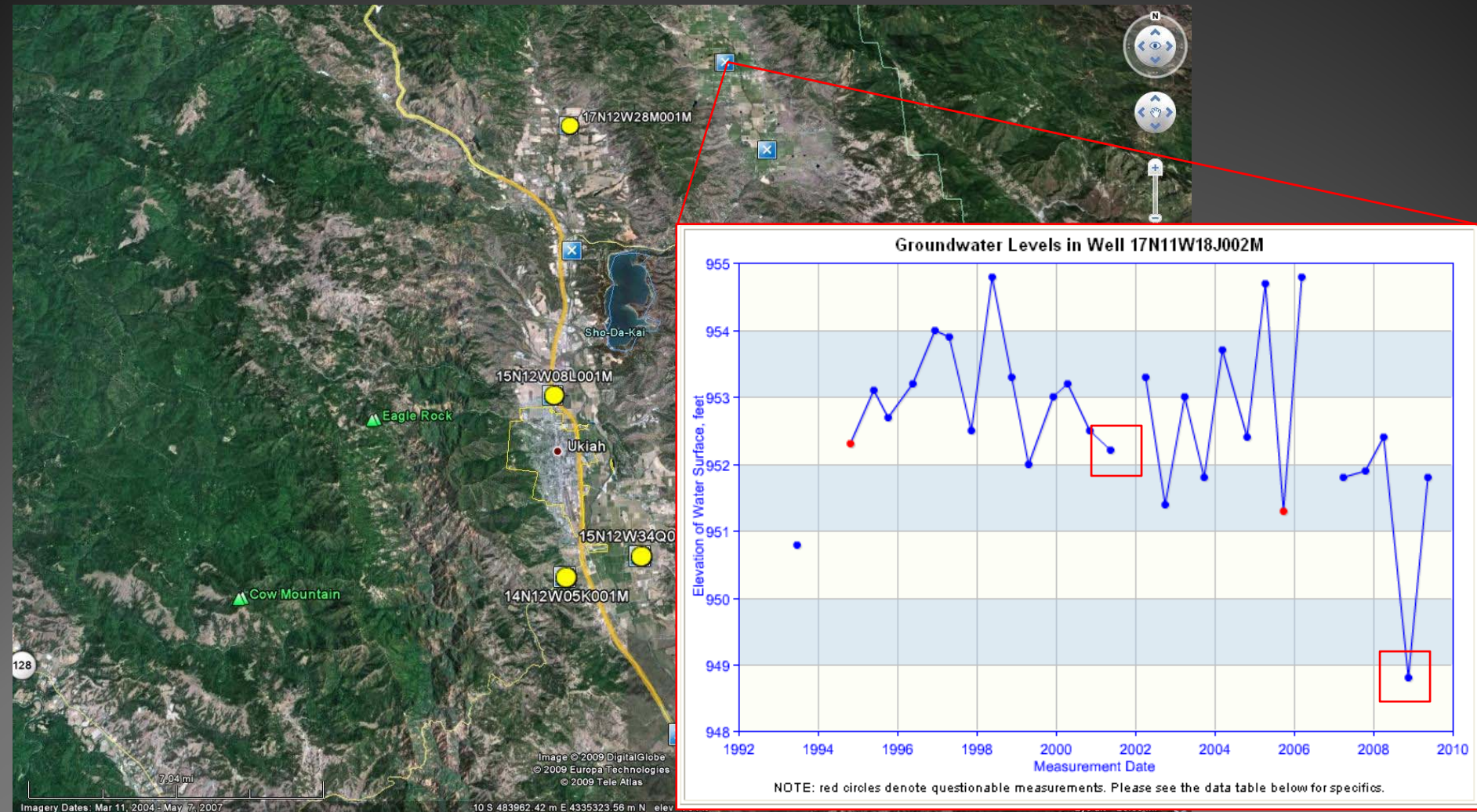
DWR Monitoring Wells – Willits Area



