

2026 VT Envirothon Current Issue Guide:

Non-Point Source Pollution: It begins at home!

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I. Background & Key Concepts

Clean water in our wetlands, rivers, and lakes is essential to all life, yet, worldwide, numerous human activities threaten and degrade this vital resource. One of the leading causes of the degradation of surface water bodies is nonpoint source (NPS) pollution. NPS pollution comes from many scattered sources, such as stormwater runoff from rooftops and roads, rather than a single source, such as wastewater treatment plant effluent (which is known as point-source pollution). NPS pollution is difficult to manage and regulate because it comes from multiple different locations across a wide area.

This year's Envirothon Current Issue challenges you to explore how everyday actions and common practices can contribute to NPS pollution. You will examine the science, policy, and the role of human behavior behind NPS pollution and then propose practical solutions that start at home to better protect our water bodies.

What can you and your community do to ensure our water stays clean while continuing to support the needs of our population?

Understanding Where Nonpoint Source Pollution Comes From

NPS pollution comes from many different locations such as lawns, golf courses, farms, sidewalks, roadways, and construction sites. It can also come from atmospheric deposition when pollutants enter the air from vehicles, fires, factory or coal-fired powerplants, and then settle on land or directly into water.

NPS pollution moves via stormwater runoff, the water that flows over land after a heavy storm, rainfall, or snowmelt instead of infiltrating or soaking into the ground. The amount of impervious surfaces in a watershed increases the volume of runoff from an area by reducing infiltration and increases the speed at which runoff leaves the watershed. Impervious surfaces

include human-made surfaces like pavement and buildings, but it also includes natural features like bedrock and frozen or compacted soil.

As runoff flows over the land it picks up pollutants and sediments. The runoff, and everything it picks up, follows the shape of the land as it flows downhill. In this way, NPS pollutants enter our watersheds, the drainage basins which funnel water into streams and rivers. Surface runoff runs directly into waterbodies as well as into human-made storm drain systems (Figure 1). NPS pollutants from runoff can also move through streams into larger rivers and then into the ocean. Some pollutants also infiltrate soil and contaminate groundwater.



Figure 1. Runoff from rain or snowmelt can flow over roads and sidewalks, entering stormwater grates. Stormwater systems typically bypass treatment and discharge directing into waters such as rivers and lakes. Source: New England Interstate Water Pollution

Types of Nonpoint Source Pollutants

There are a wide variety of NPS pollutants linked to different activities and land use, including:

- Nutrients such as nitrogen and phosphorus from fertilizers, manure, combined sewage overflows, and failing septic systems.
- Herbicides and pesticides from agricultural operations, commercial lawn care, and residential gardening.
- Sediment from erosion, fields, dirt roads, exposed stream banks, and construction sites.
- Fluids such as gasoline, oils, and other petroleum products from vehicles, roadways, and industry.

- Pathogens from pet waste, manure, and sewage.
- Chlorides from winter road deicing salt.
- Acids, particulate matter, heavy metals, and organic compounds from atmospheric deposition.
- Microplastics from degrading litter, plastic mulch, and irrigation systems.

Because these pollutants originate from so many different sources, reducing NPS pollution requires a strong understanding of where each type of contaminate enters a watershed and which everyday actions contribute what type of pollutant.

The Impact of NPS Pollution on Water Quality and Ecosystems

NPS pollutants in our surface and groundwater cause a significant number of environmental problems and pose human health risks. Nutrients such as phosphorus and nitrogen can cause unwanted plant and algal growth in lakes and trigger bacterial blooms, which can sometimes produce toxins. Cyanobacterial blooms, also referred to as algal blooms, can reduce light and oxygen levels, harming fish and other life below (Figure 2). Sediment from erosion can cloud the water, block sunlight, and smother habitats and aquatic organisms as it settles on the bottom of lakes, rivers, and in the ocean. Pathogens, poisons, and carcinogens can make water unsafe for drinking or recreation.



