2026 State Envirothon Current Issue Scenario
"Non-Point Source Pollution: It begins at home!"

Background

As a Senior Project Manager for Watershed Solutions LLC, you work with many clients to investigate pollution problems and provide recommendations to address them. Your clients include local governmental units (cities or townships), non-profit organizations (such as lake or river associations), and even state agencies where you provide expertise in a consulting capacity. You are recognized nationally for your company's high level of detail, years of experience, and ability to address a variety of natural resource issues due to the diverse skillset of your team. It is this recognition that resulted in the City of Zimmerman and the Little Elk Lake Improvement Association requesting your team to lead an investigation into the poor water conditions of their prized natural resource, Little Elk Lake.

Little Elk Lake's water quality has been an increasing topic of discussion in community meetings in recent years. Concern has been raised in the lakes excessive aquatic plant growth as well as the more frequent algae blooms during the summer recreation months. The lake community has reached a tipping point, and they are ready for action. All are in agreement that a lake of better quality would increase home values as well as tourism which would improve the local economy. As such, the City of Zimmerman and Little Elk Lake Association has raised funding with assistance from the Sherburne Soil and Water Conservation District to develop a plan for Little Elk Lake. They would like your team to investigate the nature of the poor water quality and develop a plan for pursuing better lake quality conditions.

Little Elk Lake is 362 acres in size and averages 7 feet in depth with a maximum depth of 15 feet. The lake does include a watershed of roughly 25,800 acres, or 40 square miles. The watershed includes a variety of land uses, all of which may contribute pollution to the lake.

After hearing from local stakeholders and the city council, you arrange for a meeting with your project team to create a strategy for tackling this project. Your team identifies the following necessary steps:

1. **Gather available data to help assess the sources of pollution.**
2. **Use online modeling software to calculate potential pollution reduction scenarios.**
3. **Create an outreach strategy to engage stakeholders in the watershed.**
4. **Identify potential grant funding to implement this plan with a targeted budget of $250,000.**

Step 1. Watershed Data Collection

To start this project, you will need to identify what is known about the Little Elk Lake ecosystem and water quality condition. Fortunately, there is a tremendous amount of data available for Minnesota's lakes through a variety of resources. Your team decides to collect more information about the watershed first, since it is quite large and likely a source of phosphorus (the nutrient that most often spurs aquatic plant and algae growth) to the lake.

A. Visit the website [Model My Watershed](#) and select "Get started".
B. Zoom into the State of Minnesota and under "Select Boundary", click on "USGS Subwatershed unit (HUC-12)" and red lines will appear on the map.
C. Within the Search bar type "Battle Brook". Two options under "Huc-12 Subwatershed" will appear. You want to select the second of these two options, which will highlight a subwatershed near Princeton, Zimmerman and the Sherburne National Wildlife Refuge. The Battle Brook subwatershed drains into Little Elk Lake.
D. Select this watershed.
E. Under the "Analyze" tab, view the information under the subcategories ("Land", "Soil", "Terrain", etc.).
   a. **What does this information tell you about the contributing watershed?**
   b. **Are there some potential challenges in this watershed that could result in diminished water quality in the lake?**
F. Select the "Model" tab, and "Watershed Multi-Year Model"
   a. Examine the data under the "Hydrology" subcategory.
      i. **At what point in the year does the watershed see the most Surface Runoff?**
      ii. **Discuss why this might lead to water quality challenges in the lake.**
   b. Examine the data under the "Water Quality" subcategory.
      i. **What land use sources generate the most sediment, total nitrogen and total phosphorus?**

Step 2. Model Best Management Practices, Agricultural

Now that we know the likely level of pollution entering the lake, we need to understand what could be done to reduce that pollution. Identification of appropriate Best Management Practices (BMPs) is important, as well as understanding where they might be placed and how much they might cost. This information can be used to communicate realistic expectations and what level of investment would be required.

Agricultural Best Management Practices

A. Visit the Minnesota Pollution Control Agency's [BMP effects estimator tool (BEET) planner](#)

B. In the first dropdown box on the top of the screen, select the "Miss R – Saint Cloud" Watershed.

C. The second dropdown box allows you to select different pollutants.

D. The third dropdown box allows you to determine the scale in which your pollutant reduction calculations take place. Since we are interested in determining the amount of pollutant delivered to Little Elk Lake (as opposed to the amount generated in the watershed) select "Subwatershed outlet (HUC 12)" and find the "Battle Brook" watershed.

