



Agricultural Impacts on Wild Rice in Wisconsin Lakes

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What pollutants are of concern?

- Nitrate
- Phosphorus
- Sulfate
- Ammonia

Where are these pollutants originating?

In Wisconsin, point and non-point source pollution are significant issues for lakes and Wild Rice (*Zizania* spp).

This includes agricultural runoff and urban runoff such as treated sewage.¹

Although sulfate pollution in waterways can be attributed to many different sources, agriculture is one of them.²

This is worsened by over fertilizing and fertilizing at the wrong time of the year.³

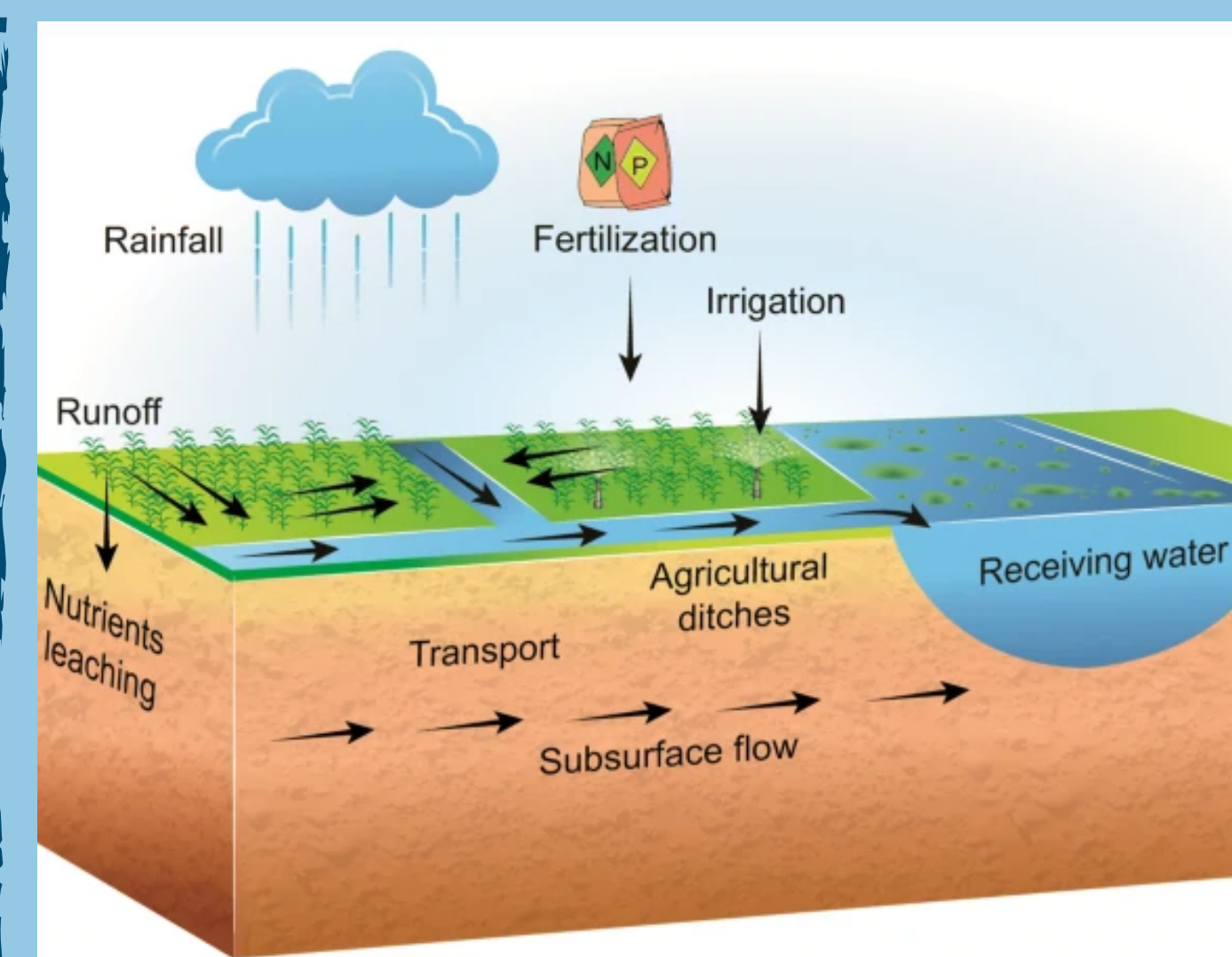


Figure 1. Synthetic fertilizers often eventually end up in large water bodies.
<https://appliedchem.springeropen.com/articles/10.1186/s13765-020-0493-6>

