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Mosier Ground-Water Project Update

Mosier Watershed Council Meeting, May 24, 2006

Ground-Water Level Monitoring

Goal: Monitor water levels in wells to evaluate changes over times scales ranging from hours to decades. These measurements will help understand the effects of climate, development and other factors on the ground-water resource.

Progress: The final network includes 35 wells: 24 are measured bi-monthly by USGS; 4 are measured quarterly by OWRD; 7 have data loggers installed and measure every 2 hours. All four of the primary aquifers are monitored: Dalles (4), Pomona (8), Priest Rapids (13), and Frenchman Springs (10).

Conditions: April ground-water levels in the central and west Orchard Tract were 1.0-2.1 feet below April 2005 levels. This rate is less than the average annual rate of decline (~4 ft/yr) in recent years. Levels in two Priest Rapids wells on the east side of the Tract were about 1 ft *higher* than they were one year ago. October through May precip is about 130% of normal at Hood River (35.8 in). The maximum seasonal declines in August last year ranged from 10 to 20 feet below April levels. The larger drawdowns tended to occur on the east side of the valley.

Estimate Ground-Water Pumping

Goals: Measure and/or estimate ground-water withdrawals for irrigation in the 2006 growing season.

Progress: Installed recording meters on 11 wells (see photos next page). One more recorder to be installed. Two wells have owner-installed non-recording meters. The 14 metered wells irrigate approximately 750 acres, or almost 87% of irrigated area. Developed plan for estimating pumpage from un-metered wells that supply about 100 acres. We will use power consumption, acreage, irrigation method. Irrigation log forms were mailed out to growers. Obtained aerial photos for 1965, 1979, 1994, and 2005 from FSA, SWCD, and library.

Plans: We will check and download recording meters about every 2 weeks. We are looking for a student/volunteer from the area could assist with the data collection and management. We will provide training. We will summarize the data from all metered wells every two weeks and post on the project web site. If growers would like, we will mail or email a report on your individual well. We will be interviewing growers to get good data on the orchards being irrigated by each well. The data would include: acres, tree age, spacing, sprinkler type for each block. Someone will be calling to arrange a time to meet with growers.

Flow-meter / data logger installations

Logger with below grade meter installation.

Meter installed in saddle in “bucket” vault.

Above grade installation. Programming with PDA.

Other Plans

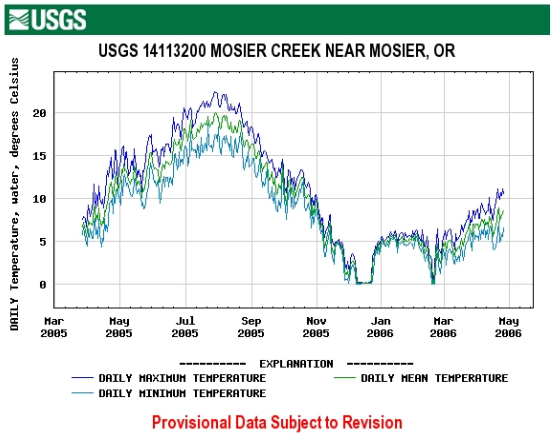
- Collect co-mingling well data. Run borehole flow-meter and other logs on the new City well and the old well before and after repairs.
- Continue work on mapping the subsurface extent and thickness of aquifers.
- Analyze data and prepare a presentation for the December meeting. All work and to date will be presented with preliminary findings.

Surface Water Monitoring

Goals: Compare flows of Mosier Creek to 1963-81 period, including low flows, annual flows, flow recession characteristics, response to climate, comparison with other basins. Assess ground water entering or surface water leaving creek (seepage).

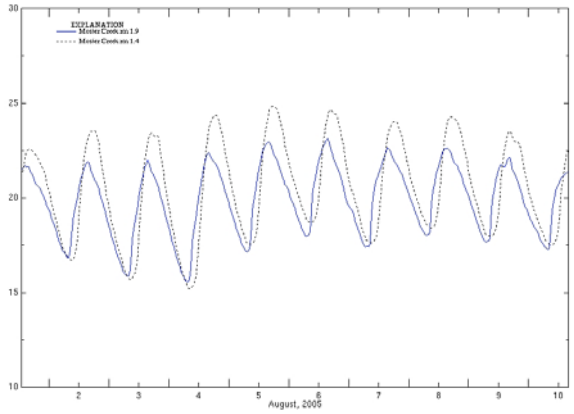
Progress: Gage in operation since last spring, with several measurements to define stage/flow relation. 5-year storm in January 2006 (1350 cfs peak). This was quite a bit of water, probably more than seen in the past several years. Low flow of summer 2005 similar to 63-81 period. Analyzing low flows of Mosier Creek with low flows of adjacent basin (Mill Creek), as well as response in low flows to climate. Continuous water temperature data now show on web site (see example below) Completed 3 seepage measurements in 2005 (May, July, September). Last week (mid-May) completed first of 3 seepage measurements planned for 2006. Seepage measurements indicate ½ to 1½ cfs gains in spring and ½ to 1 cfs losses in summer. Used additional tools (stream temperature and specific conductance) to aid in detection of ground-water discharge to the creek. See examples below.

