

ZUMBRO RIVER

WATERSHED RESTORATION AND PROTECTION STRATEGIES

- a summary -



**Minnesota Pollution
Control Agency**
www.pca.state.mn.us



OUR ZUMBRO

For untold centuries, the Zumbro River has served Native Americans, early European settlers and today's growing population with transportation, food, water, recreation and beauty.

In the past 170 years, however, we have greatly altered its 1,422-square-mile watershed for our cities and farms, plowing up nearly all our native prairie and draining many wetlands. Because of that, combined with more precipitation due to climate change, more water drains off the land faster so we have had many more floods. And with it, more pollutants flow into our streams.

It's time to say Enough!

It's time to repay the river and ourselves. We have had a great start.

The Clean Water Act of 1972 required massive cuts in pollution from point sources - wastewater treatment plants, factories, anywhere pollution comes from a pipe. Using engineering and billions of dollars, we have dramatically improved many rivers and lakes across Minnesota. For example, in the Zumbro north of Rochester, phosphorus dropped dramatically from 1973 to 2008 mostly because of better management of human waste.

Now, it's time to focus on non-point pollution that can come from every acre of land in city and country.

Studies to understand non-point pollution began in earnest more than a decade ago. The findings have been summarized in the Zumbro Watershed Watershed Restoration And Protection Strategies (WRAPS) with 185 pages outlining pollutant origins and their present status along with nine appendices, 61 maps or graphics, 25 tables and a glossary of 11 key terms.

Ultimately the WRAPS can be summed up in one word: HOPE.

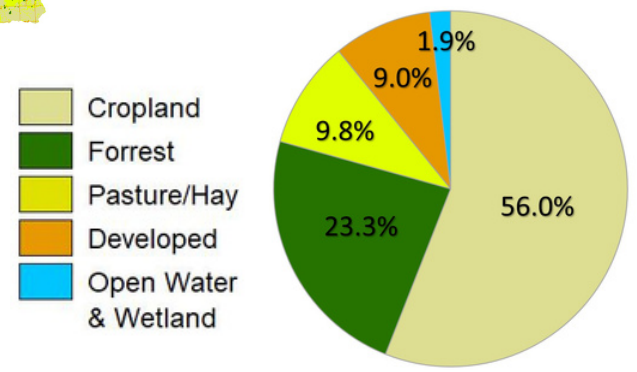
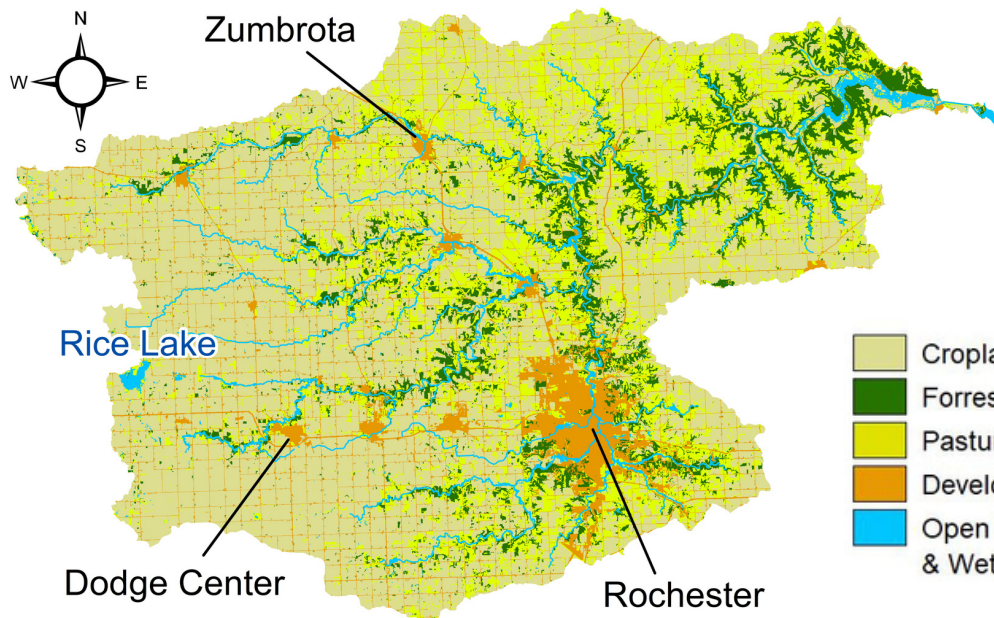
We now know where the pollutants are coming from and know what changes will bring improvements. We can see a cleaner future.