Figure 2. Cyanobacteria are a type of photosynthetic bacteria found in aquatic ecosystems. Under certain environmental conditions, their populations can “bloom” or rapidly and dramatically increase. Cyanobacteria are commonly called “blue-green algae” as they can form dense foam or mats on top of surface bodies which resemble true filamentous algae. Source: Lake Champlain Sea Grant

Even in small amounts, pharmaceuticals, heavy metals, petroleum products, and microplastics can poison aquatic organisms and disrupt life stages and developmental processes. Some chemicals and compounds also bioaccumulate in organisms, entering and moving up the food chain, this may eventually disrupt life beyond the watersheds. In this way, NPS pollution does not just threaten our water quality or threaten aquatic wildlife, it moves through and threatens all ecosystems.

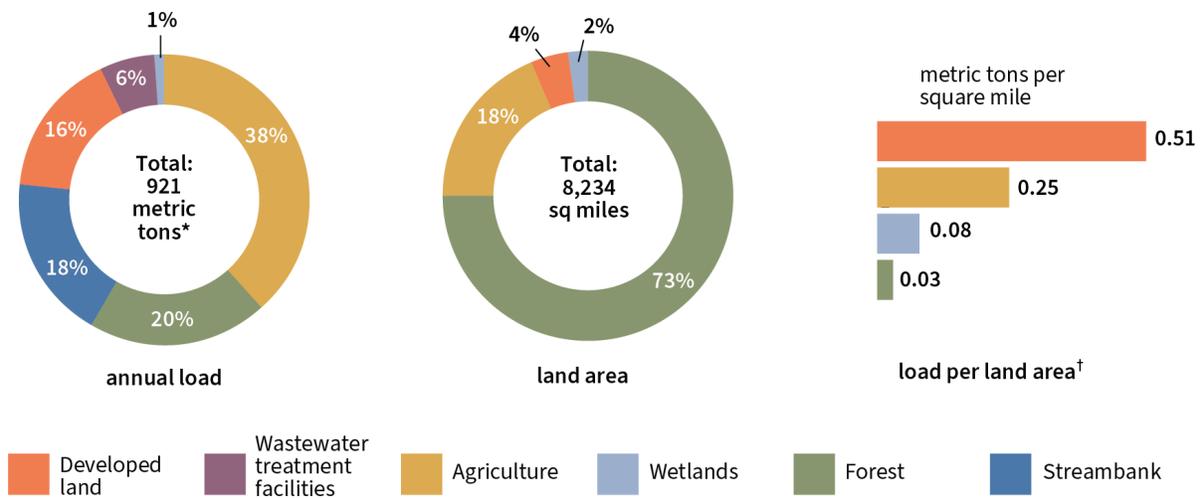
The Types of NPS Pollution in Vermont

Across Vermont, different regions face different challenges when it comes to NPS pollution. In agricultural regions like Addison County, rain and snowmelt is likely to wash fertilizer, pesticides, and sediment off fields. Places with extensive networks of unpaved roads such as Chittenden County develop runoff thick with mud and dust.

Areas with high levels of tree loss through development or forestry logging operations performed without acceptable conservation practices may have disturbed slopes that can erode quickly without proper stabilization. Tree roots and plant debris left behind from areas that have been clear cut can also experience nitrogen leachate as microbial communities have access to additional organic nitrogen sources as the plant materials decay, which can lead to an increased production of soluble nitrogen forms from microbial nitrification.

And, in towns and cities across the state, stormwater running off impervious surfaces can carry oil, road salt, and other pollutants into rivers and lakes, and water running off lawns, golf courses, and parks can carry fertilizer, pesticides, pet waste into those same waterbodies.

While there are a wide range of pollutants, phosphorus is of particular concern in western Vermont because of its role in lake eutrophication, especially in the Lake Champlain basin. In Lake Champlain, phosphorus comes from a variety of land uses (Figure 3).