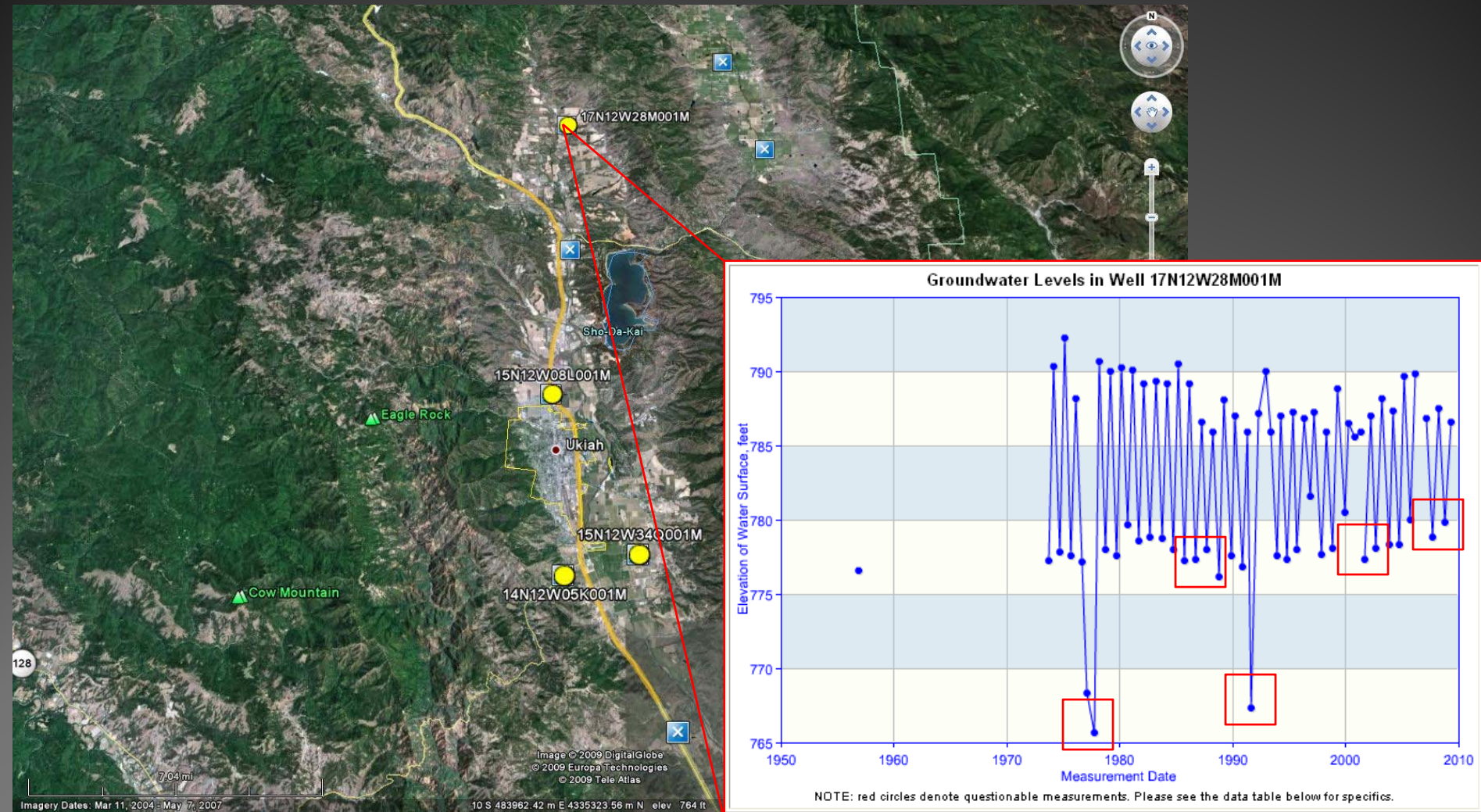
DWR Monitoring Wells – Ukiah Area



