Lower Santa Cruz River Basin Study
Project Team Meeting 12
NOTES
July 23, 2019, 1:30 to 3 pm

Attendees:

Eve Halper, Reclamation	Kathy Chavez, Pima County
Neha Gupta, U. of Arizona	Margaret Snyder, Tucson Water
Marie Light , Pima County /DEQ	Mead Mier, Pima Association of Governments
Jim DuBois, Pima County/RWRD	Lee Comrie, Pima Association of Governments
Julia Fonseca, Pima County/OSC	Jeanette De Renne, Pima Association of Governments
Wally Wilson, Metro Water District	

Attending via videoconference

Kathy Jacobs, U of Arizona	Lindsey Bearup, Reclamation Technical Service Center
Ken Seasholes, Central Arizona Project	Steve Piper, Reclamation Technical Service Center
Austin Carey, Central Arizona Project	Jaime Galayda, Tucson Water
Kip Volpe, Vail Water Company	Doug Greenland, Cortaro-Marana Irrigation District
Jeff Yockey, Tucson Electric Power	Selso Villegas, Tohono O'odham Nation

1. **Welcome and Introductions – Kathy Chavez, Pima County**

- Meeting attendees, Project Team members and sub-team members, welcomed. Introductions were made.

2. **Reliability Analysis and Systems Reliability Metrics – Eve Halper Reclamation**

Review of documents: LSCRBS Plan of Study and Reliability Handout

- We are almost at the end of Task 1. Climate projections, supply and demand evaluation using CAP:SAM, and surface water modeling have been completed. The groundwater model results will provide better information of supply and demand imbalances.

- Next major part of study is evaluating risks to reliability, followed by evaluation of adaptation strategies. This includes an analysis of how infrastructure will perform in face of changing demands, climate, and population
- Typically, reliability analyses tend to be focused on surface reservoir considerations. However, we can define reliability in a manner more appropriate for our circumstances. A description of regionally-specific potential reliability considerations are presented in the document titled "Defining Water Supply Reliability"
- Feedback and discussion of reliability and the reliability document ensued. A snapshot of comments are included below:
    - Comment: In general, like the broad-brush beginning, but think environmental sub-team can provide some fine-tuning, such as the inclusion of sub-basin planning.
    - Comment: Need some consideration of non-municipal well owners (exempt and non-exempt) that could see wells go dry, potentially with substantial impacts for businesses. Though we are not addressing non-exempt wells directly, we should consider impacts to areas or subdivisions where wells have gone dry, such as in the Tucson Mountains.
        - Could add text discussing this to the document and/or the final basin study report, even if this is not included as an analysis.
    - Given our long planning horizon, how do we approach the dimension of reliability that changes with time?
    - What about the movement of existing contaminant plumes in the groundwater supply? Water quality is not included in the groundwater model and therefore is not directly within the scope of the study, but we could have a qualitative evaluation of the threats that plumes present to current and future water availability. This is a distinct issue on a sub-basin level**.** We **c**ould add text discussing this to the document and/or the final basin study report, even if this is not included as an analysis.
    - Support voiced for Items Number 2 and Number 3 in reliability document (reliability with regard to the environment and recreation and cultural activities)
    - Maintaining biodiversity intact includes keeping soil in place and shading the ground to maintain temperatures.
        - Phoenix is having large dust storms on average of three times a year, we want to keep our soil intact so we do not generate those dust storms
        - There is also a cost for soil maintenance that municipalities would absorb

- Comment: Would appreciate more clarity on cultural and recreational features, and their potential economic considerations (e.g. boost to economy that birding and associated industry brings)

- Support voiced for broader inclusion of aspects that affect health and safety. Support also voiced to explicitly refer to infrastructure considerations in reliability analysis.

- Discussion: Analysis should incorporate changes in demand associated with temperature
    - Temperature changes are factored into CAP:SAM model (e.g. with plant consumptive use, and demand declines at less steep rate)
    - Question: Are those changes in CAP:SAM proportionate to amount of increase in temperature in the climate projections? E.g. is there a direct relationship to the climate projections that UA provided?
        - Rate of change of crop ET included in hotter, drier climate CAP:SAM runs. However, there is no direct relationship to Reclamation or UA's climate projections.

System Reliability Metrics

- We just discussed dust storms, water quality, groundwater levels – how can we add to this and be more specific?