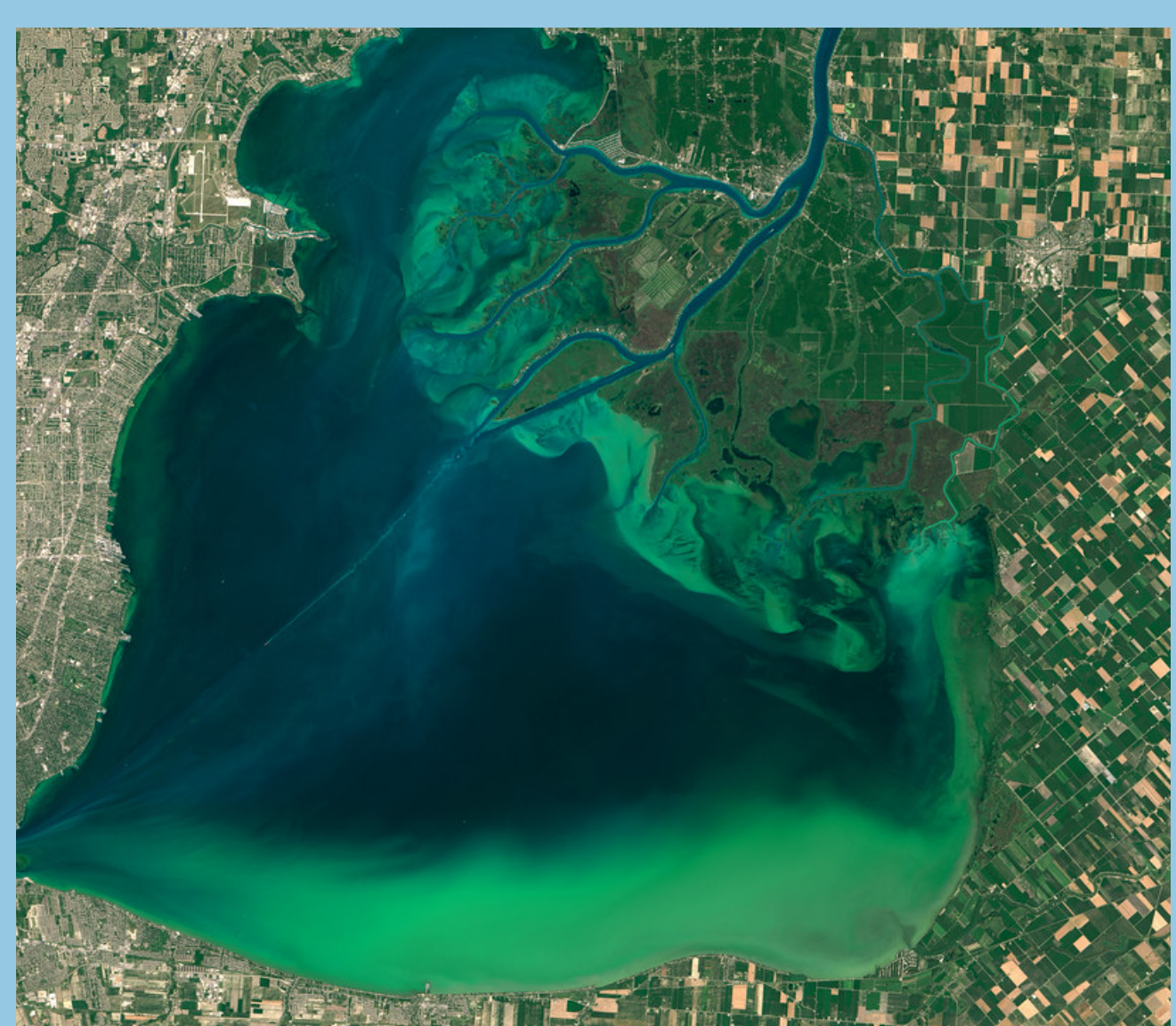


Figure 2. Lake St. Clair aerial photo depicting algae blooms.
<https://www.flickr.com/photos/gsfcr/25299065237>

What is happening to lakes?

Excess of these pollutants-of-concern causes potential harm to lake ecology.

High nitrate and phosphorus pollution does not directly affect the growth of wild rice, but it stimulates eutrophication (overgrowth of algae). This eruption of dense vegetation blocks sunlight and consumes oxygen, harming other lake dwelling organisms.⁴

Climate change causes extreme rainfall events and consequent flooding in wild rice waters. Agriculture upstream can cause spikes in ammonia and phosphorus in surface waters downstream.⁵

Sulfate directly impacts Wild Rice

Sulfide is toxic to wild rice and creates an inhospitable environment in lake sediment.

Sulfate is converted to sulfide by bacteria fed by carbon.

However, sulfide can be reduced to lower, tolerable levels when iron is also present in the sediment.⁶

Sulfide in sediment reduces Wild Rice productivity.

