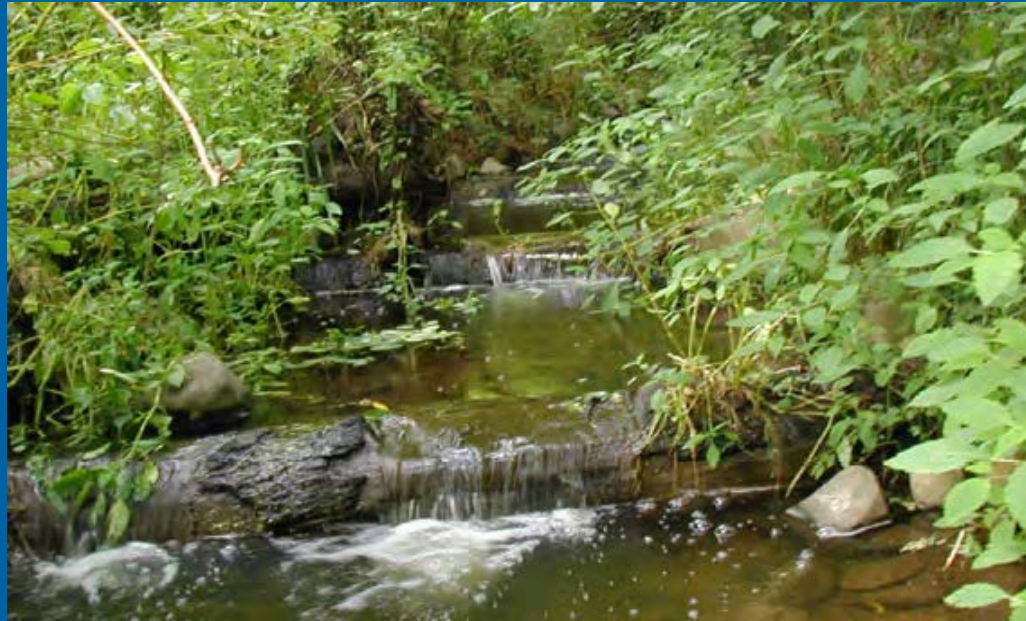
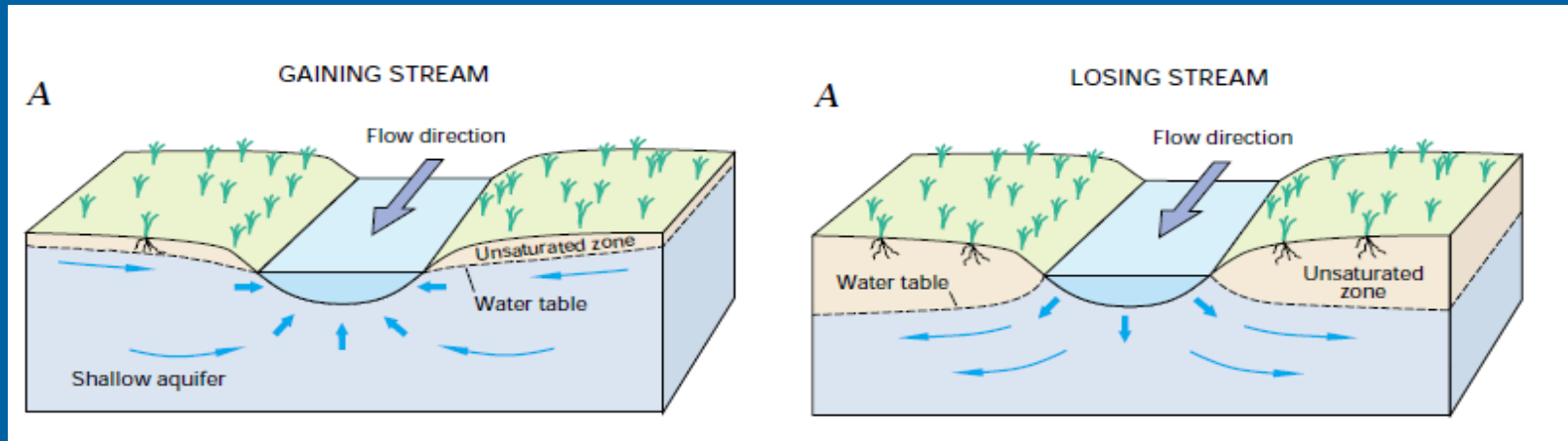


