

Watershed Management Optimization Support Tool (WMOST)

WMOST is a software application designed to facilitate integrated water resources management across wet and dry climate regions. The tool allows water resources managers and planners to screen a wide range of practices, such as meeting projected water demand, maintaining minimum in-stream flow targets, and reducing flooding, across their watershed or jurisdiction for cost-effectiveness and environmental and economic sustainability.

Uses

WMOST screens management practices for water and water-related resources within a watershed content for an optimal mix, while accounting for the direct and indirect cost and performance of each practice (Figure 1). It can be used to (1) identify the most cost-effective mix of management practices to meet projected human demand and in-stream flow standards, (2) understand trade-offs between meeting management goals and total annual costs, and (3) characterize the sensitivity of the solution to input data and parameters (e.g., effects of climate variability and resulting changes in runoff and recharge rates on the mix of least-cost practices, the robustness of the recommended mix of practices to a range of cost assumptions). Cost savings associated with reducing probability of flooding damage are incorporated using outputs of FEMA's Hazus tool (methodology that contains models for estimating potential losses from earthquakes, floods and hurricanes) using publically available data from Flood Insurance Studies.

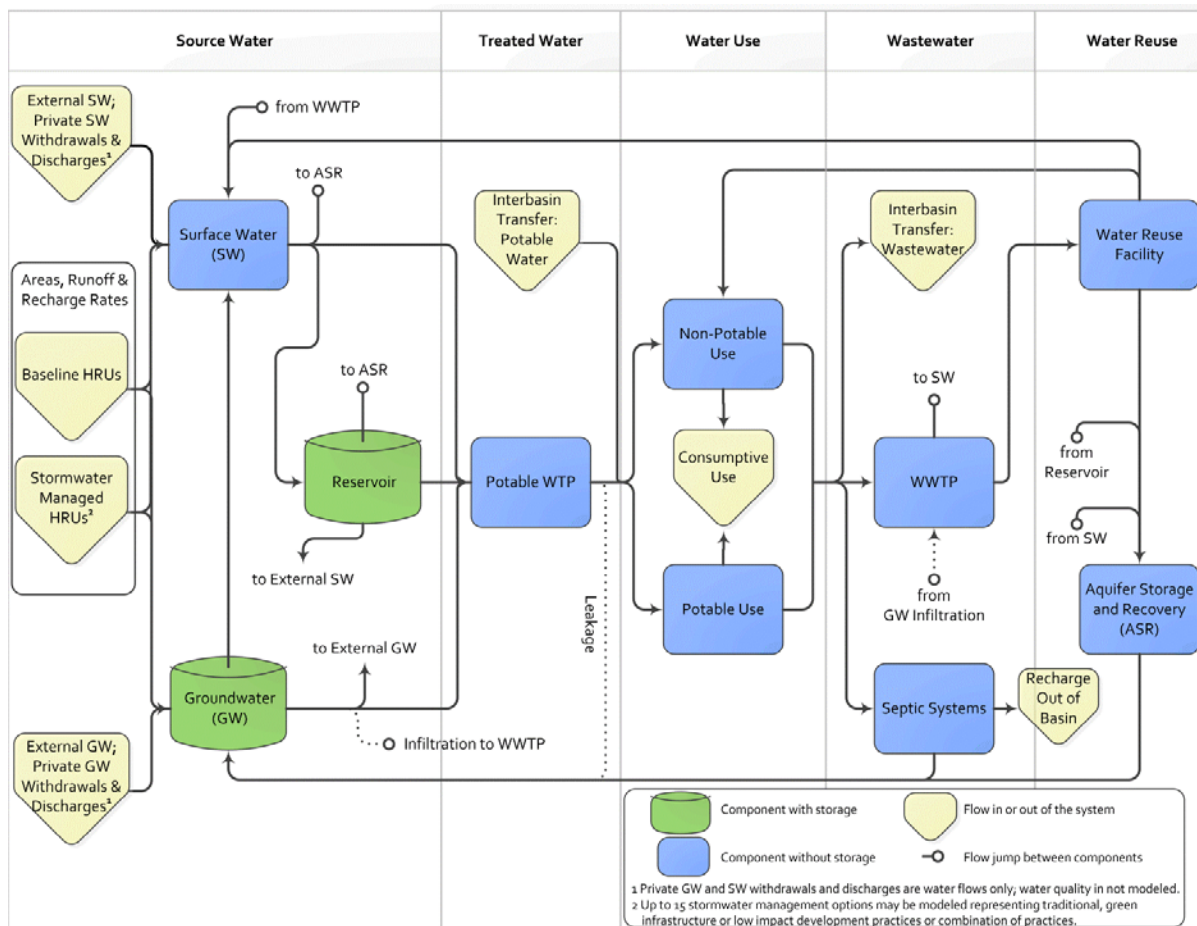


Figure 1. Watershed and human water system components represented in WMOST.

Process

WMOST calculates the optimal solution based on user inputs of watershed characteristics, human water system characteristics, management practices, and management goals (Figure 2).



Figure 2. WMOST modeling process from user inputs through to results used to derive optimal solutions.

Features

- ❖ Implementation in Microsoft Excel 2013®, which is linked seamlessly with a free linear programming optimization solver, eliminating the need for specialized software.
- ❖ Availability of over twenty potential management practices and goals related to the following:
 - *Stormwater management practices:* Up to fifteen best management practices (BMPs), including traditional grey infrastructure and green infrastructure and other low impact development practices
 - *Water supply:* Demand management practices, surface and groundwater pumping, surface water storage, water treatment plant, and drinking water distribution system leak repair.
 - *Wastewater:* Septic systems, wastewater treatment plant, and infiltration repair in wastewater collection systems.
 - *Nonpotable water reuse:* Wastewater reuse facility and nonpotable distribution systems.
 - *Others:* Aquifer storage and recharge, transfer of water and wastewater between drainage basins, land conservation, minimum human demand, and minimum and maximum in-stream flow targets.
- ❖ Spatially lumped calculations modeling one basin and one reach, but with flexibility in the number of hydrologic response units.
- ❖ Modeling time step of a day or month without a limit on the length of the modeling period.
- ❖ Consideration of baseflow and peak water flows only (water quality module to be added in summer 2016).
- ❖ Automated import of runoff and groundwater recharge rate time series from existing hydrology models and estimated performance of proposed BMPs (version 2).

Contacts

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Model Download

WMOST Version 2: www.epa.gov/exposure-assessment-models/wmost