What is a Groundwater Study?

- Unbiased, data-based scientific investigation of groundwater system
  - Water availability
  - Water quality
  - Simulation tools

Healy and others (2007)
What is a Study Workplan?

- Defines study purpose, scope, and objectives
- Provides detailed:
  - Tasks
  - Timeline
  - Budget
  - Deliverables
USGS Groundwater Studies in WA

With numerical model

Without numerical model
Why Do We Need a Study?

- Basin issues
  - Bi-state basin with a complex hydrogeologic system, long-term water level declines in regional aquifers & insufficient in-stream flows

- Need for basin-wide study to understand the resource for its management and protection
  - States requested USGS involvement

- Long history of data collection and interpretive studies
  - Opportunities to collaborate and leverage data sets
Study Value

- Why is it important?
  - Competing interests for a limited resource

- How will it be used?
  - Inform planning and water-management decisions at a basin-wide scale


Salmon image: Phillip Martin at: http://animals.phillipmartin.info/fish_chinook_salmon.htm
Study Goals

- Work with water-resource agencies and stakeholders in OR and WA

- Understand and describe the basin-wide groundwater system including
  - Groundwater extent and connectivity
  - Impacts of pumping on groundwater levels, and
  - Interactions between groundwater and surface water.

- Develop a tool to simulate the groundwater system and evaluate water-management scenarios
Some Questions to be Addressed

- How much water enters the Basin (recharge)?
- How much water leaves the Basin (discharge)?
- How might water-level declines progress in the future?
- How can water-level declines be managed?
- How does pumping affect streamflow?
- To what degree are different parts of the basin hydrologically connected?
Defined Study Roles

- **USGS**
  - Lead collaborative study including data collection and interpretations
  - Author peer-reviewed reports

- **Cooperating agencies**
  - Assist in data collection and interpretation
  - Contribute to study reports
Study Tasks

- Compile and review data and literature
- Collect new data – groundwater levels, streamflow, geochemistry
- Describe hydrogeologic framework – hydrogeologic units, hydraulic properties, water-level maps
- Define hydrologic budget – groundwater use, recharge, discharge
- Evaluate flow-system – water-level trends, flow directions, role of structure, geochemistry and age dating, groundwater-surface water interactions
- Publish peer-reviewed reports and data

30-yr average precipitation (1981-2010), PRISM Climate Group, Oregon State University, http://prism.oregonstate.edu
Frequently Asked Questions

- What is an aquifer?
- What are aquifer properties?
- How old is groundwater?
- How much recharge is happening?
Thank you

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USGS Walla Walla Project Webpage,
https://www.usgs.gov/centers/wa-water/science/walla-walla-groundwater?qt-science_center_objects=0#qt-science_center_objects
References