Appendix E

MODSIM Model Set-up, Assumptions, and Sensitivity Analysis

This page intentionally left blank.

APPENDIX E

MODSIM Model Set-up, Assumptions, and Sensitivity Analysis

Within the secondary screening process, the Boise-Payette monthly time-step MODSIM model was used refine the initial hydrologic analysis. Available water records documented by USGS from 1928 through 2000 were used as model input.

A limited number of storage site locations were modeled to evaluate the hydrologic refill potential of on-stream and off-stream storage opportunities located within the major segments of the Boise and Payette River basins. These included:

- Big Pine Creek (South Fork Payette)
- Bissel Creek (Lower Payette)
- Boiling Springs (Middle Fork Payette)
- Cabarton (North Fork Payette)
- Casey Ranch (Upper South Fork Boise)
- Dry Creek (Lower Boise)
- Gold Fork (North Fork Payette)
- Moores Flat (South Fork Boise)
- Ola (Squaw Creek)
- Firebird (Lower Boise)
- Rabbit Creek (North Fork Boise)
- South Fork Boise River (South Fork Boise)
- Twin Springs (Middle Fork Boise)
- Upper Shafer Creek (South Fork Payette)
- Upper Squaw Creek (Lower Payette)
- Wash Creek (South Fork Payette)
- Yuba (Middle Fork Boise)

Each specific potential candidate site are represented by these 17 MODSIM locations because they are spatially scattered throughout each basin and within each of the major tributaries.

Modeling Assumptions

Since 1992, Reclamation and Colorado State University (CSU) have jointly revised the MODSIM river simulation model to address various river system operation analyses requirements. The MODSIM model has proven to be a highly reliable planning level tool, however, it is important to note that the assumptions to the model are critical to ensuring accurate results.

Natural flows (referred to as “gains” in the MODSIM model) for new storage sites in ungaged areas are based on the percentage of drainage area at the new storage site relative to the gains that are in the existing model. Return flows to the system from water stored at sites studied in this assessment are not estimated. This conservative assumption provides a conservative reinforcement to the intent of not impacting existing users, rights, contracts, or minimum flows.

Important assumptions used in the MODSIM analysis included: 1) no adverse impact of existing water rights or contracts, and 2) maintenance of minimum flow targets, whether statutory, policy-driven, or established as general goals. The second assumption is conservative in that existing minimum flow targets can be superseded by future consumptive water uses according to State law.

In the MODSIM model, the delivery distribution curve (Figure E-1) is based on current release patterns from Lucky Peak, which reflect high summer integrated demands associated with either future DCM&I or irrigation uses (Figure E-1). Water delivered to Payette River users assumes the same delivery distribution curve used in the Boise River basin.

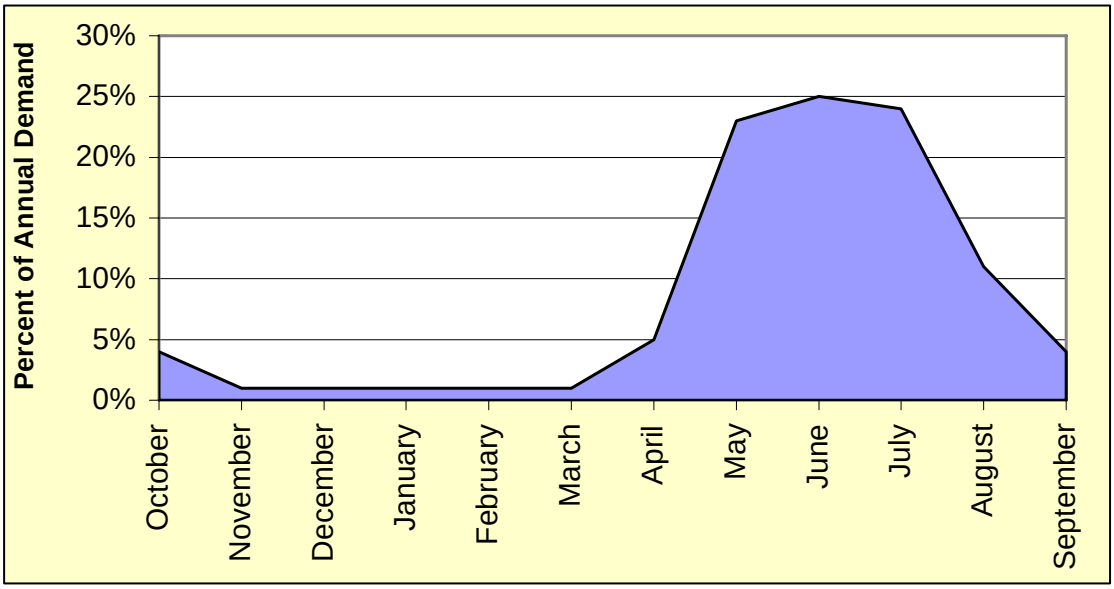

Figure E-1. Delivery Distribution Curve for Potential Candidate Sites

MODSIM assumed assumes that water to meet future demands will be diverted first, where possible, before it is stored. New reservoir storage space was assumed to be completely active (total volume of dead storage in the existing reservoirs represents less than 2 percent of the total capacity [see Table 1-2 in the main assessment report]). In addition, the model assumed that water can be diverted and stored year-round with no seasonal limitations. Finally, no flood control curves were applied to new storage sites because these curves are unknown at this time.

Modeling Scenarios and Sensitivity Analysis

Hydrologic analysis using MODSIM was an iterative process that included several different modeling scenarios. Following is a description of initial modeling scenarios.

- The first modeling scenario evaluated new storage sites using a uniform delivery distribution. This modeling scenario was revised to improve the refill potential of new storage sites by better utilizing high runoff periods. This modeling scenario evaluated the refill potential of new storage sites (listed above) based on the published storage capacity previously identified.

- The second modeling scenario evaluated new storage sites using the non-uniform delivery distribution. This modeling scenario also abandoned previously identified storage capacities and used a storage capacity based on best available information and the results of the first modeling scenario to optimize the refill potential. This modeling scenario provided better insight in understanding the refill potential in the Boise and Payette River basins.
- A third modeling scenario was performed to attempt to determine the "maximum" amount of water that could be stored at each site. This model run placed an "infinite demand" at the storage site that could only be met after existing water rights were met. The results of this analysis indicated that there were significant impacts to existing storage facilities; therefore, this scenario was abandoned from further consideration. This modeling scenario was insightful because it demonstrated how a new, junior water right could significantly impact senior water rights due to a change in the dynamics of the existing, complex reservoir system.
- The final modeling scenario evaluated new storage sites using the non-uniform delivery distribution and a refined modeled storage capacity based on previous modeling scenarios to optimize the refill potential. In this scenario, both a natural flow right at the point of diversion and a storage right were simulated.

In general, the level of detail provided by MODSIM is beyond an pre-appraisal, reconnaissance-level assessment. However, because Reclamation has invested considerable time in developing and calibrating MODSIM, the planning team utilized the model by making some general assumptions to obtain reconnaissance-level hydrologic yields. To ensure accurate results, subsequent hydrologic analysis using MODSIM should include the following.

- Refined target volume
- Flood control curves for new reservoirs
- Estimate return flows
- Channel conveyance analyses
- Refined point of diversion and delivery

This page intentionally left blank.