Salinas Valley Integrated Hydraulic Model
Technical Advisory Committee Meeting
Meeting Notes

MCWRA Board Chambers -- September 13, 2016

In Attendance:

Les Chau	Germán Criollo	Martin Feeney*	Howard Franklin
Randy Hanson	Wes Henson	Joe Hevesi	Bob Jaques*
Jonathan Keck*	Jonathan Lear*	Brian Lockwood*	Casey Meusel*
Peter Pyle*	Don Sweetkind	Amy Woodrow	Matt Zidar

** TAC Members*

I. Welcome/Introductions

The meeting began at approximately 1:15 PM with introductions.

II. Activities since the last TAC meeting

Matt Zidar, stakeholder outreach consultant, provided a summary of recent stakeholder meetings and other outreach efforts. This included meetings with agricultural experts and the general public. Presentations provided at the meetings are available on the MCWRA website (http://www.mcwra.co.monterey.ca.us/srgb_tac_model/srgb_stakeholder_model.php).

Also noted was that Norm Groot (Executive Director, Monterey County Farm Bureau) recently contacted Farm Bureau members reiterating the request for data that was made during the public meeting process. This collaborative effort at obtaining data for the model was much appreciated.

Many stakeholders have expressed that the data being requested (e.g. crop types, rotations, irrigation practices, etc.) is already reported to the Regional Board. Discussion ensued as to how that data might be made available for the SVIHM while maintaining confidentiality.

III. Model Development -- Detailed Updates for three models

Note: copies of all slides presented during the following portions of the TAC meeting are posted on the MCWRA website. http://www.mcwra.co.monterey.ca.us/srgb_tac_model/srgb_tac_model.php

1. SVWM Rainfall-Runoff Model: BCM & HSPF Rainfall-Runoff Models

Joe Hevesi began this presentation with an update on the model development status, which spurred a series of questions from a TAC member about differentiating between the BCM and HSPF models. Discussion included the fact that the BCM is a distributed-parameter model that uses a 270-meter grid with about 160,520 cells. In comparison, HSPF is a lumped-parameter model that uses a connected network of approximately 1,000 hydrologic response units (HRUs). The BCM grid cells are not connected, and therefore BCM cannot be used to directly simulate flow routing processes, however runoff and baseflow are estimated at pour points based on the defined contributing area upstream of the pour point and a fitted baseflow recession curve. The BCM is most useful for (1) spatially distributing the climate inputs over SVIHM grid cells and HSPF HRUs, (2) simulating spatially-distributed PET and the effects of topography on PET, and (3) generating spatially-distributed results for in-place runoff and recharge. Because of the high spatial resolution, the BCM will be better able to capture the effects of topography on climate, recharge, and runoff. HSPF is used for simulating streamflow (including overland flow, streamflow, and baseflow) and in-channel processes, and can also be run in sub-daily time steps whereas BCM is limited to daily time steps. Additionally, HSPF can simulate water quality. Both BCM and HSPF models integrate with the SVIHM at the pour points and over the areas of sub-drainages.

The model boundary has been refined in a few areas to better match tributary drainage areas; these were small changes. This refined boundary was used, along with the Calwater2.2.1 sub-drainage areas, to update HSPF segments. 148 pour points have been defined where inflows to the SVIHM will be simulated by HSPF and BCM.

USGS staff noted that the NHD had lines in some places that showed no connection to other waterways, and these disconnected flowlines were confirmed by aerial photos. In many cases, the NHD lines (both high and medium resolution NHD) were not well matched to recent aerial photos, possibly because NHD is representing older channels. For these locations, NHD lines were modified

to provide a better match to current hydrography and land use, or in some instances a new flowline was added to match the channels indicated by LiDAR and aerial photos.