Plans: We will continue analysis of streamflow data, as well as conduct additional seepage measurements in summer and fall.

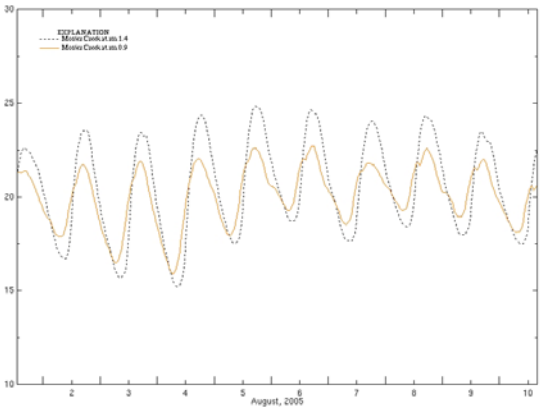


Past year max/min/mean stream temperature

Measuring streamflow



Stream temperature increases from RM 1.9 to RM 1.4



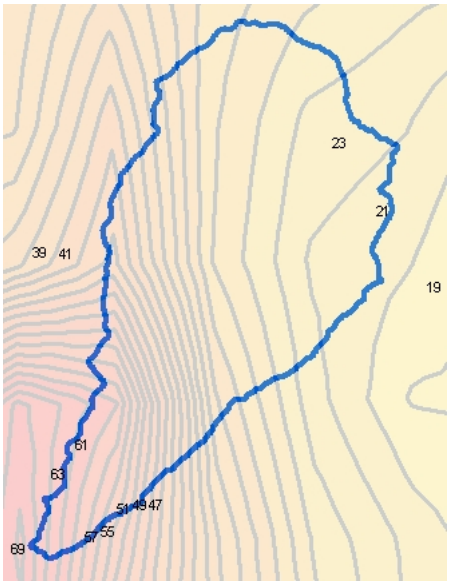
Stream temperature decreases from RM 1.4 to RM 0.9

Surface Water Modeling

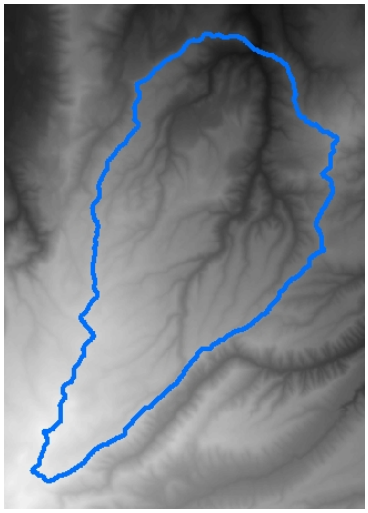
Goals: Use surface water model to estimate recharge to ground water system. Conceptually the model is a series of leaky buckets, conveying what comes in (rain/snow) both downward (into the ground) and laterally (to the stream). The model used daily precipitation and max/min air temperature. These inputs are distributed over the land surface. The land surface can be seen as a layer-cake of topography, soils, geology, and vegetation. The goal is to balance a budget of the inputs (rain/snow) and the outputs (streamflow, evaporation, and ground-water recharge). Of these the recharge part will be used to fuel the ground-water flow model.

Progress: We have gathered climate data from Hood River, Parkdale, The Dalles, and Dufur for 1953-2005. Since there is a strong gradient both east/west and north/south, adjustments are made to estimate the actual rain in the watershed. (map below). We are assembling the GIS layers of topography, soils, and land cover, and have developed a preliminary map of the model basins (see below).

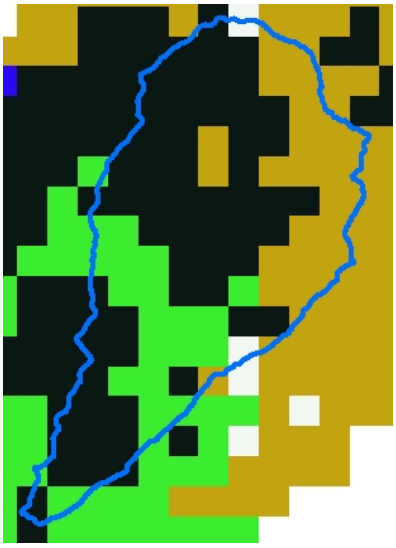
Plans: Compare the interpolated climate data to on-the-ground climate data available for short period in the watershed (Wasco Butte, Mosier). Finish building the model and calibrate it to the historic and current flow data.



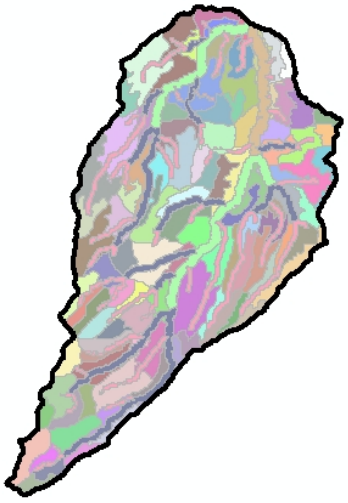
Precipitation



Topography



Vegetation



Model response units