

## **WATER QUALITY EVALUATION OF ASYLUM LAKE & LITTLE ASYLUM LAKE WITH MANAGEMENT RECOMMENDATIONS, KALAMAZOO, MICHIGAN**

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**Project Costs:**            **\$55,000**

**Project Completion:** **2008**

Western Michigan University (WMU), on behalf of the Asylum Lake Policy and Management Council, authorized KIESER & ASSOCIATES, LLC (K&A) to initiate a study of Asylum Lake and Little Asylum Lake beginning in July 2006. The purpose of this effort was to develop a robust understanding of current lake conditions, identify factors influencing water quality and recommend strategies for long-term management and improvements. A range of efforts was conducted by K&A that included:

- Watershed delineation and assessment of runoff contributions
- Identification of stormwater pollutant sources and loading estimates
- Water quality monitoring (seasonal and wet weather)
- Stormwater inlet and lake outlet sampling
- Sediment sampling
- Aquatic plant surveying
- Development of a hydraulic mass balance
- Development of a phosphorus mass balance, and
- BMP recommendations and preliminary stormwater treatment concepts

Project findings relevant to Asylum Lake Policy and Management Council interests in Asylum and Little Asylum Lakes are presented here. These relate to critical findings and considerations for future management.

- Stormwater pollutant inputs from storm sewered areas to the west and north of Asylum Lake constitute the largest source of external loading that can be managed through controls. Large land areas that drain to the lake via overland flow are mostly pervious and covered with vegetation of some type.
- Asylum Lake and Little Asylum Lake are largely isolated from downstream Cherry Creek and Willow Lake. Under normal precipitation conditions, very little water flows out of Little Asylum Lake.
- Groundwater inflow is the predominant source of inflowing water to Asylum Lake. Conversely, nearly all water exits Little Asylum Lake via groundwater.
- Water quality conditions in both lakes suggest these systems can be characterized as eutrophic based on phosphorus, chlorophyll *a* and secchi disk measurements.
- Rapid onset of anoxia is attributable to organically enriched sediments that exert a high sediment oxygen demand on overlying waters.
- High TP and TN concentrations in sediment samples suggest significant retention and accumulation of these materials. This is corroborated by mass balance calculations indicating that more than 70% of the phosphorus that enters Asylum Lake remains within the lake. This is closer to 100% retention in Little Asylum Lake.
- The littoral plant communities of these lakes are moderately diverse. Invasive species include Eurasian water milfoil and purple loosestrife in Asylum Lake and Curly leaf pondweed in Little Asylum Lake. Cost factors for management will likely dictate decisions made to control these species.
- The most pressing water quality/watershed management issue is controlling stormwater loads from highly developed storm sewered drainage areas, principally for Asylum Lake.