A prototype HSPF model was developed using BASINS to test f-tables and parameterization. There is high error with the HSPF prototype model because there are no losing reaches, baseflow is being overestimated, and riparian ET is likely being underestimated. Low flows from the prototype model are also too high because the simulations were done using the initial set of standardized f-tables that have poor resolution, especially for the low flows. Development of refined f-tables that are matched to available data at USGS streamgages as well as other available field data (such as LiDAR and aerial photos) using f-table estimation tools available with BASINS/HSPF is ongoing. TAC member noted that it will be important to refine the f-tables for the model.

BCM daily outputs for precipitation, maximum and minimum daily air temperature, and PET were completed for water years 1948-2015. The results were post-processed into monthly grids and these were remapped to the SVIHM grid. The daily results were processed into daily averages over each HSPF HRU area, and these are being imported into the WDM file.

BCM precipitation results are being compared to local records (e.g. Salinas Airport). USGS staff will be looking at daily results in addition to results at monthly and water year time steps. (*See page 25 of presentation for an example*.) BCM PET results are being compared to CIMIS data. USGS staff noted that the BCM results can be rescaled if necessary.

Next steps will be to continue importing climate and PET data from BCM into the WDM; continue verifying climate inputs using local records; continue developing parameter estimates for PERLND and IMPLND areas; continue development of f-tables; and continue model testing in preparation for starting calibrations.

2. Salinas Valley HFM Build

Presentation by USGS staff member Don Sweetkind began with a description of the components of the 3D Hydrogeologic Framework Model (HFM), namely: extent, layering, and texture.

Hydrostratigraphic unit tops have been interpreted using published cross sections, high quality descriptive interpretations ("golden spikes"), DOGGR well records, and interpretation of lithologic data from 1,300 well logs. Unit tops have also been digitized from previous work. USGS staff noted that there is a high degree of professional judgment that goes into this interpretation, but an effort is made to key into the "golden spikes". Records from oil and gas wells/boreholes are used mostly to define the top of the Paso Robles and Purisima formations.

TAC member asked what type of software was being used. USGS staff indicated that a RockWare product was being used and that data is captured in an Access database.

USGS staff noted that not every borehole is being used. Ultimately, the goal to generate x, y, z data. Presentation demonstrates that there is consistency in the elevation of formations between the current work and previously completed efforts.

TAC member asked if holes in the aquitard had been found in the Pressure Area. Another TAC member indicated that previous work by Kennedy/Jenks and Janet Heard had indicated the presence of gaps in the aquitard between Salinas and the coast. (*Note: both of the referenced documents are available on the MCWRA website under Model Development TAC Resources.*)

TAC member asked how differing interpretations of offshore geology were going to be resolved. Discussion among the group noted that there are various interpretations, each showing outcrops at differing depths and distances offshore. USGS staff indicated that this has not yet been resolved.

Textural distributions extrapolate away from the borehole point data in a horizontal direction and will be refined once unit elevations are finalized. The spatial distribution will turn into a 2D map for each unit within the model. Vertical profiles of textural data are similar to lithologic cross sections completed for prior work (*See page 16 of presentation for example*).

TAC member asked if any electrical geophysics would be used to help refine the textural distributions, specifically SkyTEM. Group discussion of SkyTEM indicated that it may not be appropriate for this application. The issue of available funds was also raised.

Lithology model development will continue with: addition of data from Paso Robles area, creating subregions and texture distributions within layers, and division of the lithology model with hydrogeologic layers.

3. SVIHM Build

Randy Hanson (USGS) began this discussion with review of a diagram illustrating the model inputs and observations for SVIHM. This was followed by an update on the status of various model components (*details on pages 4 and 5 of the presentation*).

Water balance subregions, or accounting units, for the SVIHM were reviewed. Thirty water balance subregions have been defined; these 30 regions will be static throughout the model period. The model assumes local water use but wells can be assigned to an adjacent water balance region to reflect deliveries of water. The Seaside adjudicated basin has been excluded from the model area in the interest of not remodeling an area that has already been modeled. A general head boundary will be used around the Seaside basin. The water balance subregions reflect a subdivision of the Zone 2C subareas in addition to areas outside of Zone 2C. The offshore region has not been developed yet.

