METHODOLOGY

The first step…

RiverWare Model

The RiverWare model used in this study of the Weber Basin Conservancy District water system is based on the Utah Division of Water Resources Weber River Model. Originally designed from the Utah Division of Water Resources FORTRAN Model. “As mentioned, the Weber River Model has been updated, within the last several years to the RiverWare platform. This update has more easily allowed the opportunity to explore alternative scenarios with the model. Making adjustments to rules, reservoirs, inflows, demands, etc.”

Demand Computations

Demand is input into the RiverWare Model using an Annual Demand Values for 20 different service areas defined in the original Fortran Model. ***Input Table-5 from the UDWR RiverWare Model Description.*** (McGettigan and Melcher, 2018).

To compute different scenarios of demands, several subfactors where implemented. These subfactors include: population changes, per-capita indoor water usage, per-capita outdoor water usage, evapotranspiration and agricultural conversion.

Population changes include values for each county, a base case of the 2015 population and the projected 2070 population and 2150 population. The total scenario populations for the District for each year are shown in Table #.

**Table #.0 – Total District Population Values Used**

|  |  |  |
| --- | --- | --- |
| **Denotation for Change** | **Population (Persons)** | **Reference** |
| Same | 623,960 | (UDWR, 2015) |
| Increase | 978,500 | (WBCD, 2013) |
| Drastic Increase | 1,263,000 | (WBCD, 2013) |

Service Areas and Populations per Service Area

Per-Capita Usage Changes

Sedimentation Scenarios

Sedimentation is …

There are two types of sedimentation, long-term sedimentation & short-term sedimentation. Long-term sedimentation is the accumulation of sediment through normal processes over large periods of time. For example, the filling of a reservoir with sediment taking decades in not hundreds of years. Short-term sedimentation is the quick accumulation of sediment over a short period of time. A typical short-term sediment time period is the movement of sediment during one or two storms. Short-term sedimentation is largely attributed to flashfloods, and particularly floods after wildfires. With wildfire severity becoming a larger issue in the Western United States the sedimentation due to fires. The effect of these wildfires is being taken into account in this study. See Figure ## (Depicting wild fire severity)

**Figure #.# (*Wildfire severity)* Murphy, 2017?**

Sedimentation varies to the extreme and is largely dependent upon watershed characteristics and in the case of sedimentation due to fires wildfire characteristics. Because of the high variability it can be hard simulate for the entire district. For this study both long-term and short-term sedimentation time periods are considered. By using a bottom up approach, we consider a range of values that should provide a good representation of sedimentation types.

No study of sedimentation has currently been done for the District.

The district has eight reservoirs objects depicting the districts 9 reservoirs (See Table #). According to the Patrick Belmont and Brendon Murphy sedimentation due to fires has a high impact on reservoir volume. The range of values selected for sedimentations effect on the system include a 0% change to reservoir volume, 10% decrease in reservoir volume and 30% decrease in reservoir volume. These values of decreased reservoir volume are implemented in RiverWare for the whole 30 years that are simulated.

Belmont and Murphy, 2019 suggest that the small reservoirs withing the district such as Smith & Morehouse and Casey are more severely impacted by sedimentation. They stated that 100% of the reservoir could be affected by a short-term sedimentation event. Echo reservoir 10% reservoir reduction is on the upper end of how reservoirs could be affected.

Therefore, the selected ranges of sedimentation are a good bottom up approach.