# Groundwater: An Unseen Resource in the Johnson Creek Watershed

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# Groundwater and stream connection



**Groundwater flows to streams:  
GW level > stream stage**

**Stream water flows to aquifer :  
GW level < stream stage**



**Groundwater levels increase: More groundwater flow to streams**

# Wells—our view of groundwater

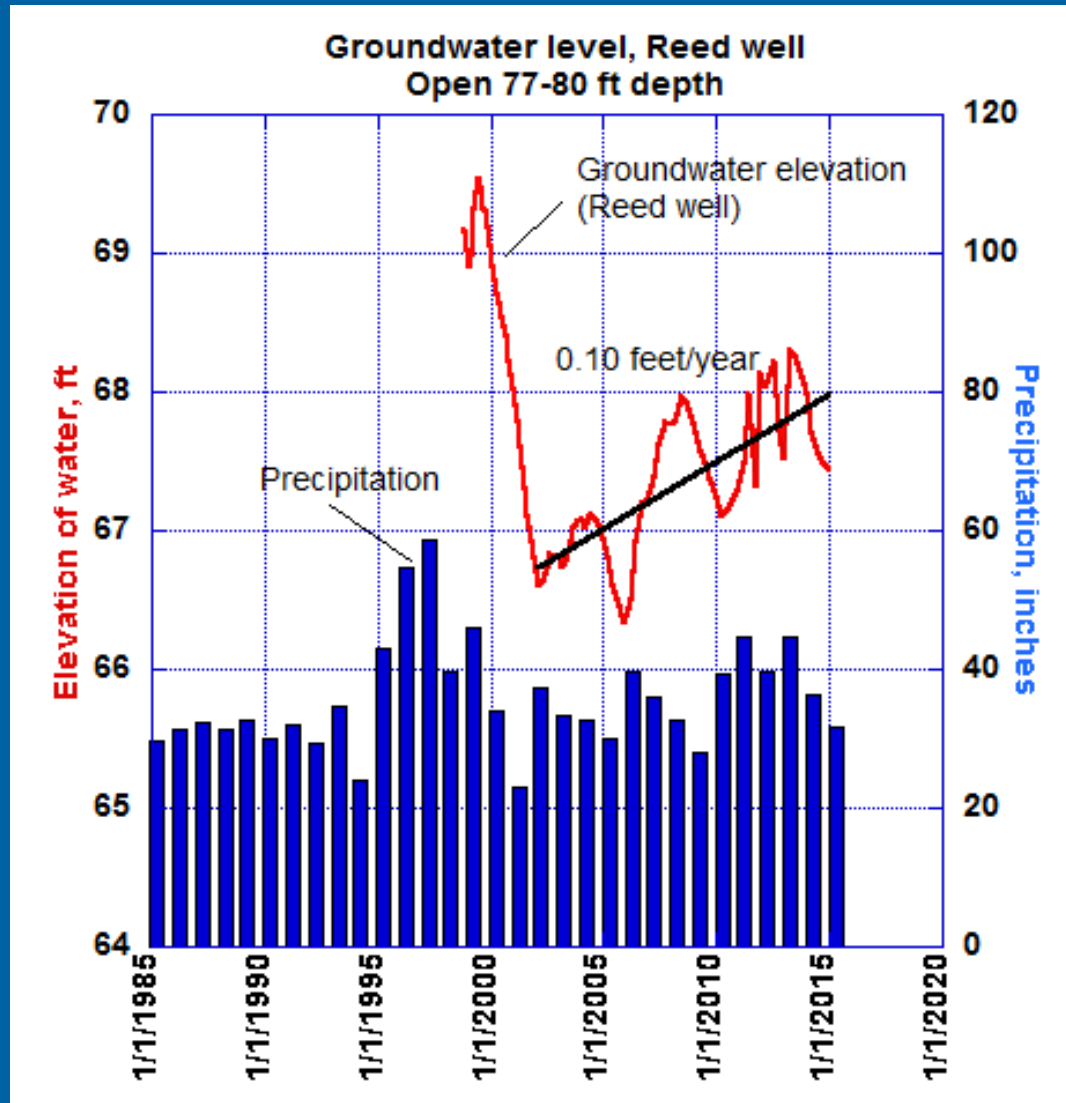


# Rainfall and groundwater levels

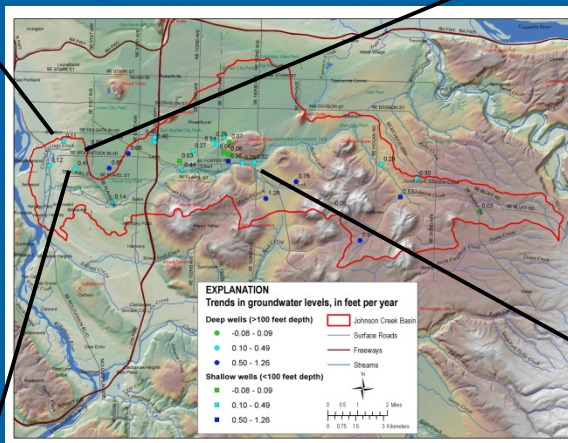
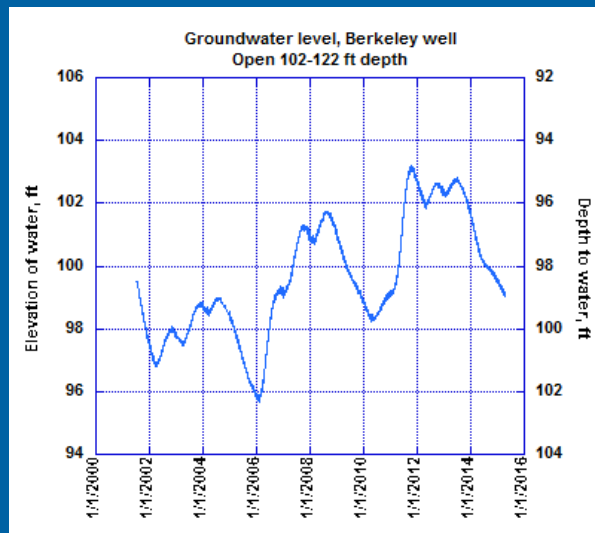
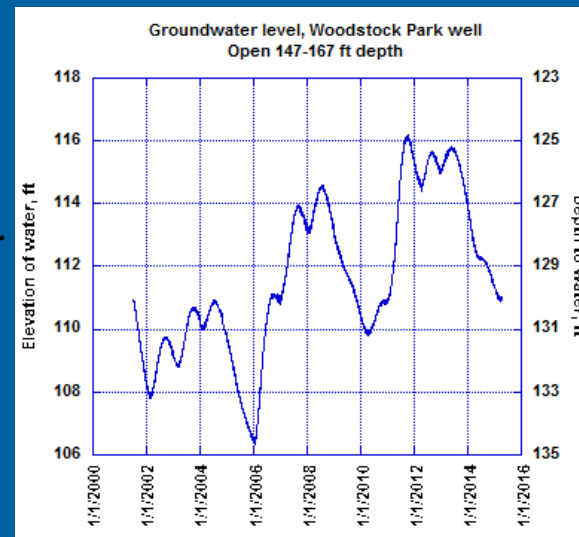
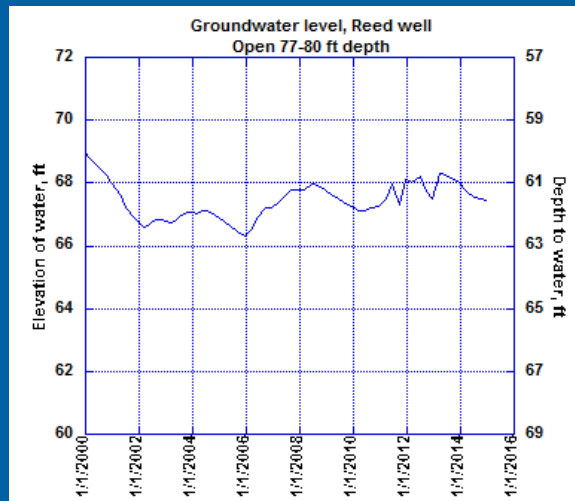
High precipitation 1995-97  
High water levels 1998-00