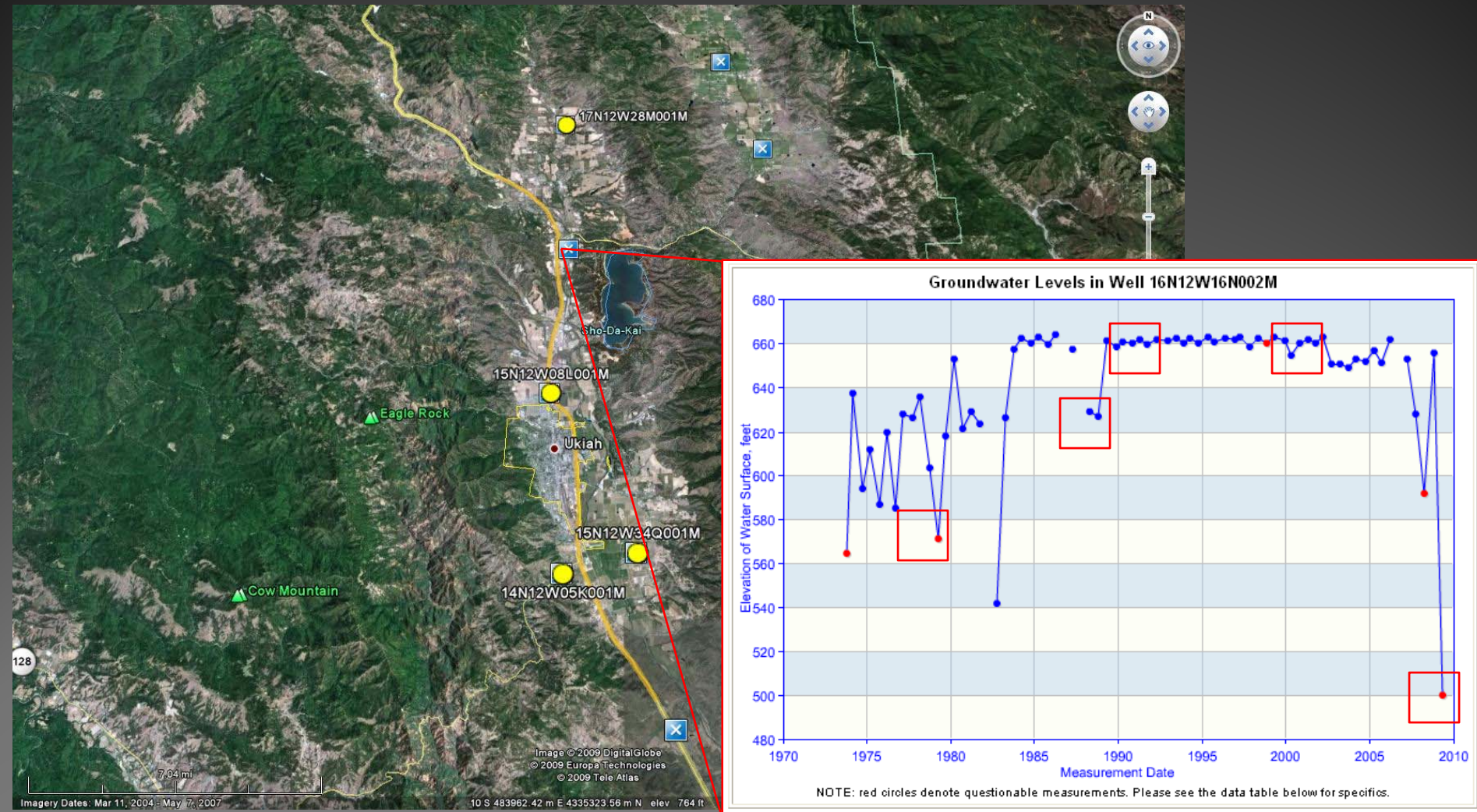
DWR Monitoring Wells – Potter Valley Area



