Great Lakes Watershed Management System

www.iwr.msu.edu/glwms/

The **Great Lakes Watershed Management System (GLWMS)** is an easy-to-use online tool containing sediment and nutrient calculators capable of assessing the environmental benefits of various conservation practices from a field-to-watershed scale. Developed by The Nature Conservancy, Michigan State University's Institute of Water Research, and other partners, the GLWMS can assist in targeting agricultural best management practices (BMPs) to areas where they'll provide the greatest environmental benefit. The GLWMS can also help inform and track progress towards watershed conservation goals.

Publicly available, the GLWMS is currently developed for the priority basins of the EPA's Great Lakes Restoration Initiative: the Fox River Basin of Wisconsin, the Saginaw River Basin of Michigan, the Maumee River Basin of Ohio, and the Genessee River Basin of New York (**Figure 1**).

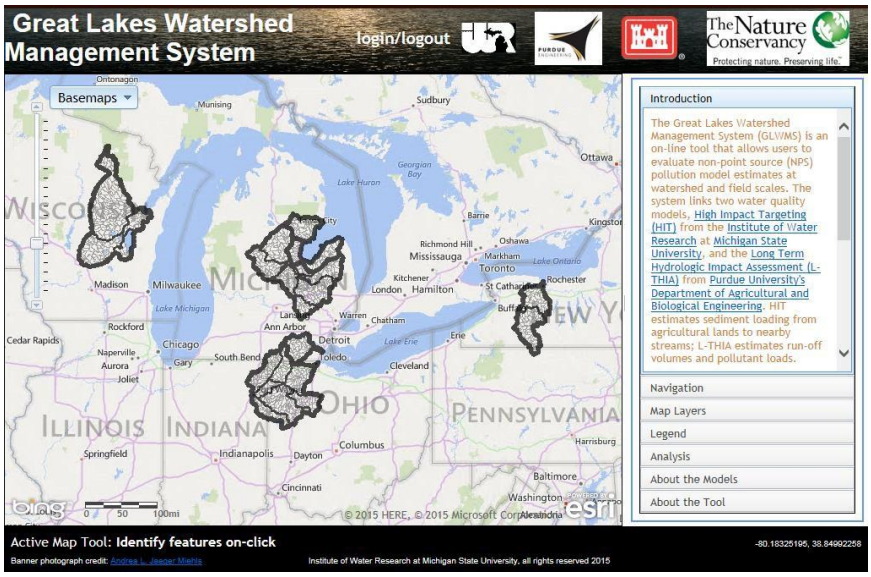

Figure 1. The GLWMS currently can be used to assess the environmental benefits of various BMPs from a field-to-watershed scale in four priority basins of the Great Lakes region.

What can the GLWMS do?

The GLWMS can perform field and watershed level analyses, *estimating not only sediment and nutrient losses but also the economic cost of implementing various conservation practices*. Various map layers can be selected within the tool to view sediment and erosion levels, watershed boundaries, and either aerial imagery or road maps to help users identify a particular field or watershed. An easy to use navigation bar on the right-hand side of the screen allows users to select options for an analysis, save and review previous results, and learn about the GLWMS.

Watershed-scale analysis can be performed at the scale of Hydrologic Unit Code (HUC) 8 to 12 watershed. In addition to estimating nutrient and sediment loadings at the watershed scale, which can be reported as per acre or total watershed loading and presented graphically as a map, watershed-scale analysis can also estimate sediment and erosion reductions as well as the associated economic cost of implementing varying levels of conservation practices. Field-scale analysis can similarly estimate initial sediment and nutrient loadings as well as reductions from the implementation of various conservation practices, their associated economic cost and the relative reductions of alternative conservation practices.

Why use the GLWMS?

Publicly available and easy to use, the GLWMS provides a way to quickly and easily measure the benefits (in tons of sediment or pounds of phosphorus or nitrogen reduced) of specific conservation practices and their economic costs, and more strategically implement BMPs in a given watershed, sub-watershed, or field. No special software is required ther than access to the internet, making it well suited for use by crop advisors, university extension staff, conservation district technicians, watershed groups, and farmers in an open-access forum, free of charge.

