

Hood River Basin Study

In preparation for the *November 5, 2012*
Hood River County Monthly Meeting

October 31, 2012 Status Updates
Deliverable Updates

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Hood River Basin Study Purpose and Overview

Basin Studies consider basin-wide efforts to evaluate and address the impacts of climate change. Funding is available for comprehensive water studies that define options for meeting future water demands in river basins in the western United States where imbalances in water supply and demand exist or are projected. Each study includes four key segments:

1. State-of-the-art projections of future supply and demand by river basin.
2. An analysis of how the basin's existing water and power operations and infrastructure will perform in the face of changing water realities.
3. Development of options to improve operations and infrastructure to supply adequate water in the future.
4. Recommendations on how to optimize operations and infrastructure in a basin to supply adequate water in the future.

Reclamation and Hood River County have entered into an agreement in 2012 to conduct a Basin Study in the Hood River Basin. Reclamation staff from the Pacific Northwest Regional Office and the Cascades-Columbia Area Office is tasked with meeting the following four objectives while conducting this Basin Study:

1. Define current and future basin water supply and demands, with consideration of potential climate change impacts.
2. Determine the potential impacts of climate change on the performance of current water delivery systems (e.g. infrastructure and operations).
3. Develop options to maintain viable water delivery systems for adequate water supplies in the future.
4. Conduct a tradeoff analysis of the options developed, summarize findings and make recommendations on preferred options. Such analysis simply examines all proposed alternatives in terms of their relative cost, environmental impact, risk, stakeholder response, or other attributes common to the alternatives. The analysis can be either quantitative or qualitative in measurement.

Brief Reclamation scopes of work are provided on the following pages for groundwater, climate change analysis, and water resource modeling and the storage assessment effort.

HOOD RIVER BASIN STUDY DELIVERABLES:

1. In addition to the inclusion of the Technical Reports identified in this document, a Final Report will be prepared that includes all of the Basin Study components (see attached) and provided to the HRC, consultant, and Reclamation teams for review.
2. Reclamation will be responsible finalizing the Final Report and providing to appropriate internal management for review and approval.

Groundwater Modeling Scope of Work

Understanding the occurrence and quantity of groundwater is vital to understanding the role that groundwater plays in the interactions between surface water and groundwater contributions to streams and aquatic ecosystems, in addition to groundwater availability for wells.

Groundwater Component Project Objectives:

A time-dependant groundwater model will be developed to evaluate alternatives related to the four study objectives. The model will be based on available data and will cover the geographic extent necessary to evaluate the alternatives. Alternatives will be determined by a working group that includes members of the Hood River County working group and Reclamation. The alternatives may include:

- What is the current state of groundwater in the Hood River Basin?
- How will new development impact groundwater conditions in the basin, including discharge to streams?
- How will hydrologic changes due to climate change impact groundwater conditions in the basin?
- What are optimal locations of recharge to maximize return and timing of return to streams?
- Can the Hood River Basin aquifer be used for aquifer storage and recovery?

The final work products will be a three-dimensional groundwater model of the aquifer in the Hood River Basin and a summary report documenting the development of the model and the alternative results. The alternative results may include contour maps of the water levels in the aquifer at various points in time, hydrographs that describe time-dependant water elevations in wells, and hydrographs that describe groundwater returns to river reaches.

GROUNDWATER DELIVERABLES:

1. Technical Report documenting the methodology, approach, and results (graphs, plots) of the groundwater assessment and alternatives evaluated.
2. Any data collected or generated during the development of the modeling efforts and related metadata.

OCTOBER 2012 GROUNDWATER STATUS UPDATE

1. 9/17/12 – Conversation with Reclamation (Jennifer Johnson and Jon Rocha) and USGS (Terrence Conlon and Erick Burns) about USGS participation in GW study.
2. 9/28/12 – Another conversation with USGS and Reclamation re: type of model, funding opportunities, and support tasks. Also discussion about possible workshop in Hood River.
3. 10/10/12 – Confirmation that seepage run would not be conducted due to funding availability and timing (too late due to rainy season impacting results). Confirmed that workshop, technical review, and SW/GW partitioning analytical assistance priorities.

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4. Meeting to be arranged with USGS, Reclamation, Niklas, Mattie and Hood River County representatives the week of November 26.

Climate Change Analysis Scope of Work

A primary purpose of a Basin Study is to understand the potential impacts of climate change on water supply (surface water, groundwater, and snow melt) and to determine how those changes in supply might affect a basin's existing water and power operations and infrastructure performance. In addition, options are to be developed to improve those existing operations and infrastructure such that an adequate water supply is available in the future. Optimization recommendations should also be considered.

Climate change analysis generally includes selection of climate change projections (emission scenarios, future time periods, and analysis technique) and generation of hydrologic data using the meteorologic data generated for those projections. For the analysis of current and future changes in water supply, the Distributed Hydrology Soils Vegetation Model (DHSVM) model that was prepared for the Middle Fork Irrigation District in Mount Hood Parkdale, Oregon (Watershed Professional Network 2012) will be used. This model was selected because it covers the full geographic scale of the Hood River Basin and was constructed for use in by the Middle Fork Irrigation District (MFID) in Hood River. It also includes a glacial component to incorporate Mount Hood glacial impacts on Hood River, which will be a key consideration in this basin. This model uses 90-meter resolution digital elevation model data and is driven by meteorological data (e.g., air temperature, precipitation). Inputs to each grid cell in the form of precipitation or inflow are processed for each time step and then transferred to cells down-gradient. Changes in future supply will be evaluated and reported.