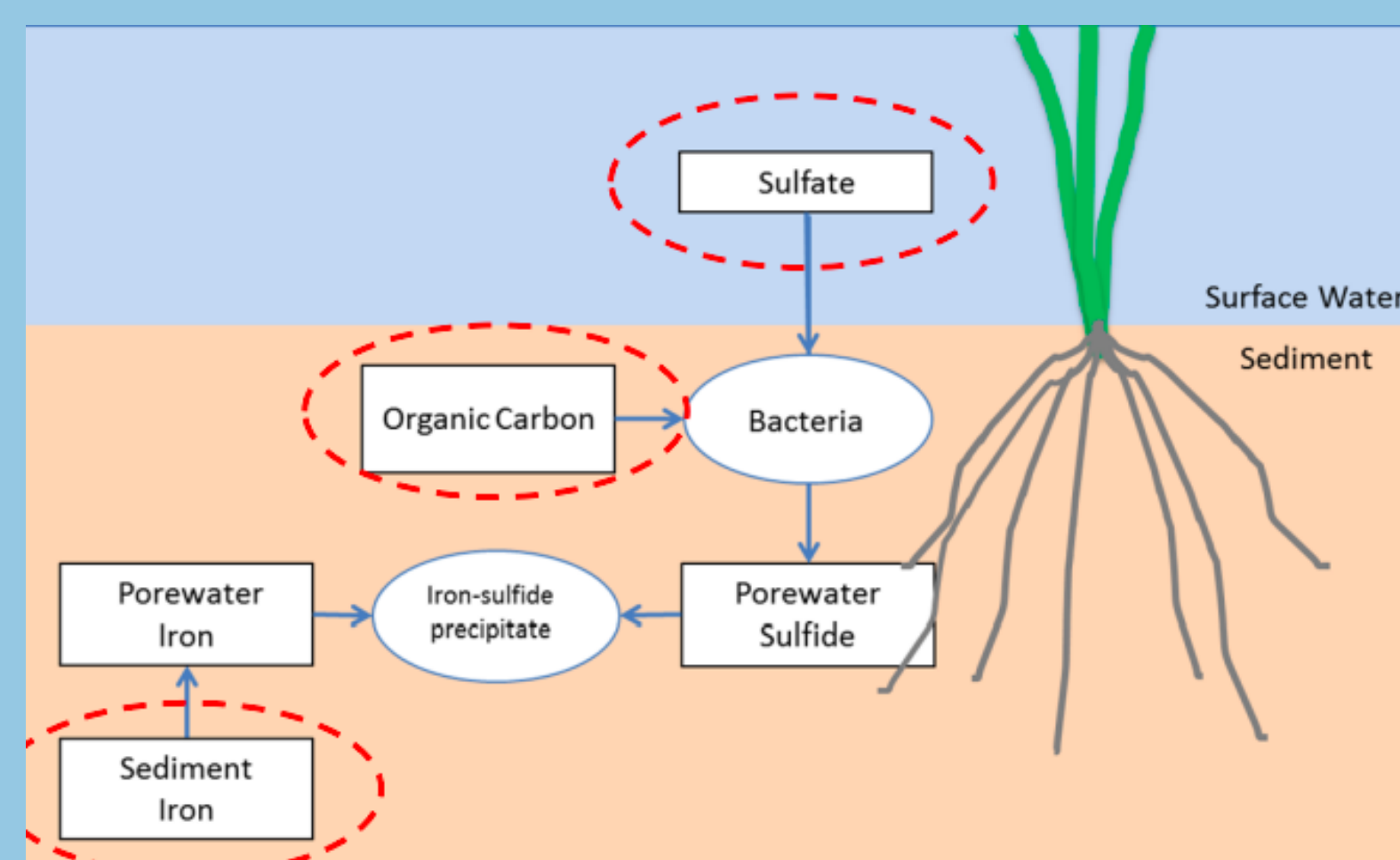


Figure 3. Sulfate and iron impacts on wild rice
<https://www.pca.state.mn.us/sites/default/files/wq-s6-43L.pdf>



Figure 4. A piece of hulled Manoomin.
Image taken by: Rachel French



Figure 5. A member of the Oneida nation winnowing Manoomin to clean the chaff off prior to cooking.
Image taken by: Rachel French

Wisconsin Tribal Nations and Wild Rice

Mayom (Mohegan), Manoomin (Ojibwe), Wild Rice, is culturally important to Great Lakes Tribal Nations for physical and spiritual sustenance. Wild Rice is crucial for cultural and ecological health. Conservation of Manoomin waters continues to be an interTribal priority.⁷

