



CONCEPTUAL MODELS NARRATIVE

Utah Lake Water Quality Study
Science Panel Meeting
December 10-11, 2019
Salt Lake City, UT

VERY QUICKLY

- Juhn-Yuan Su (Univ. of Utah) and Nick Von Stackelberg (UDWQ) identified components of conceptual models that are in water quality models
- We clarified this in the updated document (version 5), which you have.
- Reviewed conceptual models with Steering Committee – no major issues/questions really

1.0 MECHANISTIC MODELING COMPARISON

Model engineers and scientists working at the University of Utah (Juhn-Yuan Su) and UDWQ (Nick Von Stackelberg) were asked to review the models above for those components that are simulated or not simulated by the mechanistic models. This section briefly highlights the feedback from those technical experts.

1.1 CAUSAL MODEL

The following elements of the causal model are not simulated in WASP or EFDC

Modifying Factors

- Turbidity: This parameter is currently not incorporated in this version as a state variable and hence is not modeled in WASP. Since WASP does not simulate turbidity, WASP will not simulate the effects of phytoplankton upon water clarity. However, EFDC does simulate classes of inorganic suspended sediment which can be used to simulate turbidity.
- Food Web: WASP is not implemented as a food web model and hence does not incorporate any food web processes nor any aquatic life or wildlife response explicitly.

Path Steps/Assessment Endpoints

- Inorganic Particulate N and P: WASP simulates the dissolved inorganic species (N and P). Inorganic Particulate N and P is incorporated in WASP through the simulation of benthic N and P rates under the sediment diagenesis routine. WASP does NOT simulate particulate inorganic N and P as separate state variables.
- Other Parameters: WASP does not simulate changes in food resources and habitat structure nor any changes in competition outside of nutrient uptake kinetics. Similarly, taste and odor or scums are not simulated directly.

Meanwhile, the following components can be represented in WASP but may exhibit significant limitations.

Modifying Factors

- Grazing: WASP incorporates grazing characteristics through the palatability of each phytoplankton group. WASP does not incorporate other grazing processes.

Path Steps/Assessment Endpoints

- Change in N and P in subsurface waters: WASP can incorporate groundwater inflow quantity and quality into the Utah Lake model, which currently includes 4 groundwater sources (Northern Valley, Southern Valley, Provo Bay, Goshen Bay). On the other hand, such groundwater inflows serve as inputs into WASP and are not simulated separately as no groundwater models have been applied.
- Algal Toxins: WASP only simulates the concentrations of phytoplankton and algae and does not simulate toxins.

NEXT STEPS

- Looking to finalize
- Any remaining comments, please send and we will put this document to bed