

Long-term Monitoring of Willow Creek

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Goals of the Project

Our scientific goals are to establish baseline values for water quality in Willow Creek as a point of comparison for future measures of ecosystem function.

Our teaching goals are to have students

1. Identify several macroinvertebrate species found in the creek, describe how they acquire oxygen, and describe their role in the stream food web.
2. Explain the significance of temperature, dissolved oxygen, pH, turbidity, and the concentrations of total phosphorus in the analysis of water quality and stream ecology.
3. Explain how the types of macroinvertebrates found in the stream are related to the water quality measures mentioned above as well as spatial distribution of organisms along a gradient from upstream to downstream habitats.
4. Explain the significance of habitat (shoreline vegetation & in-stream substrate) on stream biota.

Description of study site and problem

As you wind your way down the Howard Temin Lake Shore Path past the crew dock, the Lake Shore Dorms, and the Natatorium towards Picnic Point you cross Willow Creek where it empties into Lake Mendota. Willow Creek is an urban stream that serves to drain much of the near west side of Madison. It receives storm sewer discharge including surface runoff from as far away as Whitney Way and Hilldale Shopping Center, Mineral Point Road, all of University Heights neighborhood, and other impervious surfaces on campus as well as sub-surface seepage from near by grassy areas and playing fields. Inputs to the watershed are from precipitation that combine with substances at the ground level, some containing high levels of fertilizer, sediment, or toxins from roadway runoff as well as biological contaminants like fecal coliform bacteria.

With the construction of the new West Campus Cogeneration power plant due to begin operations in spring 2005, Willow Creek may receive additional storm sewer discharge.

Researchers at the UW-Madison, have received a grant from the Wisconsin Department of Natural Resources to create a master plan for storm water runoff which could provide input on future management of Willow Creek. The goal for this project is to decrease the concentration of chemical runoff from surrounding fields, parking lots, and roadways, decrease rates of sedimentation, and decrease the spread of invasive non-native wetland species. In addition to this project, Willow Creek is situated directly adjacent to the new West Campus Co-Generation Power Plant and a large construction footprint. Although the planners have developed an extensive environmental impact statement that anticipates minimal impact of the power plant on Willow Creek and Lake Mendota (MG&E 2003), data derived from our study could provide further evidence for this claim. Lastly, the city of Madison has just recently instituted a phosphorus ban that would eliminate the sale and use of phosphorus containing fertilizer to go into effect January 1, 2005 (Dane Co. Lakes & Watershed Commission 2004). Urban runoff has been found to contain high levels of phosphorus that contributes to algal blooms and rapid growth of aquatic weeds in our local lakes. All of these elements together stress the importance of monitoring Willow Creek. To understand the dynamics of Willow Creek and the environmental impact of new development, we will be collecting base-line data about the stream ecosystem such as water temperature, pH, total phosphate and nitrate, fecal coliform, and dissolved oxygen levels, as well as the diversity of aquatic macroinvertebrates. We will be using the data we gather from this study to characterize the chemical/ physical quality of the water as well as the macroinvertebrate community as an indicator of a functional stream ecosystem. Following our analysis, these data will go into a long-term database that will be used by future Biocore 302 students as well as others who are interested in conservation and maintenance of waterways that effect Lake Mendota.