Huron River Report

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FALL 2020

feature story

Oh, Dam! Was that a Beaver?

A keystone species at work in the watershed

The North American beaver (*Castor canadensis*) is enjoying a time of relative prosperity in the United States, a significant feat given that the beaver was driven to near extinction by the start of the nineteenth century. An insatiable European demand for beaver pelts to make fashionable clothes and hats fueled the North American Fur Trade in the seventeenth and eighteen centuries, when French, English, Canadian, and American fur trappers harvested beavers in incredible numbers. Here in Michigan, demand for beaver pelts played a crucial role in European colonization of the territory. French fur trappers were among the first white people to push west into the Great Lakes Region and the lands of the greater Anishinaabe peoples. Forts at Detroit, Mackinac, and elsewhere across the territory allowed the French to establish control over the lucrative fur trade, the primary economic driver at the time. As fashions changed and the demand for beaver pelts waned, the fur trade ended. The remaining beaver populations faced a continued battle with polluted waterways and habitat decline. However, with the help of conservation efforts

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Beavers provide many ecosystem benefits. credit: Bedardar

Healthy Forests Equal Healthy Rivers

Why HRWC is focused on land use

Among the Huron River's many blessings are the forests, wetlands, and prairies that make up 44% of the watershed's 588,000 acres. These natural lands clean polluted runoff, keep streams cool, and soak up rain, which can then infiltrate into groundwater to recharge the river and drinking wells. Mature forests and wetlands also operate as a carbon sink, helping to offset greenhouse gas emissions.

These remaining natural lands are a major reason the Huron watershed is home to two-thirds of Southeast Michigan's public recreational lands, numerous endangered and threatened species, rare ecosystems like bogs and prairies of state-wide significance, and a burgeoning trail system. Thanks to nature's cleansing services, the Huron hosts a multi-million-dollar recreational fishery, 125,000 paddlers every year, and dozens of swimming beaches. Even more importantly, it is clean enough to provide drinking water to over 150,000 residents of the city of Ann Arbor as well as Scio and Ann Arbor townships. It feeds Lake Erie which supplies drinking water for about 11 million people. The watershed's groundwater, filtered through natural lands, supplies water to thousands more private and community drinking water wells throughout the watershed.

Natural lands are the workhorses for clean water

Protecting natural lands is the most cost-effective strategy for maintaining clean water and healthy freshwater systems. For instance, a study by the Trust for Public Land and the American Waterworks

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Rebecca's Stream of Consciousness

Communities need to be building smarter. Research released this summer found that nationwide, 14.8 million properties are vulnerable to flooding. (Explore the data and find your home's flood factor at floodfactor.com.) This finding opposes the 8.7 million identified by the Federal Emergency Management Agency—the agency responsible for drawing the country's floodplain maps. The analysis added changes in rainfall, smaller streams and sea level rise into the equation, and the results nearly double the number of properties that should be considering flood risk. Michigan has had several consecutive years of extremely high water resulting in surface flooding and high flow events on the river. Conditions are changing in a way that brings rivers in conflict with the built environment. Now more than ever we need to revisit where and how we build.

Addressing our stock of aging dams and improving our approach to floodplain management are two key solutions. The breach of the Edenville and Sanford dams on the Tittabawassee River in May illustrated how a perfect storm can cause massive damage.

Without action to remove obsolete dams and investment to repair those that still serve a practical function, dam failures will become more common. Much of the state's stock of 2,600 dams have exceeded their intended lifespan. Obsolete designs meant to withstand past conditions are quickly becoming inadequate for current and future climatic conditions.

Across the country, experts understand that removing dams we no longer need is the best way to keep people safe, improve water quality, restore critical wildlife habitat, and eliminate ongoing costs of dam maintenance and repair. In Michigan, a growing number of dams have been successfully removed including three on the Boardman river in Traverse City and one on the Mill Creek tributary of the Huron river in Dexter. It concerns me that some media coverage of the Tittabawassee dam failures frames the argument as wildlife versus people. This is a dangerous and false narrative. Addressing dams can and should improve the health of a river and protect citizens from catastrophe.

On land, communities need to revisit floodplain maps and understand the implications of more water on buildings, homes, and other infrastructure. Expanding floodplains mean more homeowners will need flood insurance at a time when insurance costs are increasing. People of color are disproportionately impacted by increased flood risk as many historically segregated neighborhoods are located in low lying areas. Residential flooding can result in mold and property damage, leaving residents with unique health and economic burdens.

