

Mountain West Water Institute (MWWI)

Capabilities to Address Western States Water Concerns

***Jennifer Jorge, Ph.D.
July 22, 2010***

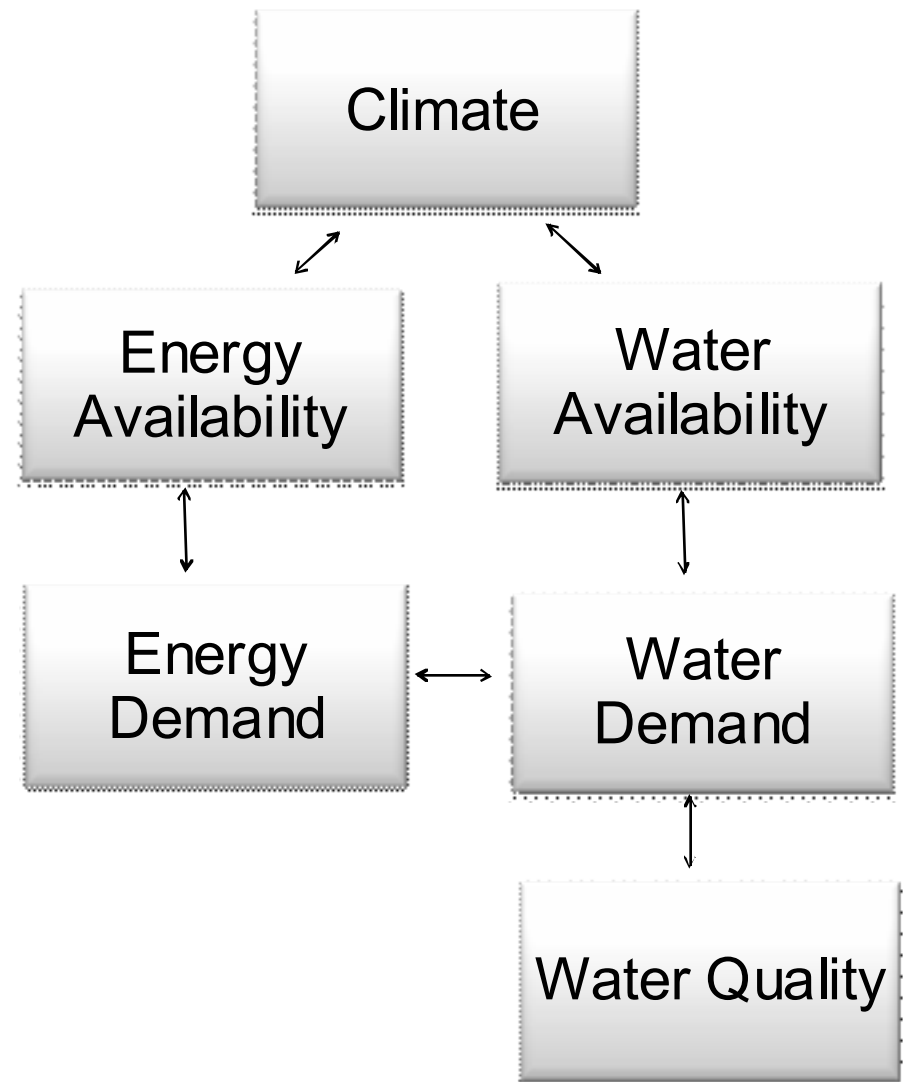


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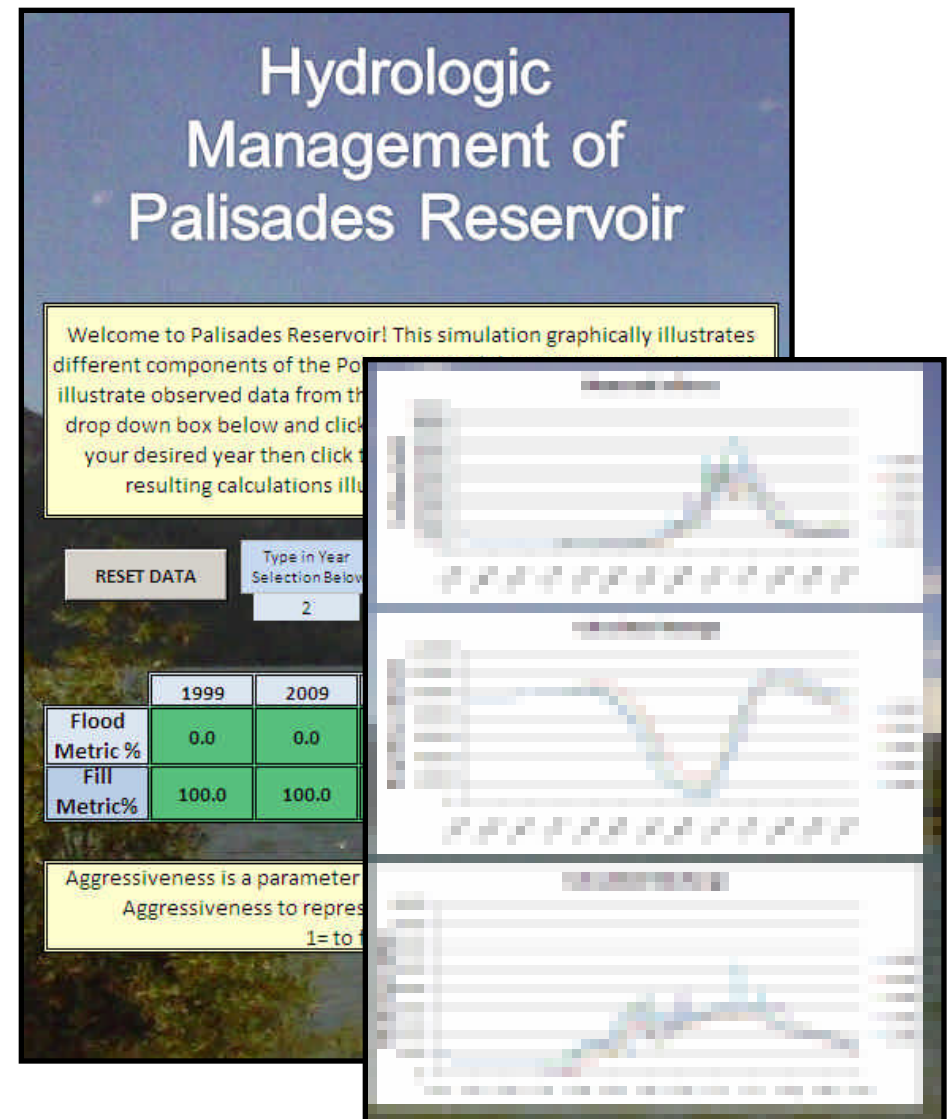
Mountain West Water Institute (MWWI)

- Water is a common resource that, if not properly managed can result in critical needs not being met.
- The MWWI is a collaborative effort between National Laboratories, regional universities, and stakeholders to help ensure sufficient clean water to meet the needs of the Mountain West now and in the future by providing defensible science, technology and information for energy-water resource management.
- The MWWI has received several letters of support from states water research institutes.



State of the Art Technologies with Real Applications for the Western States

- System Dynamics Modeling
- Thermal Groundwater Model Calibration
- Hybrid systems and water purification
- Low altitude remote sensing and GIS applications
- Unconventional fossil energy – oil shale, tight gas exploration



System Dynamics Modeling

- An innovative way to address complex problems involving diverse stakeholders
