

Title: Incorporate information from calibrated models into the screening tool

Synopsis: The Water Withdrawal Assessment Tool (WWAT) is designed to provide an instant assessment of a proposed large quantity withdrawal. It automatically approves withdrawals if they are not likely to cause an adverse resource impact. If the proposed withdrawal does not meet this standard, the applicant is referred to EGLE for a site specific review. The WWAT uses an analytical solution to calculate streamflow depletion from nearby streams. A numerical groundwater model can be developed to accurately represent an area, including the stream/aquifer interactions, and account for the local water budget, with the goal to reasonably represent the streamflow depletion that occurs from area wells. It may be possible to improve the accuracy of the WWAT if the information from a calibrated numerical model could be incorporated into the screening tool. A promising modeling technique may provide this capability.

A metamodel is a computationally efficient surrogate for a more detailed numerical model. After a calibrated numerical groundwater model is developed to accurately represent an area, it can be run many hundreds, or thousands, of times determining the streamflow depletion for wells at different locations, and pumping different rates. The results can be statistically modeled. This statistical model (metamodel) can be used to rapidly predict the depletion from a new well. It could become part of the screening tool.

Recommendation: Evaluate metamodeling approaches. Develop and test a metamodel with a well calibrated numerical groundwater model. Determine the metamodel's accuracy, and if it can be reliably designed to provide reasonable, yet conservative, solutions in the screening tool.

Implementing Organization: The WUAC will work with the USGS to do this study.

Cost \$50,000 if done as part of a model development in MHF, \$100,000 if a stand alone project.

Timeframe one year.