At the local level, we need more policies that reduce vulnerabilities to flooding. Green Oak Township limits development within 100 feet of

K. Paine

any tributary, dramatically reducing potential harm from flooding. The City of Ann Arbor has proposed a flood damage prevention ordinance to create a new zoning overlay that includes properties in or near the floodplain. The ordinance calls for no new development within the floodplain and elevating buildings that are in the "flood fringe" where flooding is possible. Land protection millages in the City of Ann Arbor, Ann Arbor Township, Washtenaw County, and Scio and Webster Townships fund the purchase of natural areas so they can continue to absorb rainfall and reduce flood risk. If you see a land protection millage come up on your ballot, I encourage you to support it.

As I watch how more rainfall and larger, stronger storm events hit our landscapes, I am reminded of something I learned back in graduate school; the best way to avoid conflict with a river is to let it do its thing and stay out of its way. This includes flooding. While, in today's society that is an impossibility in most places, there is something to be said for aspiring to that goal.

— Rebecca Esselman
HRWC Executive Director
@natureiswater

Make a Gift for Ages to Come

Contact Wendy Palms about your planned gift to HRWC: wpalms@hrwc.org, (734) 769-5123 x 605

Huron River Watershed Council

Take a Suds Tour of the 'Shed

Support local businesses and HRWC!

Suds on the River is HRWC's iconic annual fundraising event, providing an opportunity to gather along the river, enjoy delicious bites and brews, and celebrate the company of good friends! It is also a time to remember the importance of this water resource in our backyard and the value of HRWC's work to keep it clean and accessible for everyone.

While we are all disappointed by the strange circumstances of 2020, we are also excited to do something a little different. This year, Suds *for* the River gives all of us the opportunity to show support for HRWC *plus* the restaurants and breweries that have made the party special for so many years.

"Explore a new community along the Huron River and pick up dinner at one of the many long-standing Suds restaurants throughout the watershed."

Rebecca Esselman
HRWC Executive Director

"It's plain and simple. Great beer starts with clean water, and as a brewery located next to the Huron River, the protection of this valuable resource is critical to our beer and our community. Hope to see you at the Corner Brewery in Ypsi this fall!"

Kyle Riffel
Sales Director, Arbor Brewing Co.

Buy a ticket and embark on the tour

You will receive a special Suds Passport, good for discounts at participating locations.

Enter the raffle for a chance to win awesome prizes

Visit at least four participating breweries between September 10th and October 31st, get your passport stamped, return it to HRWC, and you could win!

HRWC can't wait to return to the banks of the Huron next year, but in the meantime, CHEERS to YOU for your continued support!

For more information including prize packages and how to get your tickets, please visit hrwc.org/suds or email agotelaere@hrwc.org.

—Wendy Palms

New State Standards for PFAS

Maximum contaminant levels established for drinking water

The State of Michigan established drinking water standards for seven PFAS chemicals. The standards, known as maximum contaminant levels, or MCLs, are more protective to human health and the environment than the non-enforceable EPA guidelines. These would be the first drinking water standards for PFAS at either the federal or state level. Previously, Michigan only had limits on what needed to be cleaned up after pollution was released into the environment through wastewater.

Despite delays in the rulemaking process due to the COVID-19 pandemic the PFAS MCLs enjoyed bipartisan support and limited pushback. Only parties with close ties to PFAS users voiced opposition to the new rules.

Scientists and environmental groups, including HRWC, argue that the standards are only a good first step for protecting water supplies from these "forever chemicals." There are more than 5,000 PFAS compounds out there and hundreds of variants have been used in Michigan. There is growing evidence that all of them could cause health problems and that they should be regulated as a class of chemicals.

To learn more about PFAS, visit hrwc.org/pfas.

—Daniel Brown

Suspected PFAS foam on Portage Lake, May 2020. credit: HRWC

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and environmental protections, this industrious rodent has made a comeback across the U.S., including right here in the Huron River watershed.

Rodent, you say?

Yes! Beavers are one of the largest rodents in the world, second only to the capybara of South America. The two species of beaver alive today are the closely related Eurasian (*Castor fiber*) and North American beavers, both of which can weigh up to 70 pounds and reach three feet in length. A semi-aquatic animal, beavers spend most of their time in the water and have developed adaptations to succeed in aquatic environments. Beaver fur is naturally oily and water repellent—one of the many reasons beaver pelts were so prized both by Native Americans and early Europeans. Beavers can hold their breath for fifteen minutes underwater and have a set of transparent eyelids that serve as goggles—they also have webbed feet ideal for paddling and their flat tail helps the beaver maneuver through the water like a rudder on a boat. Beavers are active all winter long, even when ponds and rivers freeze over, as they can swim long distances beneath the ice and their thick coats keep them warm even in the coldest water.