Current meteorologic data have been processed using Reclamation AgriMet sites among others as part of the IFIM Study for the MFID. The selection of future projections for use in comparison to the baseline data will be determined in collaboration with Hood River County and other stakeholders that will include which future period(s) are of interest, which emission scenario(s), and whether a time-evolving or step-change technique is preferred (or both).

CLIMATE CHANGE ASSESSMENT DELIVERABLES:

1. Technical Report document methodology, approaches, and results (plots, graphs) of modeling results.
2. Any hydroclimate data generated for use in construction of the DHSVM and glacial models with metadata and any descriptive information required to understand the data
3. Downscaled and bias-corrected flows at a yet-to-be-determined number of locations (will be based on Needs Assessment among other tasks) using either CMIP5 or CMIP3 global climate models.

OCTOBER 2012 CLIMATE CHANGE ANALYSIS STATUS UPDATE

1. 9/26/12 –Ed Salminen (Watershed Network) shared streamflow data with Reclamation (provided a list of gaged sites and period-of-records).
2. 10/22/12 – Bob Lounsbury (Reclamation) participated in a one-week training in Washington State to learn the DHSVM model to learn how to combine DHSVM with the

glacier component, and initiated calibration. He also completed an example run using the DHSVM model prior to departure (reran DHSVM 3.0 and results lined up well with Ed's simulation results).

3. 10/26/12 – Discussion between Bob and Ed re: use of snow water equivalent (SWE) comparisons using existing snow course and SNOTEL sites (link provided).
4. 10/29/12 – Bob indicated that when glacier component was added to the DHSVM v3.0 (was initially used with v2.0), the results were off. Bibi is working on updating the scripts to work with v3.0. The model will be rerun to see if that addresses the issue.

Water Resource Scope of Work

The water resource model will be fed by the results of previous efforts of this study. Water supply and demand data developed by others (i.e., water needs assessment, the IFIM Study, and the storage assessment) in addition to future supply changes generated by Reclamation will be used to construct the water resource model (likely a RiverWare model). As described above, a key segment of a Basin Study is to evaluate how future supply may affect current water and power operations and infrastructure performance.

The goal of this model will be to help the County and other stakeholders determine:

1. The current and future water supply availability in the Hood River that will include consideration of climate change, current and future water demands, and groundwater interaction.
2. A determination will be made by Hood River stakeholders on the potential location(s) for a storage facility in the basin. This capacity and to the extent possible, operational information will be used in the construction of the model.
3. A discussion of the potential impacts of sediment on the capacity of the reservoir over time (using input from a sediment analysis conducted by others).
4. Sufficient analyses to provide the HRWWG enough information to determine if a feasibility level study on any of the suggested alternatives should be pursued.

WATER RESOURCE DELIVERABLES:

1. Any data used to generate a water resource model
2. Any water resource model
3. A technical report documenting what is in the water resource model and detailing how it was developed. It will also include uncertainties, limitations, and other information relevant to the technical aspects of the modeling work.

OCTOBER 2012 WATER RESOURCE STATUS UPDATE

1. No update. Work will likely not start until January 2013 or later depending on completion of other tasks.

Storage Assessment Scope of Work

The storage study scope includes a site visit by Reclamation staff (Geology, Design, others) to evaluate several sites that have been identified in several internal HRC meetings. There are several small storage facilities in the Hood River basin, but additional ones are being considered by the county. Reclamation Design staff has been tasked with conducting site visits of potential sites identified by Hood River County and other local stakeholders. Storage data to date indicate that three months of flow at 100 cfs (18,000 ac-ft) is 100% of diversion, however that volume of storage won't need to meet that. It's been discussed in meetings that a capacity range of approximately 5000 to 10,000 acre-feet is likely needed, and this volume will be refined through this process. The conceptual effectiveness of the potential site(s) selected for further consideration will be evaluated using a reservoir model.

STORAGE ASSESSMENT DELIVERABLES:

1. A Technical Report will be written providing any documentation of sites under consideration, issues that may need to be addressed at each site, and documentation of public involvement (e.g., communications with residents) that has taken place.
2. Deliverable may include a reconnaissance level cost estimate based on existing topographic information.

OCTOBER 2012 STORAGE ASSESSMENT STATUS UPDATE

1. Several sites are being considered. All of these locations are within the East Fork Subbasin upstream of the Middle Fork confluence.
 - a. County Parcel located near Parkdale off of Highway 35
 - b. Horsethief Meadows (this site is likely eliminated)
 - c. Rick Ragan (Director for HR Soil and Water Conservation District) said it shouldn't be considered due to geology and proximity to OR-35.
 - d. Rimrock Creek, a tributary of the East Fork Hood River
 - e. Neal Creek
 - f. Two other sites may be investigated including on Tony Creek and one on the west side of the basin that Jer Camarata (DM for FID) has engineered storage design for a site there.
2. Field trip during week of November 5 to visit each site will be completed.
3. Mattie has a map (shapefiles with general areas) and is figuring out Water Rights with each location and will get an estimate of amount of water available and needed for diversion. She will send that information out this week.
4. The HRC will contact the Forest Service because several sites are on their property.