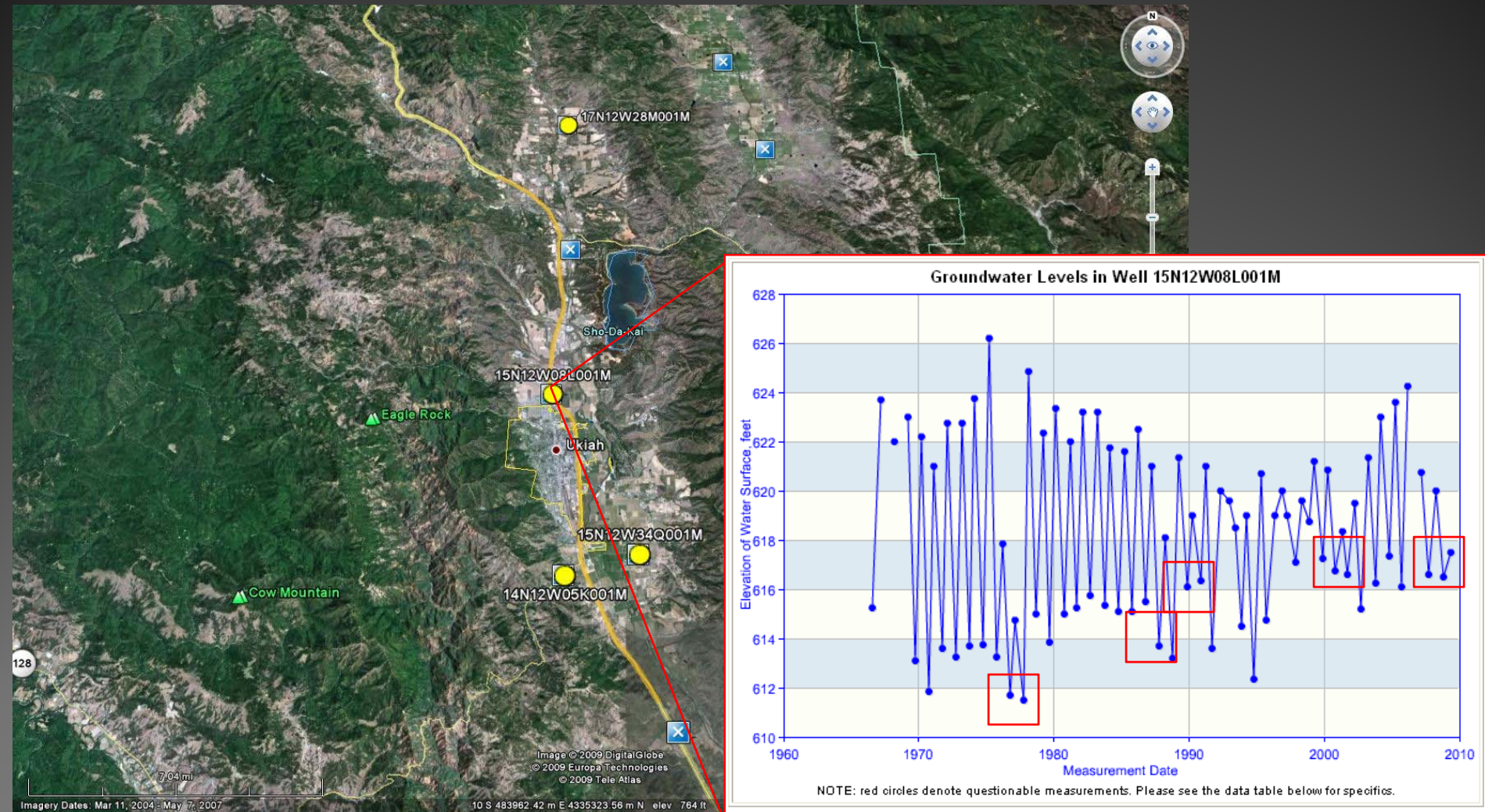
DWR Monitoring Wells – Ukiah Area