* Estimated 2001–2010

† Does not include load from streambanks and wastewater treatment facilities

Figure 3. In 2015, the Lake Champlain Long-Term Monitoring Program analyzed nonpoint phosphorus loading to Lake Champlain by land use, looking at both annual load and land area. The bar chart shows that developed land has the highest phosphorus load per square mile, followed by agriculture, wetlands, and forest. Source: The Lake Champlain Basin Program

Agricultural land contributes the largest share of annual phosphorus load (38%) despite covering a smaller portion of the lake's watershed area (18%), while forests cover most of the land area (73%) but contribute a smaller share of load (20%). Developed land contributes the greatest amount per square mile but its relatively small area (4%) means its total contribution (16%) is still less than most other land uses. Streambank erosion is a unique source because the erosion unlocks phosphorous that was otherwise locked up and relatively stable in the streambank sediments.

On the eastern side of the state, in the Connecticut River Watershed, nitrogen is a bigger source of concern. Whereas phosphorus causes biological and water quality concerns in the freshwater of Lake Champlain, nitrogen causes biological and water quality concerns in the salt water of Long Island Sound. In that environment, nitrogen drives algal blooms much more than phosphorous. The death and decay of these algal blooms can cause the same drop in dissolved oxygen that phosphorous-driven algal blooms cause in Lake Champlain.

Policies and Management Strategies in Vermont

Vermont's landscape drains into one of four primary larger waterbodies. To manage the unique challenges and opportunities for water quality around the state, Vermont's Department of Environmental Conservation (DEC) breaks the state up into 15 "tactical basins" (Figure 4). Each basin contains a network of smaller watersheds that collect runoff from forests, farms, towns, and roadways (Figure 4). To manage and protect these watersheds, the Vermont Department of Environmental Conservation (DEC) creates a tactical basin plan (TBP) for each. TBPs use water quality data (often collected from volunteer water quality monitoring programs) to identify emerging problems, help track pollution sources, and suggest and guide projects to help protect or restore water across the state. TBPs address both point source and NPS pollution concerns.

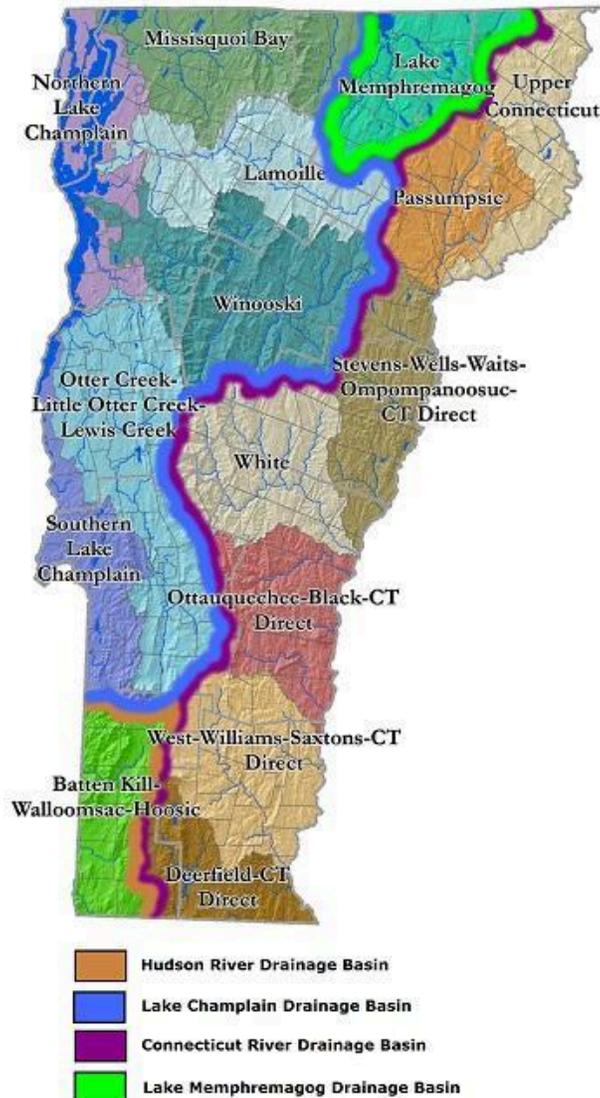


Figure 4. Vermont organizes its major drainage basins into fifteen regions for assessment and planning purposes. Source: Vermont Department of Environmental Conservation.