The Zumbro's name was given to it by French explorers who referred to it as the Rivière des Embarras or "river of obstructions" because of its many turns, sunken trees and snags. The word was changed by English-speaking people to Zumbro. Native Americans knew it by another name, Wazi Oju, the River of Pines.

The watershed's topography changes dramatically from west to east. At the beginning of each of the three river forks, it is mostly flat cropland but as it flows north or east, the Zumbro gets wider and enters the Driftless Area with its rugged bluffs, steep topography and forests. The Driftless is a landscape missed by the last glacier, but shaped by its melt water.

Unusual for Minnesota, the Zumbro Watershed has only one true natural lake - Rice Lake west of Dodge Center that is the start of the South Branch Middle Fork Zumbro. The watershed does, however, have larger reservoirs, including Lake Zumbro, 7 Rochester flood-control reservoirs and several old quarries now flooded in and around Rochester. It also has 8 spring-fed trout streams, some of which hold brook trout, the only native trout in this region.



Neighbors Taking Action

How he helps the watershed

He has turned a boulevard and some of the land around his home in northeast Rochester into a rain garden. He also bikes to work as often as possible.

Why

The rain garden, which is put in with the city's financial help, collects rainwater so it doesn't rush into the Zumbro River. It also collects debris and chemicals coming off lawns to keep it out of the river. Personally, he said, "I don't have to mow as much" and the prairie plants attract bees and butterflies. The insects "are pretty entertaining." When he bikes, his carbon footprint is lower and "it's a real nice quiet few minutes and I don't have parking issues."

Henry Walker



NITROGEN

One of the pollutants that needs more work is nitrates--a form of nitrogen--which can directly harm humans, fish and small aquatic animals, like mayflies. Most importantly, too much nitrogen pollution can alter ecosystems. According to the WRAPS, nitrates increased about 2.3% per year from 1973 through 2008. Nitrate levels are now well above natural conditions.

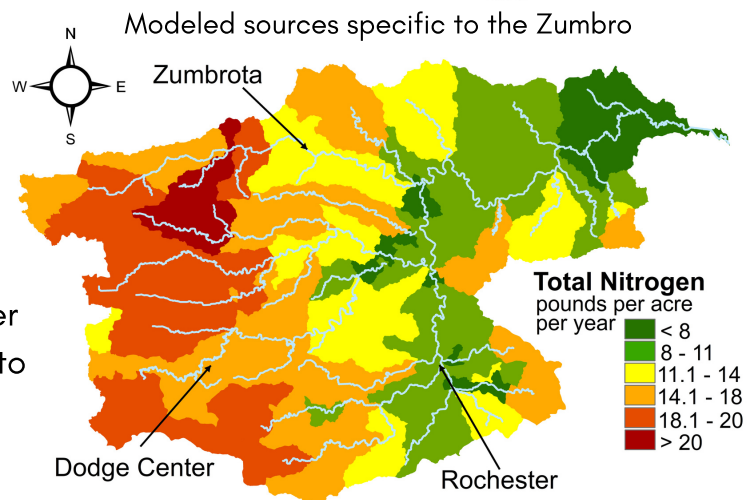
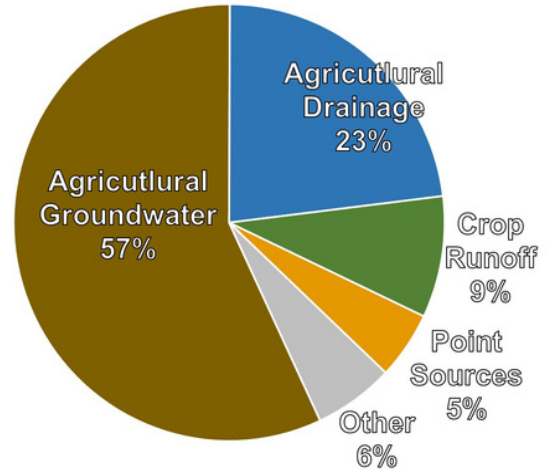
The intake of nitrates by aquatic organisms converts oxygen-carrying pigments into forms that are unable to carry oxygen, thus inducing a toxic effect on fish, such as trout, which can have problems when nitrates are as low as 2 parts per million (ppm, the federal drinking water standard is 10 ppm).

Nitrates are also a major worry because their presence indicates other things, such as pesticides or other contaminants, are in the water. And if they're in the water, they can also get into groundwater because in much of this region, surface and groundwater are intricately connected.

On a much larger scale, nitrates and phosphorus in the Zumbro watershed flow into the Mississippi River and into the Gulf of Mexico where they contribute to the hypoxic (low-oxygen) zone.

Where does nitrogen come from?

