Marion County Lake was completed in 1937 by the Civilian Conservation Corps. The primary purpose of the lake, then and now, is for recreation. Recreation at Marion County Lake includes fishing, swimming, and watersports. In 2002, Marion County Lake was listed on the register of National Register of Historic Places (NRHP).¹

The officials at Marion County Lake seek to establish a management strategy for Marion County Lake and its surrounding watershed. The primary use of Marion County Lake is recreation based. With that in mind, this work will seek to establish the foundation of a lake management plan to be written for managing the lake for the purpose of maintaining recreation capabilities. To be discussed are the principles of lake management plans, the potential effects climate change will have on Marion County Lake and what management strategies need to be employed, and the effects that changes in land cover will have on the lake - all in terms of the recreation potential of the lake.

Managing Marion County Lake for the volume of water in the lake and the quality of the lake water will be of highest importance. Changes in both climate and land cover are the focus of this report. A 35-year review of daily temperatures and precipitation volumes taken from NOAA at Marion Lake will be studied to assess historic climate trends at Marion County Lake. Additionally, a climate model using PRISM data will be generated to show a 30-year review of trends of climate change across the United States and more specifically in Marion County. The effects of land cover change will also be assessed in this body of work. Runoff calculations will be performed to determine how changes in land cover will affect the volume of runoff into Marion County Lake, and, subsequently, the lake water volume and water quality. These data pools will be analyzed to offer management strategies for maintaining lake water volumes and lake water quality.  

Over the last 30-year climate normal, precipitation and temperature averages were taken within a raster calculation in GIS. A true/false raster calculator was used on both precipitation and temperature data in order to determine the risk of climate change across the United States. For temperature, if the 2017 average held a value greater than 99% of the climate normal average temperature, a true response was generated. For precipitation, if the 2017 average held a value less than 90% of the average precipitation from the climate normal, a true response was generated. These responses were combined to determine No Risk, Moderate Risk, and High Risk regions.

The runoff models were made using the “curve number” or CN method found in the Urban Hydrology for Small Watershed document by the USDA. The major factors that determine the curve number or CN are the hydrologic soil group (HSG), cover type, treatment, hydrologic condition, and antecedent runoff condition (ARC). Another factor considered is whether impervious areas outlet directly to the drainage system (connected) or whether the flow spreads over pervious areas before entering the drainage system (unconnected).

### References