- State of the art dynamic, non-linear simulation modeling
- Provides a dynamic visual model of the system
- Captures the human decision making process and its interactions with the physical system
- All model equations and data sets are “transparent”
- Can integrate the output of many other modeling tools



Navigation Controls

Cover Page

Input Page

Parent Model

Input/Output

Scenario

Normal Year

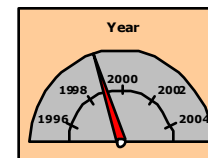
Flood Year

Drought Year

Pause monthly?

No

Yes



PALISADES RESERVOIR MANAGEMENT

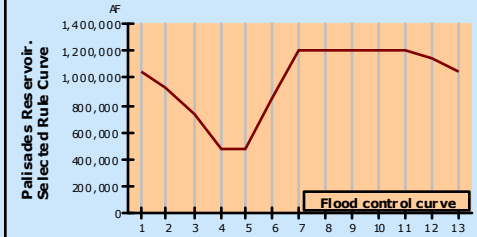
January to July: Use the slider to select a flood control rule curve that will be able to absorb the spring runoff. Your goal is for reservoir storage to be above the critical refill point by July, without allowing the outflow to reach flood stage.

July to December: Determine whether storage and flow are sufficient to satisfy all junior water rights. You may even satisfy more than 100%, to simulate other downstream requests such as refilling a lower reservoir. Your goal is to satisfy as many rights as possible, and to be above the critical refill point by December.