- What are we specifically vulnerable to?
    - Rates of decline over some threshold is a clear indicator that extracting more groundwater than replenishing.
    - Shallow wells are at risk of going dry, this can serve as an indicator.
    - Phreatic vegetation supported by shallow groundwater can be affected by declines in groundwater levels.
    - If recovery wells are exceeding 4 feet/year, one cannot claim CAP storage credits and the stored water is considered groundwater pumping (only applies to those with CAP allotment).
        - Permitting for effluent recharge project may not fall under the 4 foot/year rule.
    - For this study, we would not focus on specific regulations but would look at the range of groundwater declines. This include the amount of saturated thickness being depleted in addition to the amount of decline.
        - Suggestion: The group should select a critical saturated thickness (if less, will not support future development or current demand) – that will help identify supply/demand imbalance areas.
            - This will identify areas that cannot supply additional groundwater pumping
            - Consider what proportion of groundwater has been mined out of an area ("easy" to do by accounting area, use net

change in storage for each cell and compare to starting point).
    - Consider combination of rate of decline, absolute amount of storage and the proportion of what has been taken out of an area.
    - Requests for a "1,000-feet below" contour map.

- Additional requested maps include distance below land surface, distance below phreatic zone, saturated thickness (perhaps a minimum threshold), the location of areas with 4 feet/year decline or greater, and other rates of decline that can strongly influence imbalances.

- Comment: Consider hydrogeology of dewatered areas - if dewatering section of aquifer contains sands and gravel, it will not have much subsidence. If dewatering areas contain substantial clays, it can have critical subsidence.
- Comment: Well productivity is paramount to assessing ability to satisfy water demand. Water providers look at saturated screen of groundwater wells to review productivity of that particular asset

- Comment: We can look at the opposite of reliability, which is vulnerability. Below are some examples:
    - To what extent are groundwater model cells supported by occasional flood flows, and what would happen if those floods do not occur?
    - Which wells may go dry in the short term due to steep decline in groundwater availability?
    - Short term impacts are worth mentioning, as they can have long-term impacts.
    - Assumption about levels of natural recharge
    - Diversity of supplies: Could a change in one supply cause problems for the entire basin? (e.g. less natural recharge).

- Demand sub-team will talk to Michael Liberti of Tucson Water, who developed a groundwater index to look at screened saturation thickness and groundwater declines to map assign a "groundwater index" score to each well.
    - Support for this idea: groundwater index as well as vadose index (e.g. to capture declines below phreatic zone). Could use separation from land surface in vadose index.
        - Can be done in groundwater wells via matrix calculator
        - Area of impact = subtracted surfaces

- Are there risks to infrastructure? Examples included recharge wells, seeing how areas of concern overlap with water provider service area or have proximity to water provider service area, and average depth of groundwater wells in an area.
    - Requests for a series of maps to summarize areas of vulnerability.

- Plug and placeholder for Pima County Regional Flood Control District: Can we look at changes in flood risk or extreme flood events? Can we dovetail current RFCD floodplain management planning identifying critical infrastructure with extreme event flood risk to water supply reliability? (e.g. changes in scour depths overlain with maps of depth of infrastructure)
    - Could be part of qualitative discussion of concerns

3. Adaptation Objectives

a. Demand Sub-team-Wally Wilson, Metro Water District

- Project team reviewed adaptation objectives draft document.
    - Primary objective is to satisfy the 100-year assured water supply requirement.
    - Secondary objectives: minimize over-pumping, water declines in areas of insufficient saturated thickness, or other conditions affecting physical availability of water; minimize pumping in areas prone to subsidence.
    - Consider strategies that minimize infrastructure costs. For example, rather than developing new pipeline routes, consider paralleling existing pipelines or enlarging existing ones. Another idea is to use infrastructure with excess capacity or to re-purpose infrastructure no long being used.

- Potential future issues include the situation where rapid outward growth may not have determination of physical water availability (development on exempt wells). Demand sub-team wants to minimize risk of this situation by minimizing this type of growth, as well as groundwater dependent growth in areas with water quality concerns (or water quality issues that are expensive to treat).

- Comment: we know the location of contaminant plumes quite well, we should avoid strategies that would increase the impact of the plumes. We might also consider strategies that would improve water quality. In general, water providers want to avoid conditions that would require treatment on their wells.

- Comment: Some contaminants are easier to treat than others – this should be noted. Also, hard-to-treat contaminants are popping up; it would be helpful to see where these sites are located.