Crop categories, land use categories, and climate zones have been developed after discussion with agricultural experts, stakeholders, and review of data. Some crops have been split into coastal and inland groups (e.g. strawberries), while other crops have been grouped together (e.g. lemon, orange, avocado, pomegranate, olive, and kiwi). Seven CIMIS climate zones that cover the model area have been simplified into two zones to define the coastal and inland areas. Crop coefficients, on-farm efficiencies, and planting dates will differ between coastal and inland zones. An effort is also being made to honor the historical work that came from the IGSM.

An initial climate analysis has been done, through which wet and dry periods can be established by looking at cumulative departure of precipitation. This analysis can be used to develop some properties for crop parameters that will be used on a seasonal basis. The climate analysis also

provides an initial estimate of the major climate cycles that affect water resources in the Salinas Valley and were found to be dominated by cycles that are coincident with the cycles of the Pacific Decadal Oscillation (PDO). These cycles influence the composite wet and dry periods and may form a basis for future water-resource planning horizons.

Ten land use time periods have been defined. The assumption is that crops are constant for the duration of each land use period. Most of the land use periods are 1-3 years long, with the exception of the earliest time period, which is from 1967-1996. Land use during this initial period (1967-1996) will be static, using 1992 land use data, the majority of which is from AMBAG. A background land use was created using NCLD for native vegetation. Urban areas will not vary during the model period.

CSIP supply and demand will be captured by SVIHM. Demands will be driven by land use and irrigation requirements. Supply will come from three sources: CSIP wells, SRDF diversions, and SVRP recycled water. Prior to CSIP operations the CSIP subregion will act the other agricultural subregions in SVIHM.

Boundary conditions for SVIHM will include the streamflow network (SFR2) and M&I wells (MNW2). Domestic wells have been omitted from SVIHM because data is very sparse and most of the pumping in the model area is from agriculture. Groundwater pumping for M&I wells will be based on GEMS data and any data provided by water companies. Pumping will be grouped by water balance subregion. Agricultural well pumping, also reported through GEMS, will be used as observations. Since GEMS data is only available back to 1994, USGS-NWIS or DWR data may be used to supplement. Additional data from USGS-NWIS and/or DWR will also be needed in areas outside of Zone 2A, which is where GEMS reporting occurs. Pumping capacities of wells are not part of the GEMS record, so they have been estimated from the GEMS monthly totals.

TAC member asked about the extent of available location data for wells. Staff indicated that most well locations are from GPS data, others are defined to the quarter-quarter section. The location of many new wells can be fairly well estimated using aerial imagery.

SVIHM will use streamflow and agricultural subregional totals of pumpage as observations, as well as seawater intrusion data, and groundwater head/head differences for calibration. TAC and staff

discussed how to define gaining/losing reaches of the river. Staff shared information on the "river series" which historically took place during the summer. This data has been made available to the USGS.

Drainage ditches are not part of the SFR network. There will be some additional drain return cells in the model for sloughs, coastal wetlands, and tile drains. Areas likely to have tile drains have been estimated using ground surface elevations of less than 30 feet above mean sea level.

Staff revised the SVIHM model framework, with a summary of the grid size, active area, layering, simulation period, and hydraulic parameters. *(See page 38 of presentation for details.)*

IV. Upcoming work

Model construction will continue during September and October. Calibration will begin in October and extend into November. Model analysis and integration of the reservoir operations module is expected for December.

V. Next TAC Meeting

TAC members discussed the upcoming work schedule and decided to meet again in December, to show some of the calibration efforts, with an interim update on model construction in November. Next meeting is set for Tuesday, December 13. No date has yet been set for the interim update.

VI. Adjournment

Copies of the presentations shown at today's meeting are posted on the Agency's website.

The meeting adjourned at approximately 4:00 PM.