Average precipitation 2000-15  
Increasing water levels  
2003-15

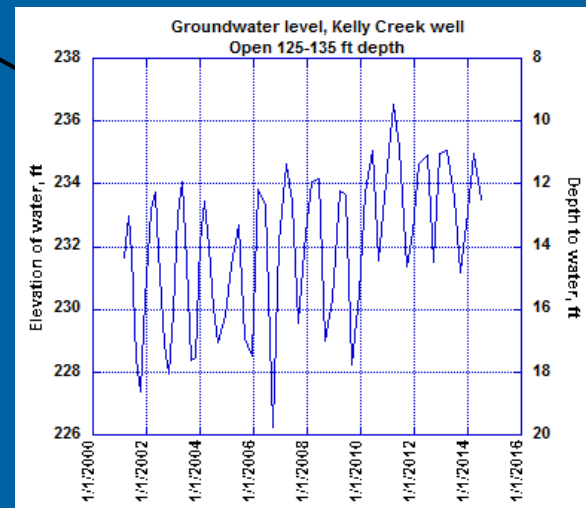
Increasing water levels:  
Is this widespread?  
Why does this occur?  
What are consequences?



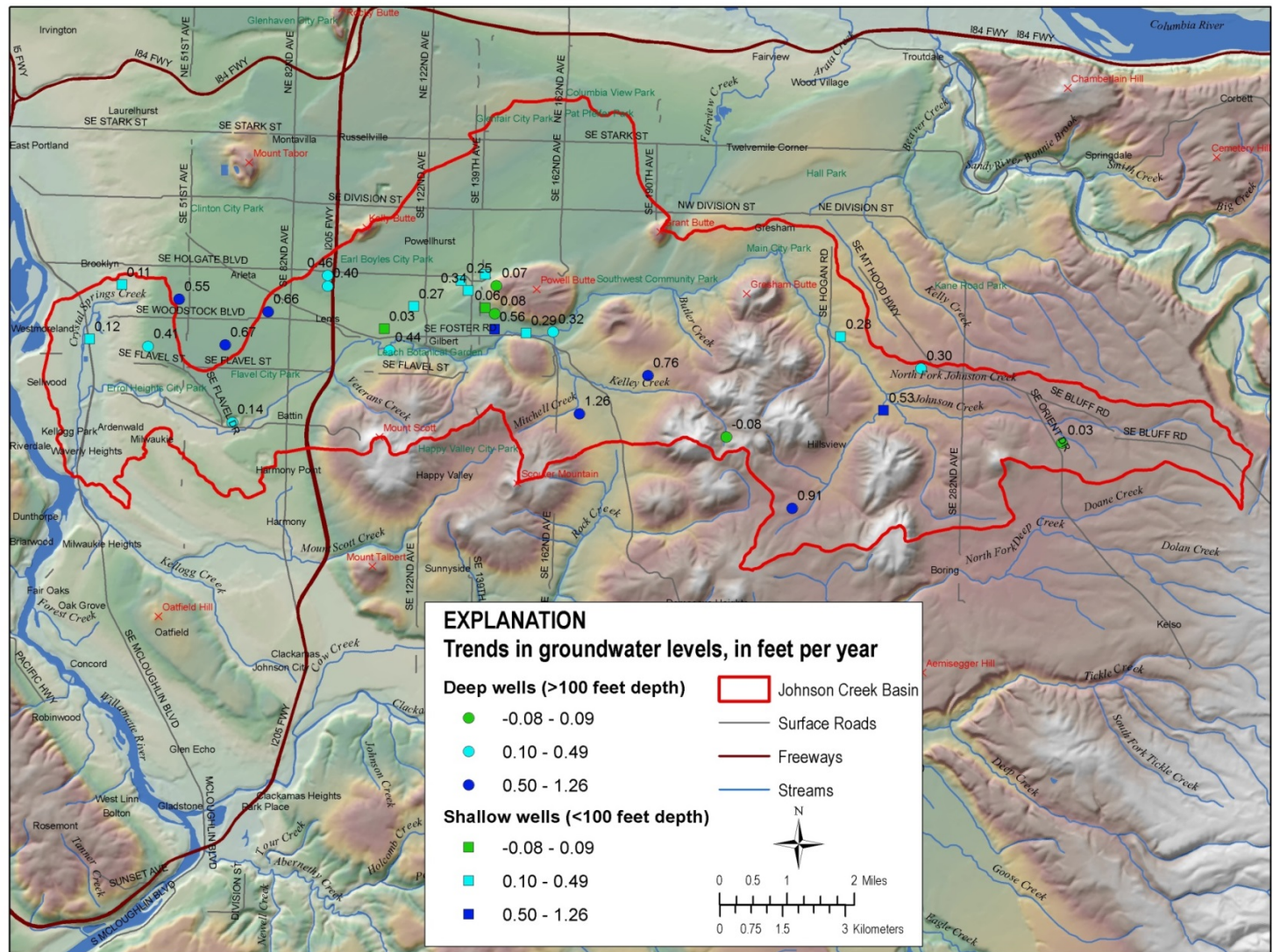
# Patterns in groundwater levels



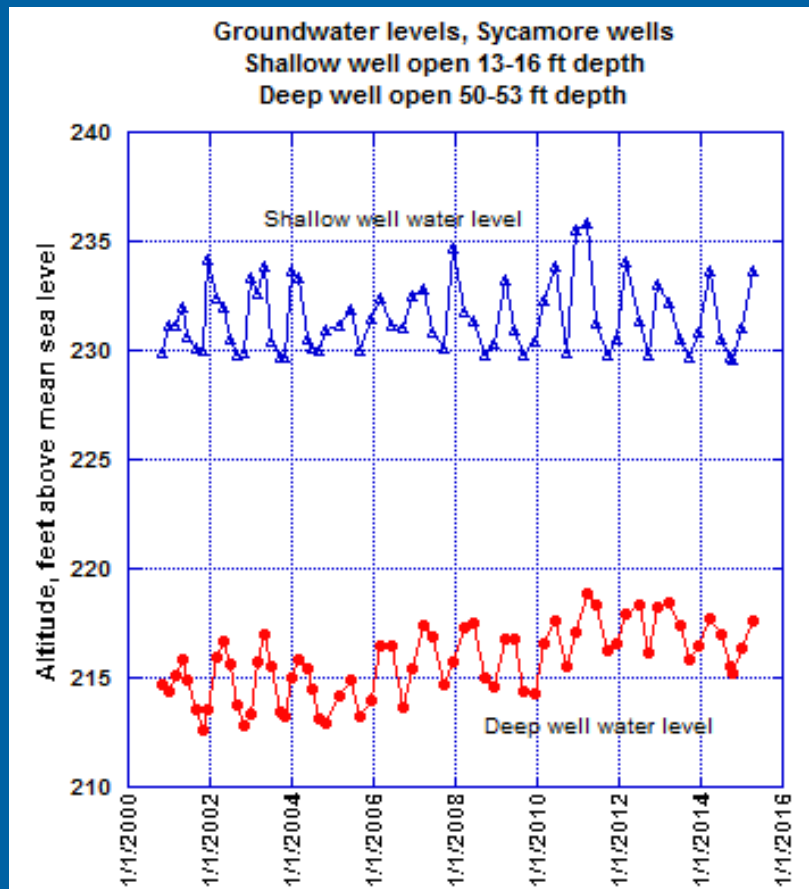
Johnson Creek watershed



