

Understanding Stormwater Pollutants and Measurements

Learn about the pollutants our projects help reduce and why it matters to you, our freshwater, and our communities.



RCWD projects and the work we do across the watershed prevent pollutants (like sediment, phosphorus, stormwater, etc.) from reaching your lakes, wetlands, rivers, and streams.

But numbers like "50 tons of sediment" or "10 pounds of phosphorus" don't mean much without context or visual explanation.

We'll explain what these pollutants are, what the measurements mean, why they matter, and how to picture them in everyday terms.



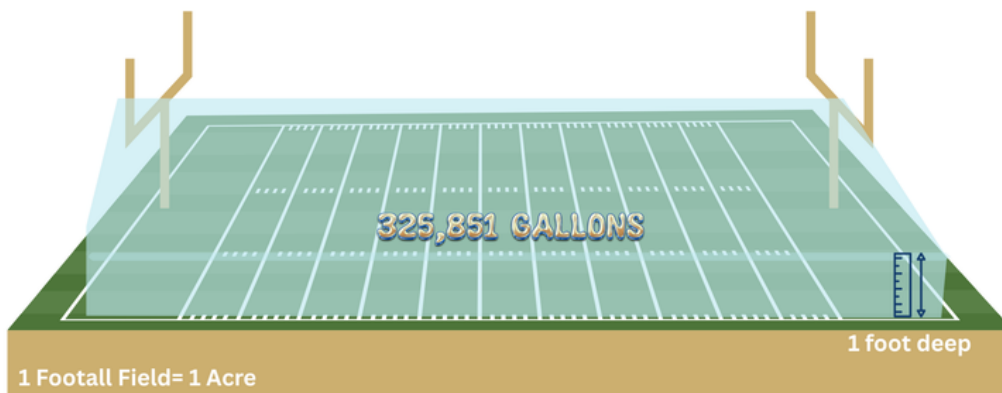
WHAT IS "VOLUME REDUCTION"?

When rain falls on natural vegetated areas like forests, most soaks into the ground. When it falls on a parking lot or our buildings, almost none of it goes into the ground, it rushes over these hard surfaces picking up everything in its path. Volume reduction projects (rain gardens, constructed wetlands, permeable pavement, infiltration basins, etc.) capture that water before it becomes pollution.

Why reducing runoff volume matters:

- Fewer pollutants reach lakes. Less water moving = less pollution transported.
- Lower flood risk. Stormwater stored in rain gardens won't overflow into basements.
- Stream protection. High-volume pulses erode stream banks; capturing volume prevents this.
- Groundwater recharge. Water that infiltrates into soil replenishes aquifers and drinking water supplies.

Swimming Pools and Football Fields: How to Visualize Volume Reduction



Volume reduction projects are often measured in gallons or acre feet.

Visual Tip:

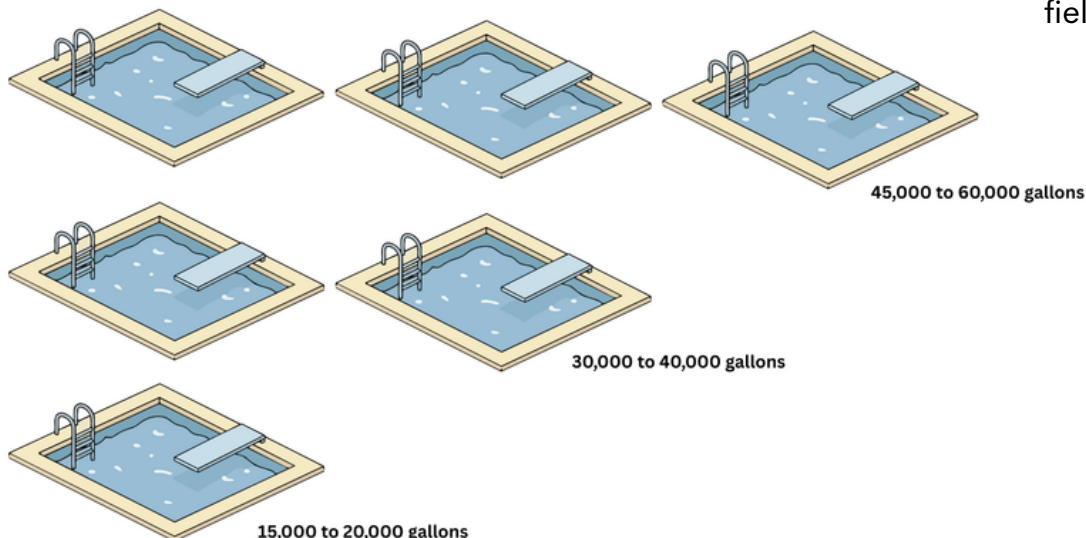
1 acre-foot = 325,851 gallons

Or "enough water to cover [X number] football fields one foot deep"

*An acre-foot/acre-feet is the volume of water that would cover one acre of land to a depth of one foot.