Changing practice and policy

Changing practices

- Educating watershed citizens on the impacts of fertilizers
- Switching to more environmentally friendly options for crops and lawns
 - Using green manure (cover crops) boosts overall soil health and limits the need for fertilizers⁸
 - Implementing stream and river buffers (Figure 6). Trees benefit water ecosystems, keeping the water cool and stabilizing the banks⁹
 - Incorporating native plants in gardening

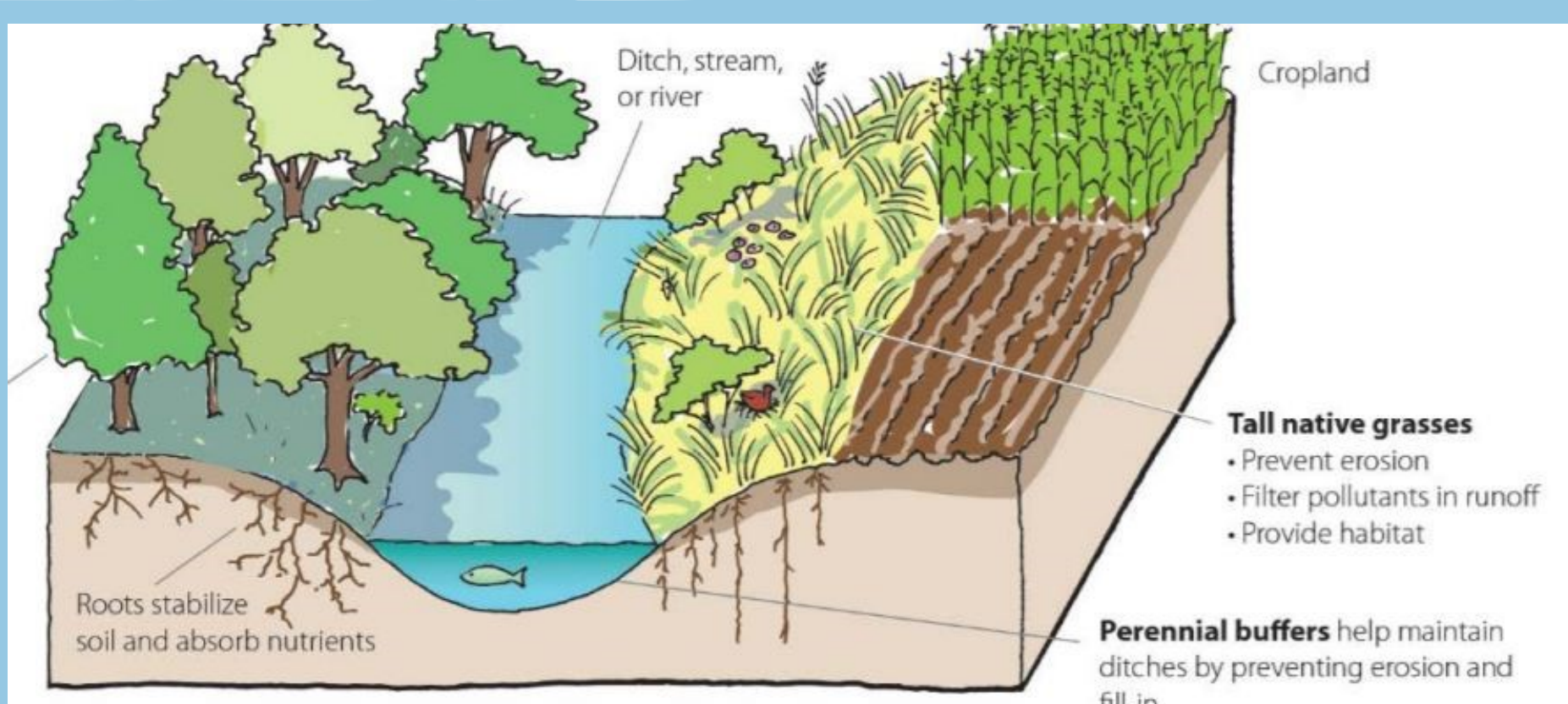


Figure 6. Diagram of a riparian buffer system. Adding native grasses or trees near waterways can be very beneficial. Near cropland, there are often drainage ditches which contain high concentrations of pollutants which runoff into lakes. Adding stream buffers can prevent pollutants from reaching water bodies.
<https://morrisonswcd.org/programs-services/buffer-law/>

Current policy affecting Wild Rice waters

Currently CAFOs are monitored and regulated for pollution, but smaller scale dairy operations are not.

Right now the WI DNR has an enforcement standard of 250 mg/L for groundwater levels of sulfate.¹⁰

However, research shows that sulfate levels of 50mg/L are harmful to rice, depending on the concentrations of iron.¹¹

Some Tribal Nations in Minnesota limit sulfate levels to 10 mg/L in order to protect Wild Rice waters.¹²

Further action can include supporting policies that sustain health of water and Wild Rice.

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