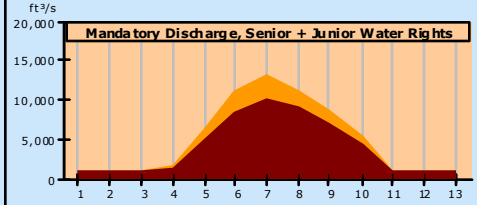
Palisades Reservoir. User selection of base curve

Historic

Early

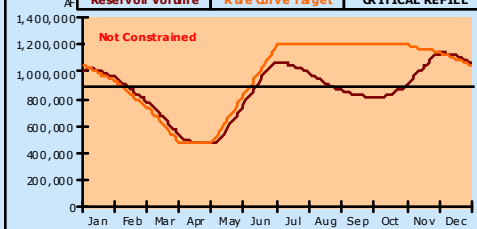


Mandatory Discharge, Senior + Junior Water Rights

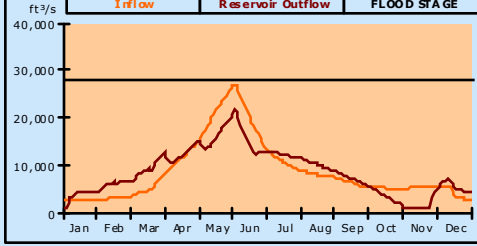


Reservoir Volume | **Rule Curve Target** | **CRITICAL REFILL**

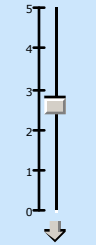
Not Constrained



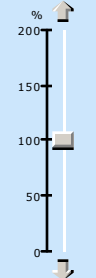
Inflow | **Reservoir Outflow** | **FLOOD STAGE**



Palisades Reservoir. User selection of Rule Curve



Palisades Reservoir. User selection of junior rights to satisfy



Modeling Concept of Water-Energy Interdependency



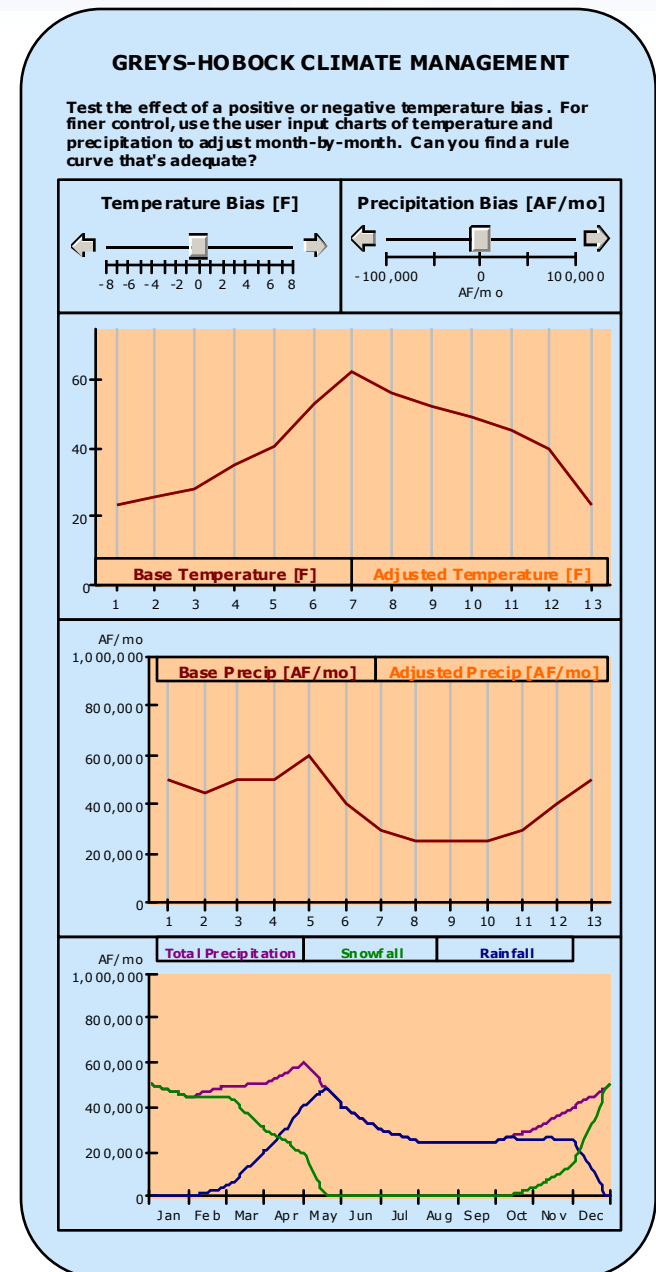
Previous and current INL System Dynamics Modeling Projects

Current Projects

- Commercial Nuclear Fuel Cycle – VISION
- Hybrid Energy Systems
- Spatio-Temporal Water-Energy Interdependency
- Biomass Feedstock Logistics