Nitrogen sources to lower Mississippi in Minnesota



Neighbors Taking Action

How he helps the watershed

Along with his father, Martin changed to no-till farming that leaves vegetation from one year to create more root channels so water percolates easier in their corn and soybean fields southwest of Rochester along Cascade Creek. Also, there are more earth worms to help percolation. They are using cover crops planted in spring or fall to keep water on the land and slow erosion.

Why

It's less work, easier and better for the land. There has been no "yield drag" that means less money. Best of all, it means Martin's son, Rudy, will have better land to farm if he decides to work that land.

Martin Larsen



TOTAL SUSPENDED SOLIDS



The most obvious pollutant is suspended solids. After snowmelt or heavy rains, the Zumbro River and its tributaries run high and brown from soil that belong on our fields and lawns.

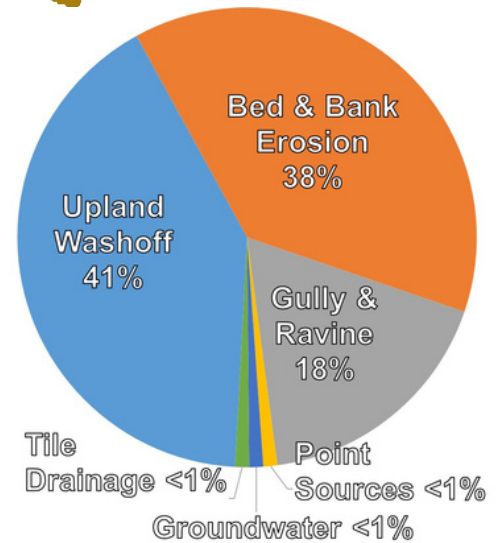
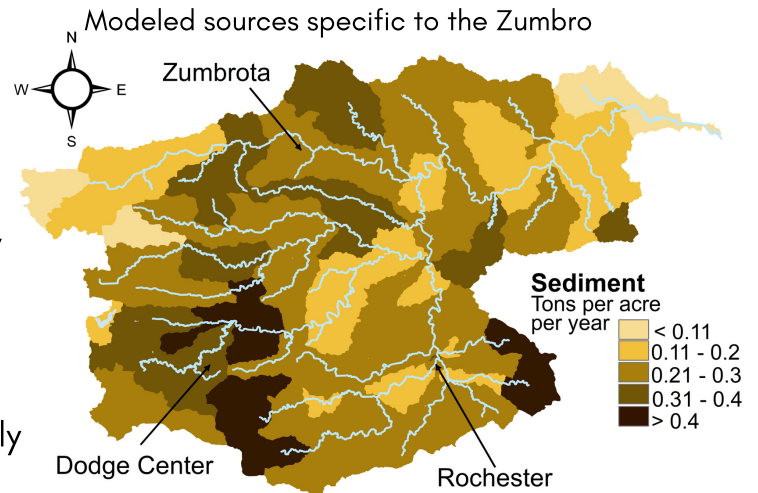
Where do suspended solids come from?

Suspended solids can be a big problem for fish and aquatic insects because they can't see to feed and can have trouble spawning. When they settle, they become sediments that cover the stream bed so completely that insects and fish can't get oxygen. Only 13% of sampled streams have good populations of aquatic insects--mostly due to sedimentation.

Tile drainage and point sources combined contribute only 0.5% of sediment to our streams. However, tiling and storm sewers play a big part because they allow water to rush into our stream faster, leading to more erosion from the gullies and banks.

Bare stream banks can shed a lot of dirt. For example, a 1,100 foot reach of Spring Creek--a Zumbro River tributary--can add 27 dump truck loads of dirt from its exposed banks annually.

Brown water also means more phosphorus--another major pollutant--is flowing from land to water.



Neighbors Taking Action

How he helps the watershed

Roger and his 3 sons are following in their father's footsteps by using new methods, such as, exploring cover crops and applying nitrogen closer to when the crops will use it rather than in late fall. The team completes soil tests semi-annually on fields to see what nutrients are present or missing. Their Dodge County farm recently became Minnesota Water Quality Certified.

Roger Toquam



Why

"It's a good thing for the environment and it's a good thing for farmer economics," Roger said. Low prices now force farmers to find ways to economize.

PROGRESS

Let's look at the good things that have happened over the past several decades. While we're far from where we can be, positive things have been happening. For example, the WRAPS shows many positive changes from 1973 through 2008 at the Milestone site downstream of Rochester. That is the one of the more important sites the MPCA uses to monitor the Zumbro. At that site, suspended solids, are down by more than half. Total phosphorus, which can alter how ecosystems function and can fuel algae blooms, is down by more than 90% mostly because of municipal wastewater treatment that required millions of local, state and federal dollars to upgrade. Ammonia, which is toxic to fish and insects, is down by even more. Biochemical oxygen demand, a measure of how much oxygen is consumed by bacteria, taking it away from fish and other aquatic life, is down by more than three-quarters.