In 2015, Vermont passed Act 64, the Vermont Clean Water Act, to improve water quality across the state, especially in Lake Champlain, which has experienced severe water quality issues in certain parts of the lake. Act 64 expanded upon the federal Clean Water Act to improve Vermont’s stormwater management and improve gravel road practices. It developed required agricultural practices to help reduce sediment and nutrient runoff from agricultural areas. In addition, Vermont is working to address the Environmental Protection Agency (EPA) required Total Maximum Daily Load (TMDL) for the Vermont portions of the Lake Champlain Basin and Lake Memphremagog.

To coordinate this work, the DEC Clean Water Initiative Program (CWIP) supports and tracks the public funding for projects suggested through TBPs. Vermont shows all the clean water projects that are on-going and completed on an interactive website called the Clean Water Projects Explorer and an annual report on TMDL progress called the Vermont Clean Water Initiative Performance Report.

The CWIP and DEC work closely with many other state agencies including the Vermont Agency of Agriculture, Food & Markets (AAFM), Department of Parks and Recreation (FPR), and Vermont Agency of Transportation (VAOT) as well as local governments, farmers, businesses, volunteers, and other conservation partners to turn water quality action plans into reality.

Why NPS Pollution Begins at Home

Many everyday actions contribute small amounts of NPS pollution that people rarely think twice about. A person washing their car in the driveway may not consider where the soap and chemicals go after water flows down the driveway. When deciding not to pick up their dog's waste during a walk, someone is probably not thinking about what happens to the pathogens once the rain washes the waste away. But all these seemingly little things add up across neighborhoods and communities.

It's not just one person who litters or one gardener who uses too much fertilizer that causes NPS pollution, it's many people doing the same thing. Preventing pollution before it starts is the most effective way to keep our water clean, and educating people about the impact of their daily habits and providing alternate ideas, tools, and opportunities to change their ways is key to protecting Vermont's watersheds.

Simple best management practices like planting rain gardens, keeping vegetative buffers in place around streams and ponds, installing different types of pavements, and using a cover crop, can make a big difference in reducing runoff and keeping local water clean.

References

Lake Champlain Basin Program. (2021). Nonpoint source pollution factsheet.

<https://www.lcbp.org>

U.S. Environmental Protection Agency. (2025). Basic Information about Nonpoint Source (NPS) Pollution.

<https://www.epa.gov/nps/basic-information-about-nonpoint-source-nps-pollution>

Vermont Department of Environmental Conservation. (n.d.). Clean Water Initiative Program.

Vermont Agency of Natural Resources. <https://dec.vermont.gov/water-investment/cwi>

Vermont Department of Environmental Conservation. (n.d.). Tactical Basin Planning. Vermont Agency of Natural Resources.

<https://dec.vermont.gov/water-investment/watershed-planning/tactical-basin-planning>

Vermont Department of Environmental Conservation. (n.d.). Clean Water Portal. Vermont

Agency of Natural Resources. <https://anrweb.vt.gov/DEC/cleanWaterDashboard/>

Vermont Legislature. (2015). Act 64: Vermont Clean Water Act.

<https://legislature.vermont.gov/statutes/section/10/037/01386>

II. Educational Supporting Materials

As your team prepares for the 2026 Envirothon, use the following Study Questions, Discussion Topics, Research Tasks, and Resource Links to deepen your knowledge of NPS pollution and its impact. These activities and resources will help you explore NPS pollutants in Vermont and make the local and statewide connections you need for this challenge.