*An acre is roughly the size of a football field.

*An acre-foot = 325,851 gallons, or about 23 residential swimming pools.



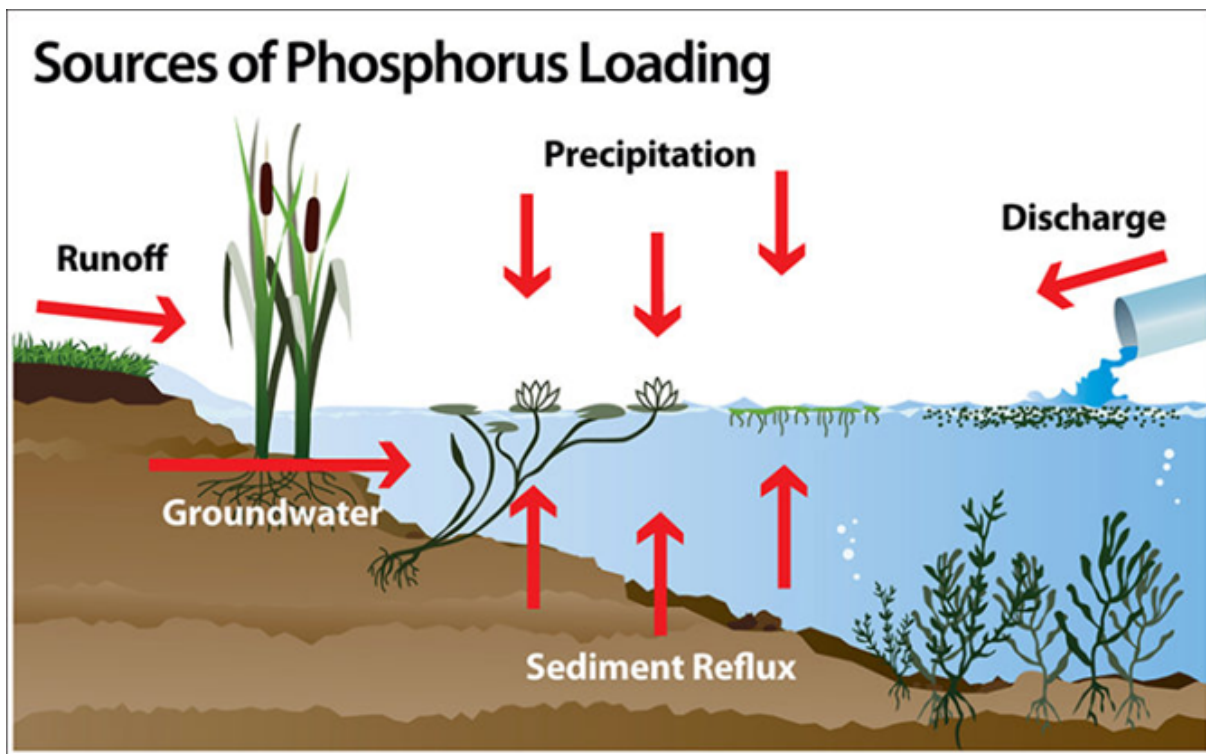
The average in ground swimming pool = 15,000 to 20,000 gallons of water

WHAT IS "TOTAL PHOSPHOROUS (TP)"?

Phosphorus is a natural nutrient that feeds plant life, including algae. In small amounts it's harmless and needed for many ecosystem functions. Phosphorus is needed in the world, but excess phosphorus disrupts the balance that keeps our water bodies like lakes healthy, fishable, and swimmable.

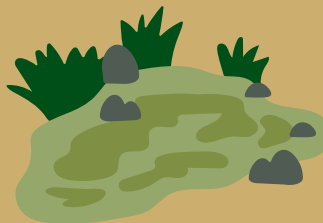
When too much washes off roads, lawns, and farm fields, it causes a chain reaction:

- Algae blooms explode across the lake surface
- Decomposing algae depletes oxygen, suffocating fish
- Some algae species produce cyanotoxins which can be dangerous to humans, pets, and wildlife
- Affected lakes become unsafe for swimming and recreation



Visual Tip:

A pinch of salt makes food taste great; pour the whole shaker in and it's inedible. Phosphorus works the same way in a lake. A little is needed; too much throws the whole lake off balance.



Visual Tip:

Just 1 pound of phosphorus entering a lake can produce up to 500 pounds of algae.

Where does phosphorus come from in our watershed?

Natural & Healthy Phosphorous Sources

The key characteristic of all of these: slow, diffuse, and part of a cycle the lake evolved with.



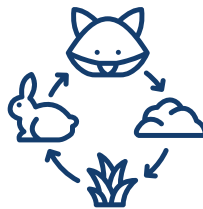
Soils

Natural soil weathering contributing trace amounts to groundwater.