Approximately 77% of sampled streams support "good" fish communities.

In the bigger picture, less phosphorus is leaving Minnesota, reducing our contribution to the Gulf of Mexico hypoxic zone (33% reduction of pre-2000 levels).

On the other hand, many water quality trends aren't getting better as fast or are even getting worse. The WRAPS breaks down the Zumbro Watershed into 474 ecologically relevant units. Focusing on 84 representative units, it found only 34 fully supported aquatic life and none fully supported aquatic recreation. No sampled stream supports "excellent" fish communities. It specifically pointed to high nitrates, bacteria and suspended solids as being the most common stressors to aquatic life.

Neighbors Taking Action

Susan Waughtal

How she helps the watershed

Susan and her husband, Roger Nelson, raise chickens, a few cows, fish, vegetables, flowers and honeybees on their 10-acre organic farm near Douglas. Squash Blossom Farm invites people to visit for wood-fired pizza or stop by the farmer's market for some wood-fired sourdough bread. They practice permaculture- which includes an emphasis on diversity, ecosystems, and growing perennial food crops.

Why

Waughtal always wanted to live on a small farm with the intent of practicing environmental stewardship. She hopes it brings people closer to the land and their food.



PROTECTION

One thing we can't lose sight of in trying to solve problems such as nitrates and suspended solids is that we have a lot of land and streams that are in good shape. One part of the WRAPS focuses on how we should protect important resources, like trout streams and drinking water.

Trout rely on cold water flowing from springs. The 8 trout streams in the Zumbro are among approximately 600 such streams in the Driftless Area; the Driftless has one of the world's largest concentration of these fisheries. The water flows through the limestone, that "enriches the water with essential minerals for aquatic insects and other creatures, which contributes to prime conditions for healthy populations of trout and other coldwater dependent species." Fish in 7 of 8 these streams meet basic requirements for good populations and the 8th, Spring Creek, is close to meeting it.

Because of that, WRAPS states "a focus of protection work should be preserving the baseflow of streams via focused monitoring and application of water appropriation analysis." In other words, we have to ensure cold, mineral-enriching water continues flowing.

Trout aren't the only ones needing protection. Our land, streams and drinking are connected. The WRAPS points out our groundwater is sensitive to how we manage land across half the watershed. We rely on ground water for drinking and it composes most of the stream flow during droughts.

Another way to help retain what we have is to focus on hundreds of dams and other structures that were built to slow water from rushing down hillsides, creating major gullies and contributing sediments to streams. WRAPS shows all of them and the lands they protect and calls for keeping these structures in working shape.



THE VISION

The WRAPS says the overall goal, which will be laid out in the One Watershed One Plan blueprint, should be a 45% reduction in nitrogen by 2040 (20% less by 2025) and 12% reduction in phosphorus by 2025. So let's imagine the Zumbro Watershed in maybe 15 or 20 years after many of the goals are met:

- Many more farm fields covered with rye or other grains (cover crops) when they aren't growing corn or soybeans.
- Poorer, more erodible farmland in pasture or forest, or maybe even prairie grasses and flowers so the land is more colorful.
- At times of rapid snowmelt or heavier rains, tiling systems empty into bioreactors that purify water.
- Fewer bridges, roads and homes flooded or damaged because flows are slowed off the landscape by structures like retention ponds and vegetated waterways.
- Streams are cleaner and their vegetated banks more stable.
- More insects in clear, oxygen-rich streams supporting resilient fisheries
- Lake Zumbro is cleaner for water-skiers, swimmers and anglers.
- Public wildlife, park and forest lands have better habitat for birds and mammals, from deer to deer mice, bald eagles to chickadees.
- As a society, we know we did the right thing.

The WRAPS offers a tool kit of ideas--specific to the Zumbro--on how and where to focus. Unlike fixes to point sources that required engineering and money, most solutions will need cooperation of many people and governments because pollutants can come from every acre, including downtown Rochester, suburban developments, and farms. We need "social capital (trust, networks and positive relationships) with those who will be needed to voluntarily implement best management practices." In other words, we have to work together - that is critical.

The next step in the process will be creating "One Watershed One Plan" that will be a blueprint for improving the watershed. Changes won't be easy or cheap. It will take time, patience, cooperation, perseverance and the will to change.

