

ABSTRACT

THESIS: Assessment of the Hydrology of the White River Watershed

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Headwater streams and isolated wetlands are integral components of a healthy watershed, and their effects extend to larger streams downstream, rivers, and wetlands. Managing headwater streams and isolated wetlands is an essential part of watershed management. Due to their smaller size in discharge/area and higher fluctuation, the impact of climate change and human disturbances are more influential for headwater streams and isolated wetlands. Science has shown that the changing climate will exacerbate aridity and decrease stream runoff in the summer in the Midwest, and degradation of headwater streams and wetlands have been commonly observed in the Midwest. The wetlands and headwater streams within the White River watershed, an upstream region of the Mississippi River Basin and a major nutrient source for the Gulf of Mexico, have suffered extensive impacts, resulting in the direct degradation of habitat in these ecologically vulnerable areas. Despite the existence of many restoration and conservation programs and plans, a recently passed Indiana state legislation SB 389 may impact more than 50% of state protected wetlands. A comprehensive analysis of the wetland dataset and hydrological alterations in the region may provide valuable information for watershed management.

This thesis is composed of an analysis of the wetlands that might be affected by SB 389 and a comprehensive evaluation of hydrology using the data collected at the White River at Muncie and the Prairie Creek Reservoir. The analysis shows that the isolated wetlands comprise over 12% of the total amount of existing wetlands. The hydrologic alteration analysis found an increasing trend in the annual streamflow and an increase in low-flow events after construction of low-head dams in Muncie, indicating the impacts of climate change and the construction of the dams. An analysis of the short-term monitored streamflow

data from the White River and Prairie Creek indicated the correlation between the two water bodies. The results will inform decision makers and stakeholders for conceptualizing a suitable conservation plan for the watershed.