Natural Lands

Decomposing leaves and organic matter releasing small amounts slowly over time in natural areas, like forests and prairies.



Fish and Wildlife Food Web

Fish and wildlife waste redistributing phosphorus through the food web.



Wetlands

Slowly filtering and releasing phosphorus at low, steady rates.

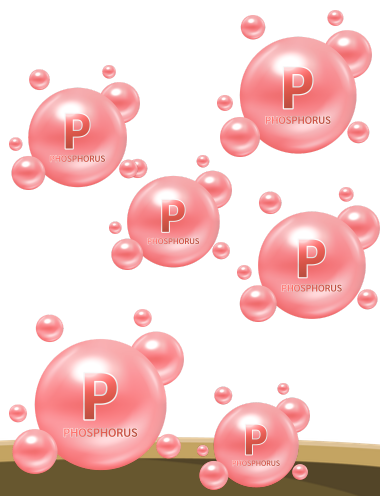


Aquatic Life and Ecosystem

Aquatic plants and algae cycling phosphorus within the lake ecosystem.

**This is not a complete list of sources of phosphorous.

The difference between the two is **rate and concentration**, not the presence of phosphorus itself. A lake receiving a slow drip of phosphorus from a wetland is in balance. A lake receiving a surge of stormwater that's carrying excessive amounts of leaves/grass, pet waste, and oils from streets and parking lots after a rainstorm is overwhelmed, and the excess nutrients fuel algae blooms.



Where does phosphorus come from in our watershed?

Excess & Harmful Phosphorous Sources

Excess and concentrated amounts of phosphorous is what harms our lakes, rivers, and wetlands. Excess sources of phosphorous are what RCWD projects and work attempt to find, prevent, stop, or slow down. ***The key characteristic of these: fast, concentrated, and arriving in amounts the lake can't process or cycle.***



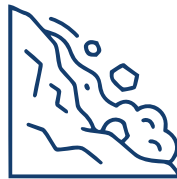
Stormwater

Stormwater runoff from highly developed areas, parking lots, roads, etc.



Oils/Grease

Oils, gas, grease residues from vehicles and road debris.



Erosion

From open farm fields, land/disturbed sites (construction, farm fields, phosphorus-rich topsoil, etc.).



Leaves

Large concentrations of leaves and natural materials piled on roads, lawns, etc.



Pet/Animal Waste

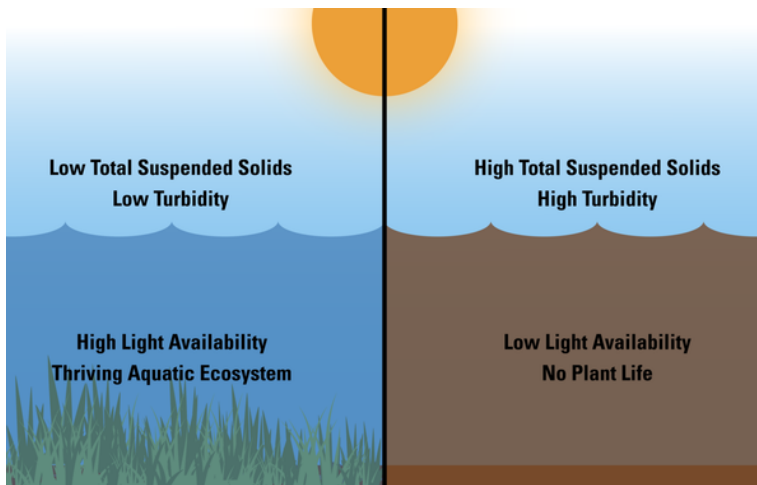
High concentrations of animal and pet waste (dog parks, geese in parks, etc.).

****This is not a complete list of sources of phosphorous.**

Remember: the difference between the two is **rate and concentration, not the phosphorus itself that is harmful.**

WHAT IS "TOTAL SUSPENDED SOLIDS (TSS)"?

Total Suspended Solids (TSS) are tiny particles of sediment and organic material that remain suspended in water. Rain washes soil, leaves, grass clippings, and other debris into storm drains, streams, and lakes. The muddy water you notice after a heavy rain is a sign that suspended solids are being carried downstream.



