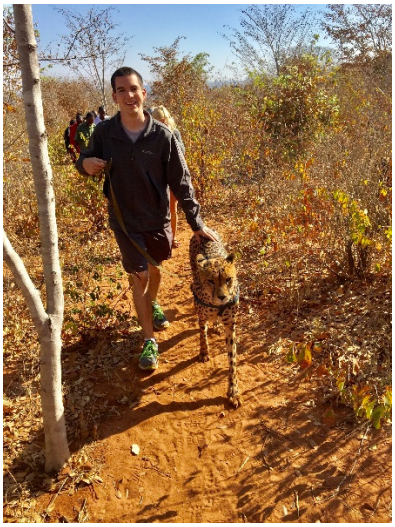

Stephen Kines is originally from Warren, Ohio. He received his undergraduate degree in Agricultural Engineering from Purdue University in 2017. He then continued on at Purdue to pursue a Master's Degree as part of the Purdue Hydrologic Impacts Group in Dr. Cherkauer's lab. Stephen also served as a TA for ABE 325 and was awarded the Chappelle Fellowship during his graduate studies. He is currently undecided on his plans following graduation.

Agricultural & Biological ENGINEERING

Thesis Defense

Speaker: Stephen Kines

Title: Modeling the Impacts of Lakes and Wetlands on Streamflow Hydrology

Major Professor(s): Dr. Keith Cherkauer

Date: Monday, April 08, 2019

Time: 2:00 PM

Location: Lilly 3410

Abstract:

Lakes and wetlands account for a large portion of the earth's surface and create water storage within the landscape Lakes and wetlands also provide many other non-hydrological benefits such as their ability to improve water quality and provide wildlife and fisheries habitat. Despite their known benefits, wetland destruction has been a prominent issue for many years. This study quantifies the hydrologic effects of lakes and wetlands by using a introducing a parametrization method for hydrologic model simulations in the North American Land Data Assimilation System (NLDAS) domain. This parametrization was a combination of known depth-area relationships as well as calculated topographic wetness index (TWI). The Variable Infiltration Capacity (VIC) model was used to test quantify the effects of the lake and wetland storage on two watersheds, the Buttahatchee River in Mississippi and the Black River in North Carolina. Simulated daily streamflow with and without the lake and wetland algorithm active was generated by the model. Flood magnitude in terms of streamflow decreased 5.8% and 29.6% for a 10-year return period flood. There were also 1.6% and 10.9% decreases in average streamflow rates as well as corresponding 0.3% and 4.1% increases in annual evapotranspiration for the Buttahatchee River and the Black River sites, respectively. The magnitude of these impacts varies based on the amount of area covered by lakes and wetlands as well as the distribution of the lakes and wetlands within the watershed.

Application:

The lake and wetland modeling technique developed in this study can be utilized in any watershed in the continental United States to demonstrate how removal or alternation of lake and wetland resources will affect streamflow, both in flood magnitude and water balance.