Study Questions

The following eight questions test your understanding of the science behind NPS pollution, how it moves through Vermont's watersheds, and the strategies in place to manage it.

- 1) What is nonpoint source (NPS) pollution? How does it differ from point source pollution?
- 2) Why is NPS pollution difficult to regulate?
- 3) Describe how runoff forms and moves through a watershed.
- 4) Explain how different land uses (i.e., urban development, agriculture, forestry, dirt roads, etc.) contribute to runoff and NPS pollution.
- 5) What environmental and health problems do NPS pollutants cause?
- 6) What are the most common NPS pollutants found in Vermont's rivers and lakes?
- 7) What are Tactical Basin Plans (TBPs), and what role do they play in managing NPS pollution in Vermont? What other laws or regulations (federal and state) are in place to help keep our water clean?
- 8) What does "NPS pollution starts at home" mean?

Discussion Topics

Use the following four discussion topics to challenge you to think critically about NPS pollution, explore presentation strategies, everyday choices, and community responsibility and solutions.

1. Prevention vs. Cleanup

- a. Why is preventing NPS pollution more effective than trying to clean it up afterward?
- b. What are the challenges associated with both NPS pollution prevention and NPS pollution cleanup

2. Everyday Choices

- a. What are some small daily habits and actions people have or do that either protect or harm water quality?
- b. Which habits are hardest to change, and why? What incentives do you think people may need to change?

3. Sharing the Responsibility

- a. Why do towns, conservation organizations, farmers, and residents need to work together to reduce pollution?
- b. What are some reasons why a group might feel unfairly singled out or that they are taking on more burden to reduce NPS pollution than others?

4. Solutions

- a. What realistic changes could your community make to tackle a NPS pollution problem Vermont faces?
- b. Are there community goals or rewards that may encourage Vermonters to adopt new best management practices?
- c. How can you use education, outreach, citizen science, and/or your voice to inspire others to care about keeping Vermont's water clean?

Research Tasks

The following four Research Tasks connect you to your watershed's data, water quality projects, basin plans, and local conservation organization.

1. Find Your Basin

- a. Visit the Vermont Basin Planning Map and locate the drainage basin that your school is located in at the following website:
<https://dec.vermont.gov/watershed/map/program/major-basins>.
- b. Record its name, major rivers, and nearby communities. (You might want to take a screenshot or draw a picture of it.)
- c. Research your area's most common land use and write down the pollutants associated with these activities. List any habits that occur in your house and in your neighborhood that you think might contribute to NPS pollution.

2. Explore Water Projects

- a. Visit the Clean Water Projects Explorer website tool here:
<https://anrweb.vt.gov/DEC/cleanWaterDashboard/ProjectExplorer.aspx> and filter by your basin.
- b. Identify two recent projects addressing NPS pollution and note which pollutants or sources they target.

3. Find Your Basin's Tactical Plan

- a. Locate and open the latest Tactical Basin Plan (TBP) for your basin using links provided on: <https://dec.vermont.gov/watershed/map/program/major-basins>
- b. Summarize one key NPS challenge and recommended solution described in it. (You do NOT need to read the entire TBP, unless you really want to.)

4. Connect Locally

- a. Find a nearby watershed planner, watershed outreach program, conservation district, or other organization related to water quality in your region.
- b. Interview someone affiliated with the program.
- c. Describe their involvement, their role, and their thoughts on NPS pollution prevention.

Resource Links

The following five resources provide links to maps, data, and other tools to support your 2026 Envirothon challenge preparations.