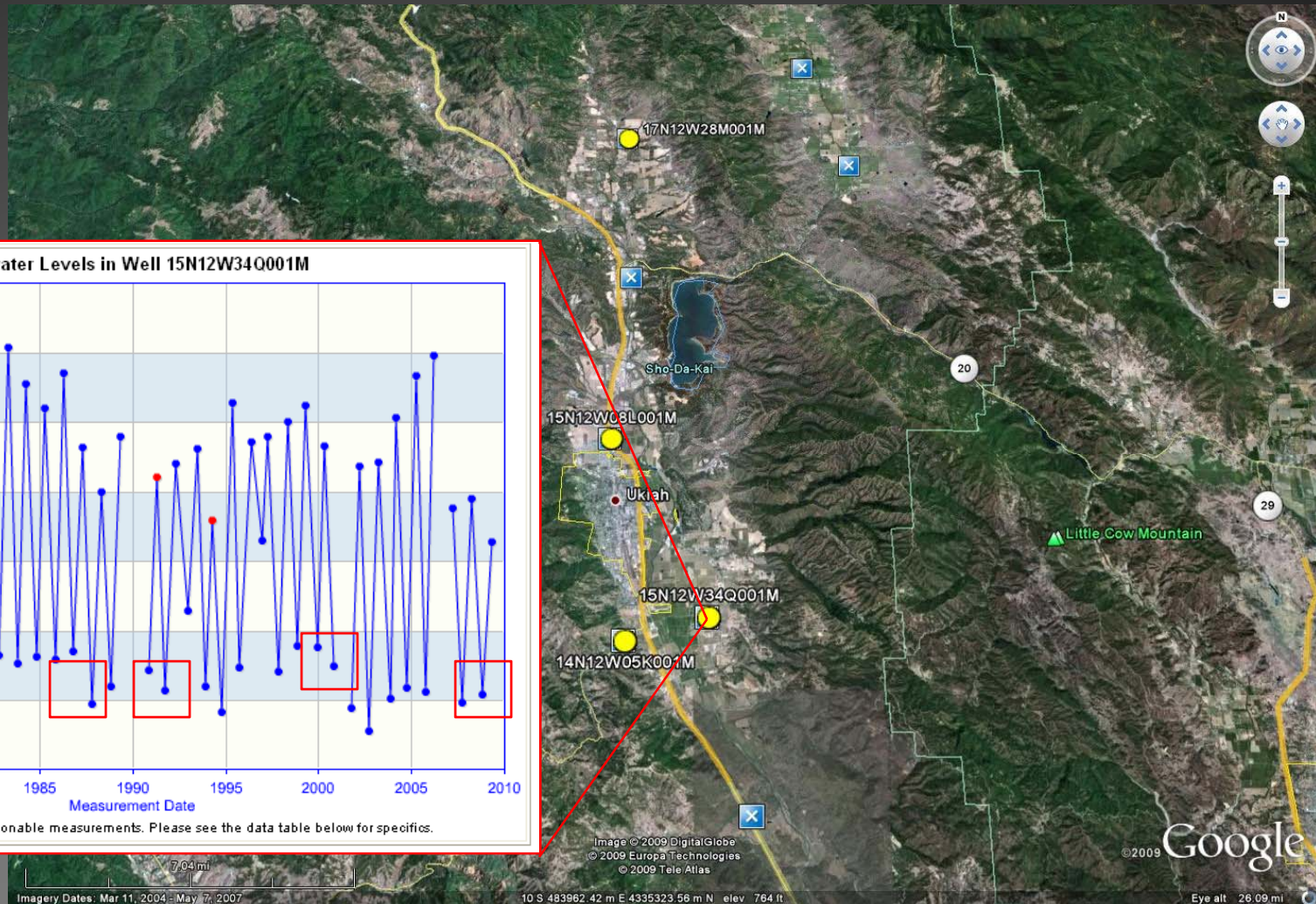
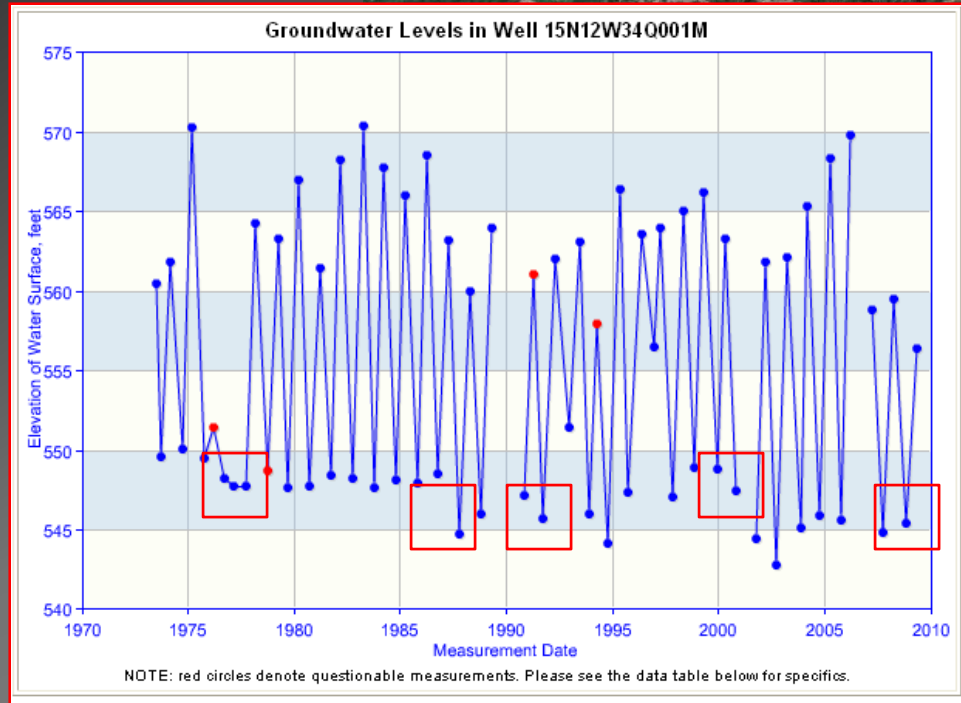
DWR Monitoring Wells – Ukiah Area



