

Critical Watershed Areas

The Pigeon Creek Watershed can be naturally divided into three subwatersheds for discussion and analysis, each with different characteristics and specific areas of concern. The first subwatershed, the Upper Watershed, consists of the area from Cedar Swamp to the inlet to Long Lake. This subwatershed primarily consists of agricultural land usage with limited flood storage along the creek. The confluence with Wood Ditch and the Angola WWTP outlet is located at the downstream end of this subwatershed. The next subwatershed, the Lake Chain, consists of the area from the inlet to Long Lake to the outlet of Hogback Lake. This subwatershed consists of a mix of agricultural and recreation / residential land use and contains the majority of the residences of the watershed. Accordingly, this area is also subject to the most flood damage in the watershed. The final subwatershed, the Lower Watershed, consists of the area from the outlet of Hogback Lake to the Steuben / Lagrange County line. This subwatershed is similar to the Upper Watershed as it primarily consists of an agricultural land use; however, the creek has steep side slopes throughout much of this subwatershed that limits the ability of flood flow from spilling out of the channel and into a typical floodplain.

The upstream or tributary portions of the watershed cause the nutrient, pollutant, sediment loading problems as the source for these constituents. The potential for floodwater originates in these upstream drainage areas and have the possibility of magnifying their impacts as they move downstream through the watershed. The Lake Chain portion of the watershed manifests the problems caused in the Upper Watershed and the tributary areas of the Lake Chain watershed. As these areas have a significant population focus, the impacts are readily observed by the residents. Some of the lakes provide a buffer to the overall watershed by functioning as a sink or settling basin for much of the pollutant and sediment loads. However, the lack of storage in the upstream watershed increases the conveyance of stormwater and increases the scouring action, re-suspending some of the fine particles which had previously settled out of the water column and further eroding and incising the downstream banks of the Lower Watershed.

Targeting the problems within the upper drainage areas and lakes, we hope to accomplish improvements throughout the entire watershed. Achieved success can be measured through improved water quality within the downstream portions of Pigeon Creek and the on-line lakes within the Lake Chain.

Upper Watershed

As previously mentioned, the Upper Watershed consists of primarily low-lying agricultural areas upstream of the lake chain. This portion of the watershed also possesses the highest concentration of hydric soils, almost 40% of the surface area. Areas suitable to wetland creation, such as locations with hydric soils, are prevalent within this portion of the watershed.

At Bill Deller Road, the Upper Watershed receives runoff from approximately 49 square miles with minimal storage for flood events. This area has been identified as critical within the watershed for providing a solution to a watershed stressor that is not currently

being facilitated. This is a larger drainage area, with minimal storage currently being provided. The excess runoff is conveyed downstream of the lake chain, where a significant amount of structural damage is recorded.

Critical Areas for the Upper Watershed (see Figure 21) include:

- Wood Ditch / Mud Lake: Additional storage and filtering before entering Long Lake to reduce flooding and *E. Coli* levels in Pigeon Creek and the lake chain.
- Bill Deller Road: Additional storage and filtering before entering Long Lake to reduce flooding and *E. Coli* levels in Pigeon Creek and the lake chain.
- Ditches along animal farms and land application users: Additional filtering is required to reduce *E. Coli* levels in Pigeon Creek and the lake chain.
- Meserve Lake and Gooseneck Lake: Quality improvements are required to maintain the environmentally sensitive Cisco population.

The Wood Ditch / Mud Lake storage facility project has been under consideration on the Kankamp Property for the past ten years.

Lake Chain

Due to the recreational benefits and level of existing development, the lake chain is an important natural resource within the Pigeon Creek Watershed. Stakeholders have noted concerns regarding the water quality in the lakes, especially at Long Lake where a large amount of sedimentation and floating debris can be found, most likely due to the lake's location at the start of the lake chain. At this location, the flow velocity decreases as the creek expands into the lake, allowing the sediment to drop to the lake bottom. The lake chain is also where the majority of the watershed's flood damage occurs. This is due to the combination of limited flood storage available upstream of the lakes, limited conveyance capacity downstream of the lakes, and clustered development along the low-lying lake shore.

Critical Areas for the Lake Chain (see Figure 22) include:

- Long Lake: Sediment removal and storage is required to reduce sedimentation in Long Lake. Quality improvements are also required to improve lake trophic status.
- Hogback Lake: Additional conveyance is required to reduce flooding in the lake chain. Quality improvements are also required to improve lake trophic status.
- Golden Lake: Quality improvements are required to improve lake trophic status.

The Long Lake sedimentation removal and storage project offers many benefits to Long Lake and the lake chain. This issue will be among the first to be addressed. Additional conveyance at Hogback Lake may not be feasible based on the potential negative impacts that additional conveyance could have downstream of the lake chain. Golden Lake will likely receive improved water quality from watershed-wide filtration and education projects.