Beavers are known as ecosystem engineers—their construction of dams in rivers and creeks can significantly affect regional hydrology and habitat. Beavers build dams by felling trees with their large front teeth. They weave tree trunks, branches, and twigs together to create a latticework wall that they waterproof with mud. Beavers use their powerful, flat tails to slap the mud into place, binding the logs together like mortar on a house. Behind the dam, water pools upstream transforming stretches of river into ponds. In the calm waters of the pond, beavers build lodges to live in. The pond provides protection from predators, a place to forage for food, and still water to float logs and other building supplies to their construction projects.

Ecosystem benefits

Flooding caused by beaver dams creates a diverse array of habitats that support populations of insects, waterfowl, fish, and amphibians. For this reason, beavers are also considered a keystone species, as their presence in an area can enhance biodiversity and promote the success of other plants and animals in the ecosystem. Beaver dams provide other benefits to ecosystems such as erosion control and pollution filtration. Slower flow coupled with higher water levels upstream allow pollutants to be filtered slowly through vegetation and break down over time. The reduction in water velocity prevents excess sediments from washing into the creek that can harm aquatic species and may contain fertilizers and other chemical contaminants.

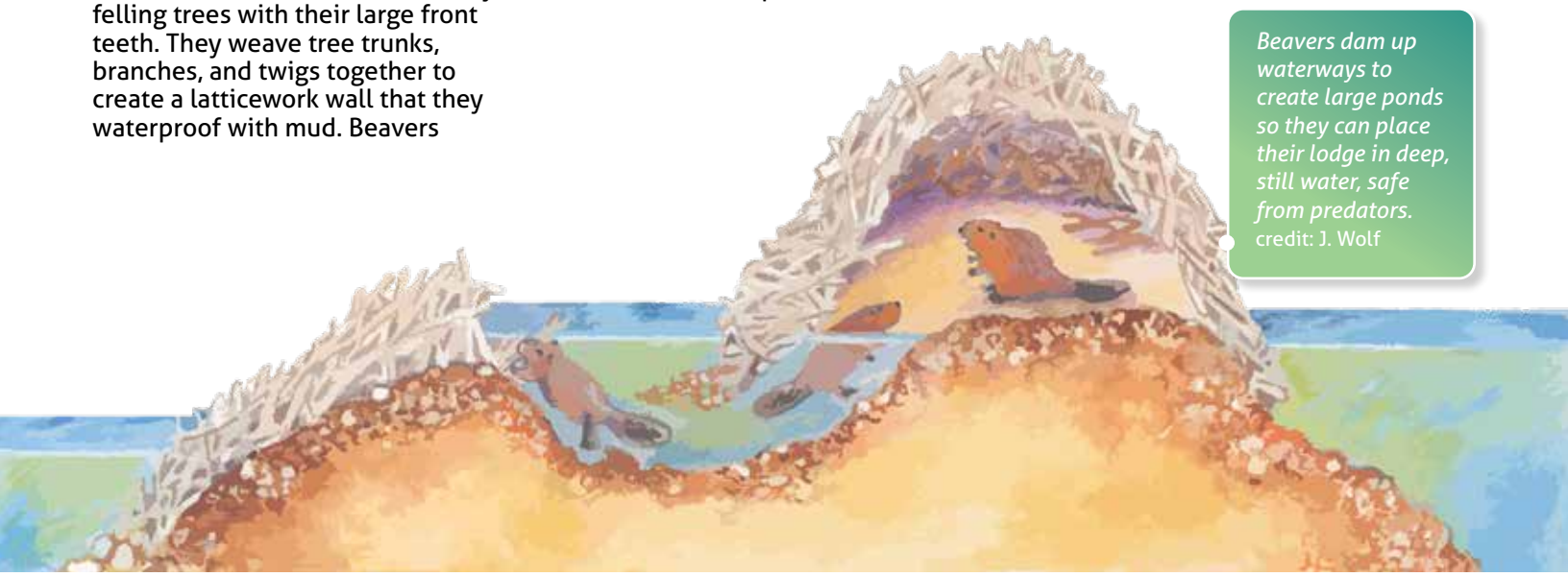
Beaver dams provide downstream benefits as well. The ponds provide a steady supply of water to downstream reaches in dry periods, as water stored upstream of the dam in rainier seasons is released slowly over time. Such changes to river hydrology and the local landscape can occur rapidly when there are beavers present—the "busy beaver" as they say, can build a dam overnight!