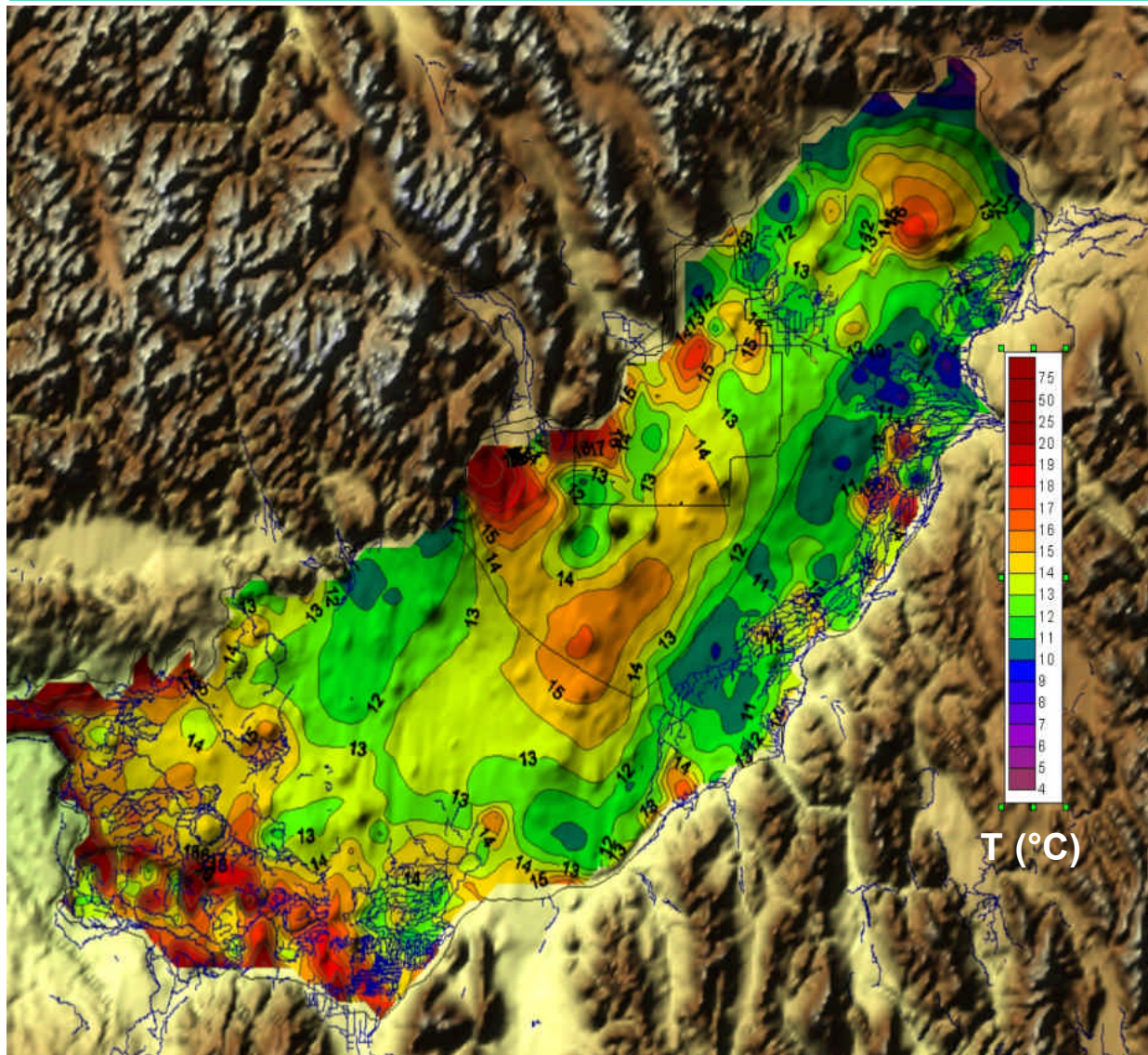
Previous Projects

- Bear River Basin Management Model
- Acid Mine Drainage
- Urban Dynamics model of water usage based on population dynamics



Thermal Groundwater Model Calibration

Snake River Plain Aquifer Temperature Map



A flow model that can reproduce known temperature distribution provides a significant increase in confidence in a model's accuracy and predictive ability

Summary

Continued progress to establish the Mountain West Water Institute:

- We have received several letters of support from regional water research institutes
- INL continues its investment portfolio to expand state of the art capabilities and tools in diverse areas of expertise in water and energy
- System Dynamics Modeling and Thermal Groundwater Model Calibration are two current examples where INL capabilities can be used to meet state and stakeholder needs

Contact Information

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