E. This tool can be used to develop scenarios for installing conservation projects on the landscape and forecasting what amount of pollutant reductions we might see in the lake.

    a. These are the 5 most common BMPs used in the area, use these practices for your pollution reduction calculations in the tasks outlined below.

        i. [Cover crops with corn and soybeans](#)

        ii. [Filter Strips, 50 ft (Cropland field edge)](#)

        iii. [Conservation Cover Perennials](#)

        iv. [Grassed Waterways](#)

        v. [Reduced Tillage (No-Till)](#)

    b. Describe how each BMPs functions, its mechanism for how it reduces pollution, and research what an approximate cost is for the BMP ("cost per acre" is a common unit to use).

        1. BMP Cost Estimates

            a. [Iowa Farm Custom Rate Survey](#)

        2. Example Seed Vendor

            a. [Albert Lea Seed](#)

    c. Since most of the land in this watershed is privately owned, any installation of BMPs is going to require the voluntary cooperation of individual landowners. Installation of these BMPs is also going to require a large cost, hopefully obtained through federal or state grants. The anticipated budget is $250,000 not including grants.

        i. **Use BEET, the BMPs identified above, the cost of those BMPs, and the parameters provided below to develop pollution reduction scenarios.**

        ii. Parameters to use in your scenario:

            1. **5 landowners have expressed interest in implementing conservation practices on their land. They are open to one**

or a combination of the 5 practices listed above. For the purpose of this exercise, the acreage below can be anywhere in the watershed.

Table 1: Landowner interest in the Little Elk Lake Watershed.

Landowner	Acres of Land
Landowner 1	100 acres
Landowner 2	120 acres
Landowner 3	60 acres
Landowner 4	120 acres
Landowner 5	80 acres

2. **Identify what practices will achieve higher pollution reduction benefits, while also ensuring efficient use of funding.**
3. **Create a table that shows the sediment, nitrogen, and phosphorus reduction.**

Step 3. Develop an Outreach Strategy, Urban

Urban Best Management Practices Integration: Step 2 includes a model that predicts pollution reduction regardless of where exactly the practice is done in the watershed, so the results and impact may vary. In general, conservation BMPs installed closer to the waterbody of interest, or closer to a tributary stream, are going to be more impactful. As such, the Little Elk Lake Improvement Association would like to see practices installed on smaller acreage immediately adjacent to the lake. While these urban BMPs may not yield pollutant reductions on the same scale as agricultural practices, they can be impactful given their close proximity and contribute to the overall health of the watershed. In addition to the 5 landowners willing to install conservation practices on a larger scale, develop an outreach plan to solicit 3 more landowners around the lake to incorporate urban practices on their properties. Each of the three landowners will select from the following BMP options:

- Raingarden
- Lawn Conversion to Native Plants
- Permeable Pavers
- Shoreline Buffer
- French Drain

The outreach strategy should also highlight general lawn care best practices that any property owner in the watershed can adopt, even if they are not receiving grant assistance. Simple changes—such as reducing fertilizer use, limiting pesticides, conserving water, and

incorporating native plants—can significantly reduce nutrient runoff and improve lake health. Importantly, property owners are more likely to embrace these practices when they see neighbors successfully implementing them. By promoting easy, time-saving options for lawn care in the near-lake area, the community can achieve impactful results that benefit both residents and the watershed.

When developing the outreach strategy, consider the following:

A. **Define the goals and target audience for this strategy.**
B. **Describe the Communication Plan that will be used.**
   a. **What communication channels or mechanisms will be used and why?**
   b. **What is a compelling message, theme, logo, or other marketing tool that can be created to clearly articulate your communication?**
C. **How can the greater community be involved?**
   a. **What role might city council or community leaders have in this project?**
D. **How will progress be measured and tracked?**

Resources for Lawn Care Best Practices:

- Minnesota Pollution Control Agency – Lawn and Garden Care
- University of Minnesota Extension – Sustainable Lawn Care
- EPA – Green Landscaping: Lawn Care

These resources provide guidance on fertilizer reduction, mowing height, watering practices, and native plant alternatives—all of which improve water quality by reducing nutrient runoff.

Step 4. Identify Potential Grant Funding

Installation of BMPs to address non-point source pollution can be expensive. These installations bring about risk if they are not done correctly, may even impact agricultural crop yields, and may have maintenance requirements. So, financial assistance through grant funding is a great incentive to use in working with landowners to get this work done.

Conduct research on sources of grant funds through federal agencies, state agencies, or local agencies. Prepare a summary of the potential grant assistance programs and what types of BMPs might be eligible. Include items such as who is eligible to apply and if there is a local investment (often called a "match" or "in-kind" contribution) required.