Lower Watershed

The Lower Watershed consists primarily of agricultural land uses; however, unlike the Upper Watershed, here Pigeon Creek has steep side slopes that limit flood flow from overtopping the channel. In turn, the side slopes limit the conveyance capacity of the

channel and act as an additional restrictor for runoff leaving the lake chain at Hogback Lake. Significant erosion has occurred along the side slopes of the channel as the water attempts to increase the channel width. Manmade improvements to increase the conveyance capacity of the channel will aggravate the existing flood situation downstream at West Otter Lake, and therefore does not appear to be a reasonable solution. Improvements should be focused on stabilizing the steep side slopes and reducing the potential for future erosion.

Critical Areas for the Lower Watershed (see Figure 23) include:

- West Otter Lake: Additional flood reduction and upstream sediment control is required.
- New Development: Multiple large scale developments are proposed for the Lower Watershed. These developments include runway expansion at the Steuben County Airport, as well as a large residential development surrounding the Irving Gravel Pit. Local storm water and erosion control regulations need to be enforced for these and all other development activities to minimize environmental impacts.

Each of the critical areas identified for the Lower Watershed will continue to have significant negative impacts if improvements are not made. Therefore, each of these concerns will be in the first group of issues to be addressed.



Figure 21: Upper Watershed Critical Areas.

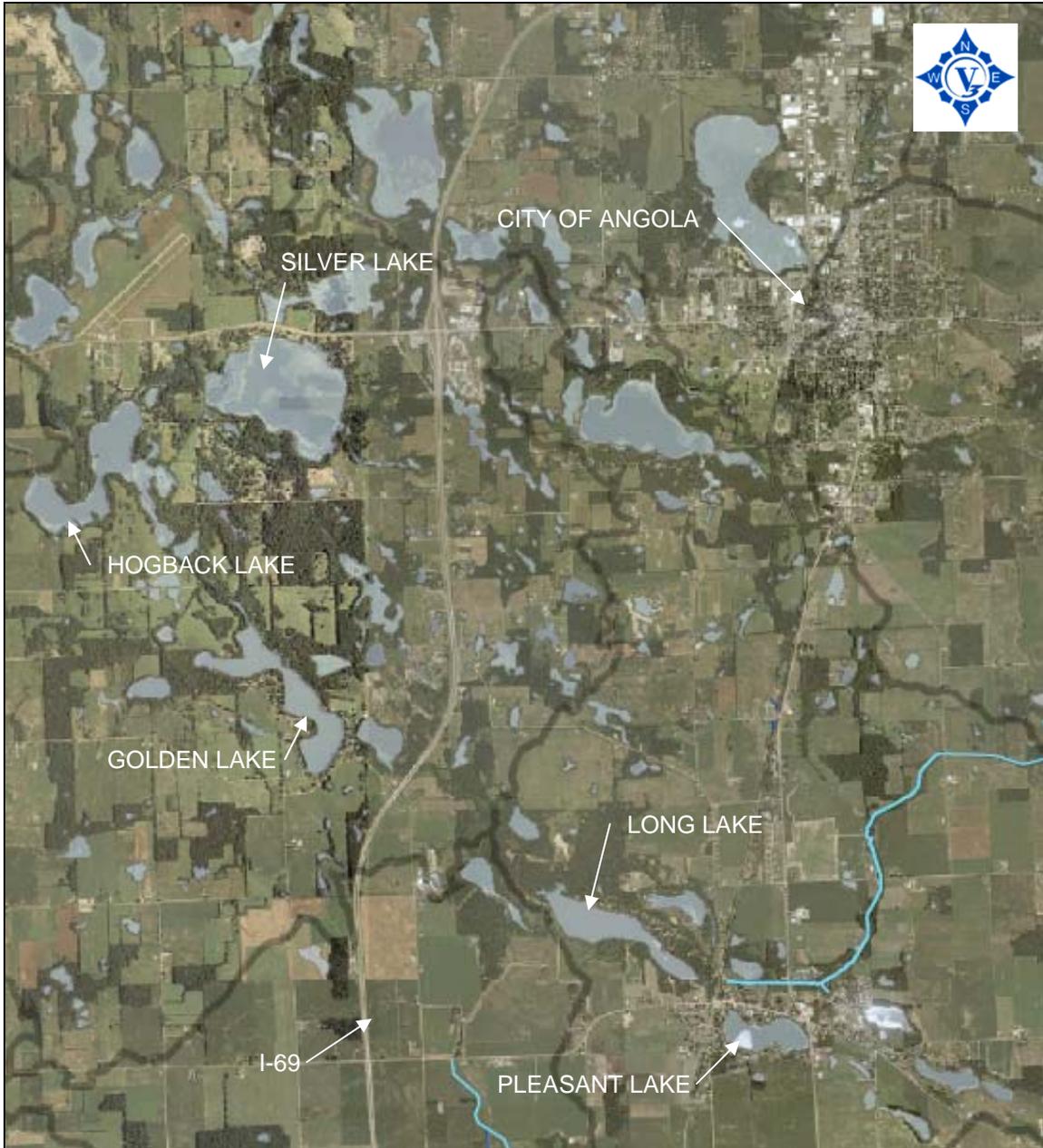


Figure 22: Lake Chain Critical Areas.



Figure 23: Lower Watershed Critical Areas.