- Sensitive areas could be considered as portions of the aquifer that are not related to riparian but cannot sustain expansions in pumping (e.g. no mountain front recharge or flow from upgradient groundwater, or deep groundwater) – expansion in extraction in these areas will create a rapid change in storage.
    - Perhaps a better term is "vulnerable to storage depletion" instead of "sensitive"
    - Demand sub-team will address this terminology so ensure readers of report understand specific definitions used by demand sub-team

- *Suggested edits to Demand Sub-team adaptation objectives document:*

- "Feasibility indicators" more akin to "feasibility considerations"
- Could change "excess capacity of infrastructure" or "alternative use of infrastructure" instead of "existing infrastructure"
- Feasibility to address riparian or environmental issues

b. Environmental Sub-team–Neha Gupta, U of Arizona

- Objectives document provided to project team is a "mirror" document of Demand Sub-team objectives, from an environmental perspective. Lists of indicators are comprehensive, with links to references to assist in assessing indicator.
- Skipping review of objectives due to time considerations

4. Process for Formulating and Selecting Adaptation Strategies – Eve Halper, Reclamation

- Handout of alternatives development in three other basin studies: Hood River Basin Study, Henry's Fork Basin Study, Rio Grande Basin Study.

- Evaluated the process in the aforementioned basin studies via the following questions
  - Which sectors were involved in development and screening of alternatives?
  - Objective statement
  - Process Description
  - Types of Alternatives
  - Evaluation Criteria

- Hood River is a simple example with specific focus.
- Henry's Fork conducted appraisal level analysis.
- Rio Grande involved more stakeholders, International Boundary Water Commission, assessed additional criteria (regulations, "implementable within reasonable control")
- Original strategy is to convene project team & sub-teams to formulate adaptation strategies, potentially with half-day workshop, and then present ideas to stakeholder advisors.

Discussion about holding a half or full day workshop to brainstorm and discuss adaptation strategy proposals:

- Workshop attendees could include members of the sub-teams and project teams.
- Requirement for alternatives to be specific (e.g. well defined)
  - Ask attendees to bring an idea that is well-fleshed out, versus proposing a project with a simple comment.
- Provide a form to meeting attendees so they understand structure of project proposal, and to bring the level of information necessary to flesh

out project proposals. Need to develop form to develop scope and details of project

        - Brainstorm ideas in conjunction with model results and context of impacts.
    - In advance of meeting: Need groundwater flow maps as discussed in first portion of this meeting.
    - The objective of screening strategies is to identify fatal flaws.
    - At what point is it appropriate to bring in the public?
        - How do we engage public who is not in the stakeholder advisors group?
        - Do we engage people who have not been continuously engaged in the project? Perhaps they can still submit a form? We could allow this to be done through the internet.
        - Those who are new to the study might need a great deal of explaining in order to formulate an adaptation strategy. It may be unrealistic to expect this.
        - Reclamation's upcoming presentation on the groundwater model will largely inform adaptation strategies, perhaps we can put that on the web for the highly interested public who want to propose adaptation strategies
        - Need a vehicle for public participation, and they need to have the same data that we have
    - Likely that group of people providing expert judgment will not agree on all areas to focus adaptation effort. We need to prepare for divergent points of view.
    - We could hold a public meeting open to all to solicit feedback on the adaptation strategies

- Discussion/Feedback:
    - Comment: Interested in nature of community engagement process in Hood River Study.
    - Completeness reviews can be used to streamline project proposal evaluation.
        - First cut: Does the proposal meet the objectives?
    - How do we respond to adaptive strategies that our datasets cannot address such as urban agriculture?
    - Need a well-structured conversation to get to an endpoint, perhaps we should aim for a full-day workshop.
        - A facilitator may be appropriate to guide conversation.

- Cost of adaptation projects will be a big driver – but we may not get to a point where we can compare costs directly of projects in the final report.
    - We may be able to do "order of magnitude" comparison of alternatives.

5. Next Steps

- Requests for another Project Team meeting prior to presentation of groundwater results.
    - Will send doodle poll to schedule meeting in late August or September
- Project proposal preferred after groundwater result presentation and/or map generation. Can have a meeting in advance using expert judgment if there are delays in groundwater modeling results.
- Stakeholder input meeting potentially in January, with public meeting to potentially follow.