

2026 Minnesota State Envirothon – Forestry Study Guide

Forest buffers, or riparian zones, are essential for meeting water quality standards by filtering phosphorus, nitrogen, and sediment from runoff, with effectiveness increasing with width, often targeting 30 to over 100 feet. They remove pollutants, reduce erosion and lower water temperatures, helping to meet regulatory requirements and improving groundwater.

Key Aspects of Forest Buffers for Water Quality

- **Function and Efficiency:** These buffers reduce sediment by 60–90% and phosphorus by 27–97%, while removing up to 80% of excess nutrients, acting as sponges for pollutants. They also remove groundwater nitrates, which is vital for safe drinking water.
- **Regulatory Standards:** Examples like the Minnesota Buffer Law require up to 50-foot perennial vegetation for public waters and 16.5 feet for public ditches to manage agricultural runoff.
- **Optimal Design:** While a minimum of 35 feet is often recommended, wider buffers (100+ feet) offer superior protection for water quality, wildlife, and stream bank stability.
- **Components:** These buffers are critical tools for environmental compliance and sustainable land management.

There are serious factors to be considered when it comes to forest management:

- Soil **type** and **drainage**;
- Forest health (i.e., Oak wilt, Emerald ash borer, terrestrial invasive species);
- Climate change (warmer and wetter versus warmer and drier);

Background:

The City of Zimmerman and Little Elk Lake fall within the Anoka Sand Plain subsection. This subsection is part of a greater Land Type Association (LTA), which is an Ecological Classification System used in Minnesota and the information can be found at the link below.

<https://www.dnr.state.mn.us/ecs/index.html>

Within each subsection, habitat types are broken down on small scale into categories called Native Plant Communities (NPC). The majority of upland habitat around Zimmerman and Little Elk Lake is a plant community called **Southern Dry-Mesic Oak (Maple) Woodland or FDs37**. Please read and refer to the link below regarding Vegetation Structure and Composition, Landscape Setting and Soils, Natural History, and species frequency within this NPC.

https://www.dnr.state.mn.us/forestry/ecs_silv/npc/fds37.html

Another major NPC within the City of Zimmerman and Little Elk Lake is **Southern Dry Savanna or Ups14**. Please read through the link below on associated characteristics.

https://files.dnr.state.mn.us/natural_resources/npc/upland_prairie/ups14.pdf

Two major forest health issues are occurring within the project area. Oak wilt, a non-native fungus and Emerald Ash Borer, a non-native boring insect are causing major forest degradation over the landscape. These issues dictate planting projects, planning and succession of local forested areas. Please review information below of these two issues.

https://www.dnr.state.mn.us/treecare/forest_health/oakwilt/index.html

<https://www.dnr.state.mn.us/invasives/terrestrialanimals/eab/index.html>

Terrestrial Invasive Species are non-native plants that cause ecosystem degradation. Although there are many on the landscape, European Buckthorn, Siberian Pea shrub, Amur maple and Siberian elm are the main players effecting local forest systems. Please review the link before regarding their presence and impacts.

<https://www.dnr.state.mn.us/invasives/terrestrialplants/index.html>

Lastly, climate change is a major factor regarding which native tree species will do better with a warming climate. The University of Minnesota developed a climate change simulator for forests in Minnesota. If interested, please play with it to better understand potential scenarios.

<https://www.mnforecast.org/>

Goals:

We are interested in Urban forestry and rural forested areas around Zimmerman and Little Elk Lake. With the data given, how would we inform the public to best manage our forested systems to into the Current Issues Scenario?