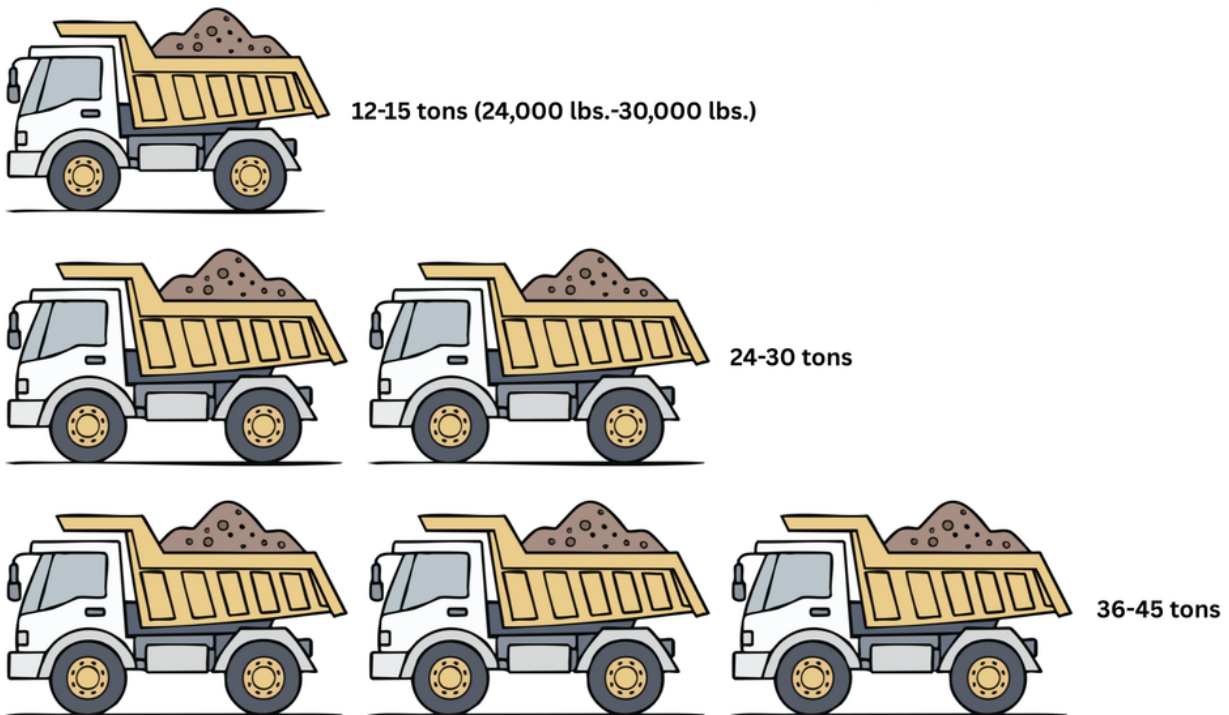
Source: <https://www.usgs.gov/media/images/turbidity-1>

Why it matters:

- Murky/cloudy water blocks sunlight causing aquatic plants die, the food web collapses
- Particles settle on the bottom, smothering fish spawning beds
- Fine clay can stay suspended for days or weeks
- Sediment carries phosphorus. Stopping sediment stops phosphorus too

Dump Truck Visual - How to Measure Sediment/Solids

500 tons prevented $\approx$ 40 dump trucks



*A typical dump truck holds about 12-15 tons (24,000 lbs.-30,000 lbs.)

*2,000 lbs. = 1 ton

Where does sediment come from in our watershed?



Sediment in watersheds comes from soil, sand, and debris washed into waterways by rain and runoff.

Common Urban Sources

- Construction sites and exposed soil
- Roads, parking lots, and winter road sand
- Streambank erosion caused by fast stormwater runoff
- Storm sewer outfalls and drainage channels
- Bare lawns, redevelopment sites

Common Rural Sources

- Farm fields and tilled soil
- Drainage ditches and gravel roads
- Land clearing and erosion from bare ground

IT ALL WORKS TOGETHER

These measurements aren't separate problems, they're one connected system. When an RCWD project captures stormwater volume, it prevents sediment from being picked up, which prevents the phosphorus those sediment particles carry.

Rain falls on a parking lot → picks up soil particles (sediment) → particles carry phosphorus → phosphorus fuels algae → our lakes turn green.

RCWD projects break this chain at the source.

What You Can Do:

Reduce Phosphorus from Your Yard

- Follow Minnesota's phosphorus fertilizer law: don't apply phosphorus fertilizers unless a soil test shows a deficiency.
- Keep lawn clippings and leaves out of streets and storm drains: decomposing yard waste is a major phosphorus source.
- Pick up pet waste and dispose of it properly.

Reduce Sediment Runoff

- Maintain healthy, dense vegetation on your lawn: bare soil erodes quickly.
- Plant native plants and groundcovers on slopes to hold soil in place.
- Report construction sites that appear to be letting muddy runoff enter storm drains to RCWD.

Reduce Stormwater Volume

- Install a rain garden or rain barrel: RCWD offers grant programs to help.
- Disconnect downspouts from impervious surfaces such as a driveway and direct it into a garden to allow water to soak into the ground.
- Choose permeable pavers for patios, driveways, and walkways. RCWD offers grant programs to install permeable pavers.
- Plant trees and native plants at your home.