

THE IMPACT OF DIGITAL ELEVATION MODEL RESOLUTION
ON AnnAGNPS OUTPUT FOR THE BREWER LAKE WATERSHED,
NORTH DAKOTA

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ABSTRACT

Yousaf, Mohammad, M.S., Program of Natural Resources Management, College of Graduate and Interdisciplinary Studies, North Dakota State University, February 2007. The Impact of Digital Elevation Model Resolution on AnnAGNPS Output for the Brewer Lake Watershed, North Dakota. Major Professor: Dr. Dean D. Steele.

The Annualized Agricultural Non Point Source (AnnAGNPS) model is a large-scale watershed model designed to determine quantities of water, sediment, and nutrients that will run off from an agricultural watershed. Primarily, three types of input data are required for AnnAGNPS simulation: topographic data, soil and land use data, and climate data. The topographic data are most commonly available as a digital elevation model (DEM). The resolution of DEM is one of the significant factors that affect the simulation. This study was conducted to analyze two main objectives: (i) Impact of changing DEM resolution from 10 m to 30, 60, 90, and 120 m of DEM dataset on AnnAGNPS model output values; and (ii) Effects of resampling by analyzing the difference in AnnAGNPS model output values between a 30-m DEM dataset resampled from a 10-m DEM dataset and an original 30-m DEM dataset. The Brewer Lake, North Dakota, watershed was selected for this study. Model simulation was performed on each selected DEM dataset to predict flow, sediment, nitrogen, and phosphorous load at the watershed outlet. Simulation results indicated that DEM resolutions affect the watershed delineation, and lower values of runoff, sediment, nitrogen, and phosphorous load were predicted at the coarsest DEM resolution (120 m). The results for resampling analysis showed a significant difference for sediment prediction. The overall study indicated that DEM resolutions and resampling affected the model output.