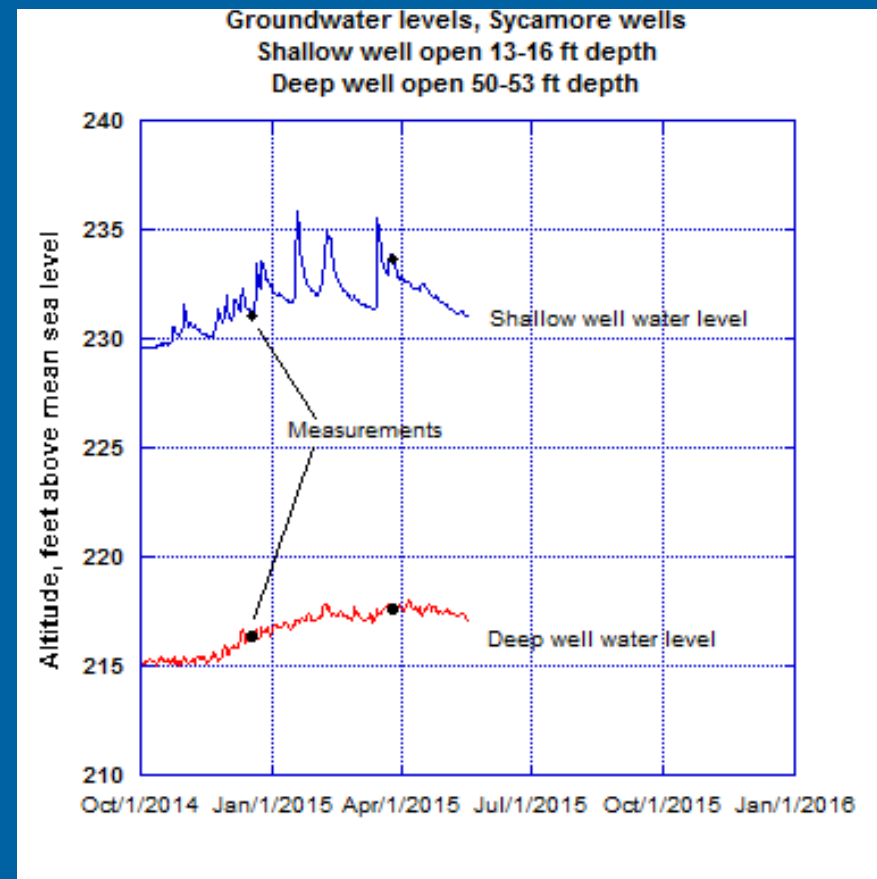
# Trends in groundwater level



# Frequency of measurements



Manual quarterly measurements



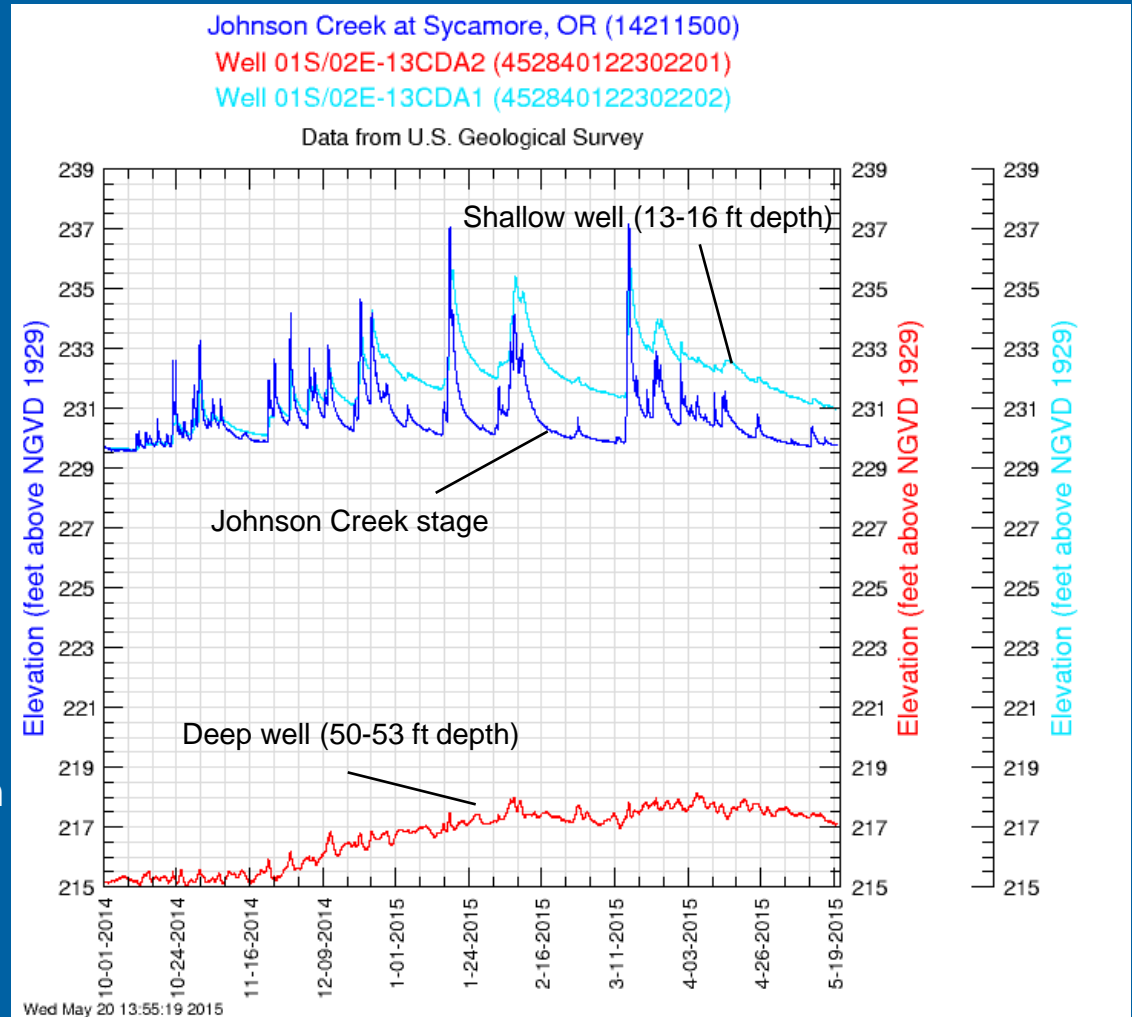
Continuous recorded water levels with manual quarterly measurements

# Coupled groundwater-stream gage

Shallow GW-stream connection

Shallow GW flows to stream

Poor deep GW-stream connection



# Summary

- Longterm groundwater monitoring network is effective and valuable
- Increasing water levels are widespread
- Rates range from 0 to 1.26 feet/year
- Increase water levels may increase streamflow
- Cause of increasing water levels:
  - Climate variation?
  - Land use changes—dry wells; green streets?
  - Changes in groundwater pumping?

# Summary—continued

- Questions for future study
  - What is the cause of trend in water levels?
  - Do increases in water levels result in:
    - Increase in stream flow?
    - Decrease in stream temperature?
    - Improved stream habitat?
    - Changes in water quality?