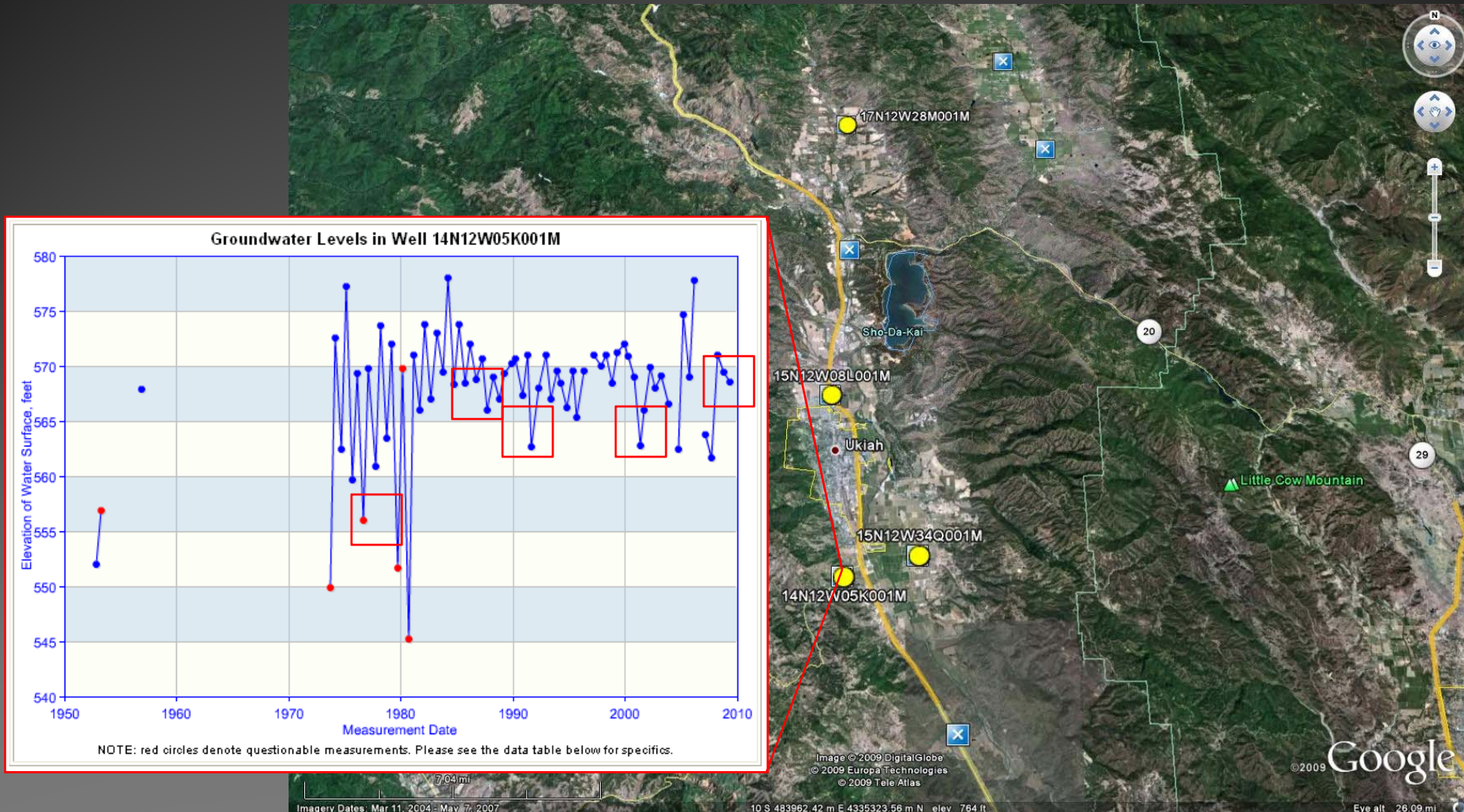
DWR Monitoring Wells – Ukiah Area



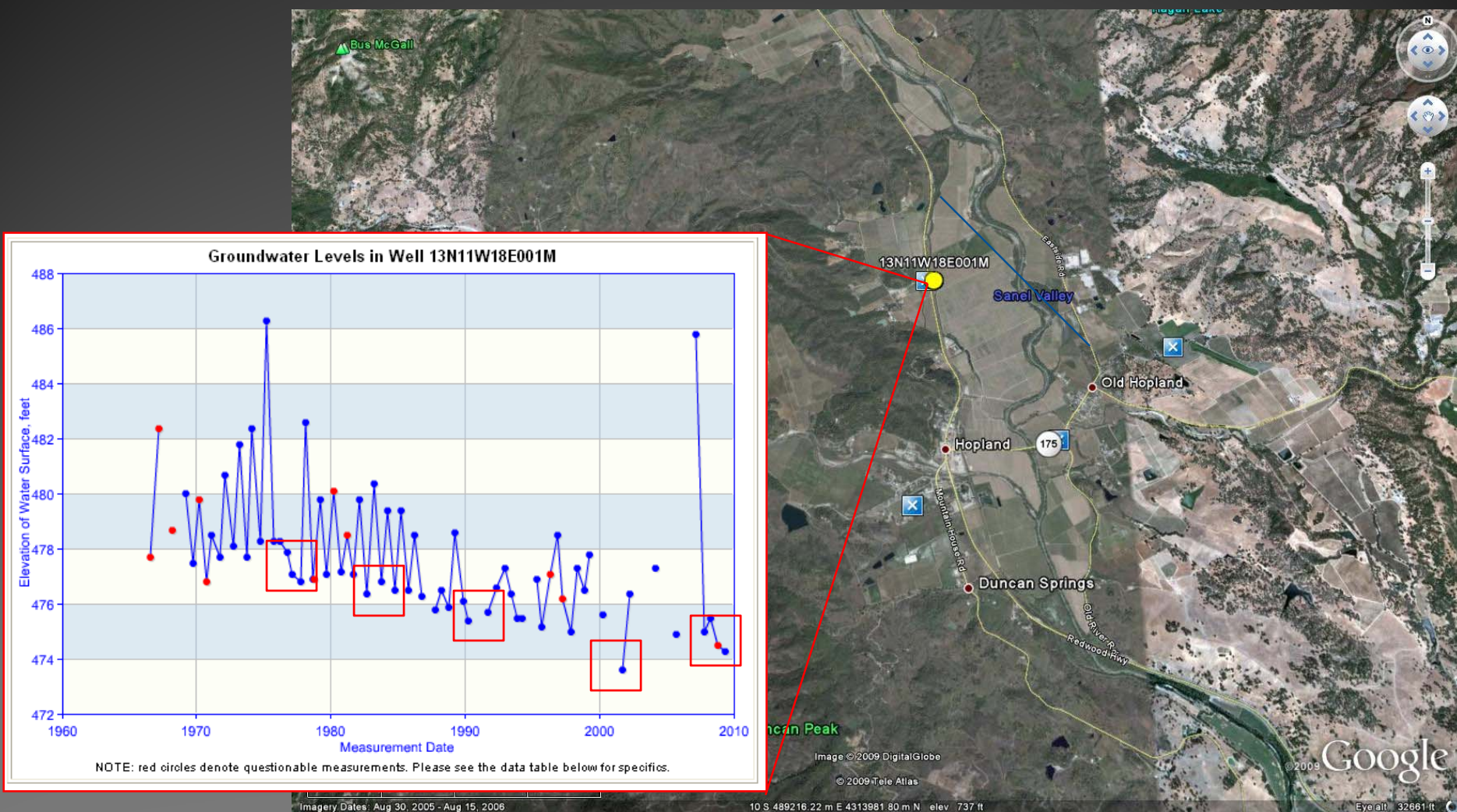
DWR Monitoring Wells – Ukiah Area



DWR Monitoring Wells – Ukiah Area



DWR Monitoring Wells – Hopland Area



Groundwater Level Data

- DWR Water Data Library (WDL)
 - <http://www.water.ca.gov/waterdatalibrary/>
- DWR Integrated Water Resources Information System (IWRIS)
 - <http://www.water.ca.gov/iwris/>

Groundwater and Drought Information

- DWR Groundwater Information Center
 - <http://www.water.ca.gov/groundwater/>
- DWR Drought Conditions
 - <http://www.water.ca.gov/drought/>
- USGS California Water Science Center
 - <http://ca.water.usgs.gov/>

For Further Information Contact

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