1. **Vermont DEC Major Basins** Overviews of Vermont's 15 drainage basins, with maps and to Tactical Basin Plans (TBP):
 - <https://dec.vermont.gov/watershed/map/program/major-basins>
2. **Vermont Department of Forests, Parks and Recreation Watershed Forestry Program** Includes resources to help protect water quality through responsible timber management.
 - <https://fpr.vermont.gov/forests/watershed-forestry>
3. **Clean Water Projects Explorer** An interactive database of funded and completed clean-water projects statewide:
 - <https://anrweb.vt.gov/DEC/cleanWaterDashboard/ProjectExplorer.aspx>
4. **ANR Natural Resources Atlas** GIS-based mapping tools for exploring rivers, streams, land cover, and conservation features across Vermont:
 - <https://anrmaps.vermont.gov/websites/anra5/>
5. **US EPA Nonpoint Source Pollution Portal** A national overview of nonpoint source pollution, causes, impacts, and best management practices:
 - <https://www.epa.gov/nps>

The seven resources below may aid in finding and connecting with local experts and community initiatives. Don't be shy! The people championing Vermont's clean water efforts love to share their time, knowledge, and educational resources with students.

1. **Lake Champlain Basin Program** Several great resources to aid in community-based out research and planning:
 - <https://www.lcbp.org/>
2. **Lake Champlain Sea Grant** A program based at UVM that shares science-based knowledge about issues impacting the water resources within the Lake Champlain Basin.
 - <https://www.uvm.edu/seagrant/>
3. **Vermont Department of Conservation Basins & Planners** Contact information for local tactical basin planners and regional clean-water strategies:

- <https://dec.vermont.gov/water-investment/watershed-planning/basins-and-planners>
4. **Vermont Association of Conservation Districts (VACD)** An interactive map for locating conservation districts and programs statewide:
 - <https://www.vacd.org/>
 5. **Vermont Agency of Agriculture, Food & Markets (AAFM)** Required Agricultural Practices (RAPs):
 - <https://agriculture.vermont.gov/water-quality/regulations>
 6. **Vermont Department of Forests Parks and Recreation (FPR)** Guidelines on acceptable woodland management practices to help curb NPS pollution in Vermont:
 - <https://fpr.vermont.gov/forest/managing-your-woodlands/acceptable-management-practices>
 7. **Watershed United Vermont** A directory of community watershed groups, their local connections, and accomplishments:
 - <https://watershedsunitedvt.org/watershed-groups/watershed-groups>

III. The Challenge

Solving environmental problems starts with clearly communicating information, collaborating effectively, and brainstorming ideas that work for everyone. As part of the Envirothon competition, your challenge is to work as a team to develop a plan of action to tackle NPS pollution, starting at home. Everyone on your team must participate to demonstrate that all team members understand the issue, have considered the scientific, social, and practical angles of your solution, and have worked together to form a well-thought-out plan of action.

Background Scenario

Your team is acting as a Watershed Advisory Group for your local Vermont drainage basin. The Vermont Department of Environmental Conservation and your regional Natural Resources Conservation District have asked you to:

1. **Define the Problem**

Describe the primary NPS pollution issues affecting your drainage basin including the types of pollutants, connected activities and land uses, movement into and through the watershed, downstream effects, and any emerging issues.

2. **Analyze Existing Efforts**

Identify any ongoing strategies, including policies, regulations, programs, and best practices, that are successfully targeting the issues. Discuss where there are gaps or remaining challenges.

3. **Propose a Solution**

Design a creative, basin-specific solution that is realistic and actionable and that individuals, schools, businesses, towns, farms, and/or other community members can implement to reduce NPS pollution in your basin.

4. **Communicate Your Plan**

Prepare and deliver a 20-minute oral presentation and then take part in a 10-minute question-and-answer session to fully describe and defend your plan of action. Your presentation must:

- clearly explain the science behind your issue in your basin,
- explain your specific plan of action and your reasoning,
- show how and why policy, programs, communities, and individuals must work together to solve this problem,
- use visuals such as data, diagrams, charts, or maps, and
- include verbal participation from every team member.