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The Nature Conservancy and MSU's Institute of Water Research are developing a companion tracking system, called the BMP tracker, to capture and display the benefits of all conservation best management practices (BMPs) as they are implemented in the Saginaw Bay Watershed (**Figures 2 and 3**). The results of the BMP tracker will be made available through the GLWMS website. (Personal details will be kept confidential and locations will only be aggregated at the watershed level.) These results will help agriculture demonstrate its watershed stewardship and track progress towards watershed-level conservation goals (see 'How Much Conservation is Enough?').

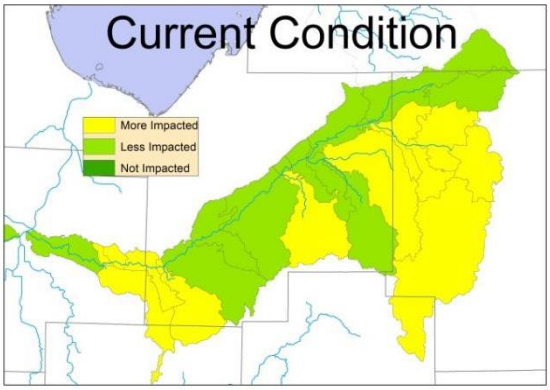

Figure 2. Current (2010) health of the fish community in the Cass River watershed, a sub-watershed of Saginaw Bay watershed.

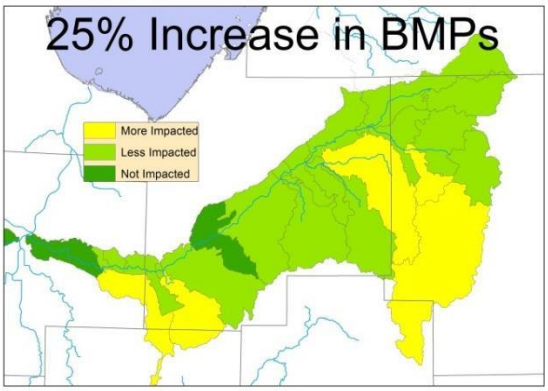

Figure 3. Predicted fish community health *after* achieving 25 percent coverage of agricultural BMPs. Watersheds that change to darker green colors improved the most.

More about the GLWMS

The GLWMS combines two water quality models: the High Impact Targeting (HIT) model, which estimates annual soil erosion and sediment loading to streams, and the Long Term Hydrologic Impact Assessment (L-THIA) model, which estimates runoff volumes of specific pollutants, such as nitrogen and phosphorus.

The High Impact Targeting (HIT) model was developed by MSU-IWR in cooperation with the Michigan Department of Agriculture and Rural Development (MDARD) and the Clinton, Huron, and Lenawee Conservation Districts with Conservation Innovation Grant funding from the USDA's Natural Resource Conservation Service (NRCS). The HIT model is a combination of the Revised Universal Soil Loss Equation (RUSLE) erosion model and the Spatially Explicit Delivery Model (SEDMOD) sediment delivery model.

The United States Army Corps of Engineers, NRCS, MDARD, and other state agencies have used the HIT model to: (1) identify baseline measurements of soil erosion and sedimentation within watersheds, (2) target conservation practices in the areas most vulnerable to soil erosion and sedimentation, (3) prioritize targeted areas and set outcome-based goals, and (4) evaluate the impact of conservation efforts on soil erosion and sediment loading.

The Long Term Hydrologic Impact Assessment (L-THIA) model was developed in partnership by the Chicago District of the United States Army Corps of Engineers, Michigan State University, and Purdue University. L-THIA is used by hydrologists, state agencies, conservation organizations, or watershed stakeholders to: (1) generate runoff volume and depth estimates for given areas, (2) model expected non-point source pollution loading into water bodies, (3) target conservation practices or land use changes in areas most vulnerable to pollution loading, and (4) assess the effect conservation practices or land use changes have on pollution loading.

*For additional information, see the **How to Use the Great Lakes Watershed Management System** tutorial.*