A nuisance to some

Despite the beaver's contributions to ecosystem diversity, beavers are considered a nuisance in some places. Beaver dams can cause flooding and damage to homes, businesses, and roads. In some small creeks, dams can cut downstream flow to a trickle. Historically, "problem" beavers were exterminated. These days, thankfully, efforts are often made to relocate beavers to natural areas where their dam building can contribute to the diversity and vibrancy of our local ecosystems.

In the Huron River watershed, beavers are currently very active in Hudson Mills Metropark along the Huron River, where the results of their tree felling are apparent near the walking path. HRWC has also received reports of beavers near Burns-Stokes Preserve, Huron Meadows Metropark, on the river in Huron Township, and in Wixom Habitat Park (Norton Creek, Oakland County). It is exciting to see this iconic rodent back at it in the Huron. An integral part of Michigan's past, the beaver is once again a part of the watershed's bright future.

—Kate Laramie



Beavers dam up waterways to create large ponds so they can place their lodge in deep, still water, safe from predators.
credit: J. Wolf

Land Protection *continued from cover*

Association of 27 drinking water systems in the United States found that protecting upstream forests and wetlands can reduce drinking water treatment costs at a rate of 20% for every 10% increase in watershed forest cover. Another study assessed the stormwater treatment value of wetlands in New York state at over half a million dollars per acre every year. The Huron River and its adjacent wetlands alone provide over $3.8 billion in ecosystem services.

Yet, these lands face continued conversion to roofs, lawns, parking lots, and roads, which robs them of their ability to provide vital ecosystem services, creating even more runoff for remaining lands to handle. Emerging contaminants like PFAS and microplastics further threaten water quality.

This map shows which local governments have participated in HRWC's workshops or adopted land protection millages. Encourage your community to run a land protection mapping workshop with HRWC or explore a millage if it has not yet done so.
credit: HRWC

Local decisions, local control

In Michigan, local governments have the power to determine land use and protection strategies within their boundaries. Several of the watershed's local governments have recognized the importance of land protection to the health, safety, and welfare of their residents and local water resources. In the past ten years, five property-tax ("millage") funded land protection programs—including in Ann Arbor, Scio, and Webster townships, the city of Ann Arbor, and Washtenaw County—successfully protected about 10,000 acres of natural lands in the Huron River watershed.

Other municipalities have crafted policies in their zoning ordinances and master plans that accommodate or encourage growth that works in concert with land protection. For instance, Webster Township's new surface water protection overlay district will protect 1,700 acres of riparian lands along 61 miles of stream in perpetuity. Webster also protected over 4,500 acres of land through their land protection property tax millage. The township master plan includes goals for continued river-friendly policies including a wetland ordinance, which would protect about 4,300 acres of wetlands.

HRWC efforts

To spread the use of these important tools throughout the 63 local governments in the watershed, HRWC offers policy and technical support to watershed communities and residents, including:

- Workshops where residents and local officials map a network of forests, wetlands, waterways, and links to connect them. They then discuss goals and how best to plan for development while protecting the natural lands network.
- A step-by-step Conservation Millage Toolkit (hrwc.org/millagetoolkit) to guide communities and local activists through the process of campaigning for and passing a millage. Watershed communities like Ann Arbor Township are finding success with millage programs.

"The Conservation Millage Toolkit is an incredible resource. Based on my experience, the advice it contains is spot on. Read it and do it."

John Allison, Ann Arbor Township Trustee

- The guidebook, *Land Use for a Healthy Watershed*, (hrwc.org/changemakers) which describes how land and water are connected, how local governments manage land, and what citizens can do to protect land and water at the local level.

What you can do

- Study the map above and ask questions about your community's status for land use protection.
- Check with your community. Has it participated in any river-friendly efforts? Investigate even further at HRWC's Change Makers page (hrwc.org/changemakers). HRWC keeps track of local land and water protection activities in the watershed's local governments and provides resources on how residents can advocate for river-friendly policies.
- Find out who is running in your local election and what proposals will be on the ballot. For instance, Washtenaw County's land protection millage is up for renewal this November. Vote with the Huron River in mind!

Together we can ensure the protection of natural lands critical to maintaining a healthy Huron River.

—Kris Olsson

MISSION
The Huron River Watershed Council protects and restores the river for healthy and vibrant communities.

VISION
We envision a future of clean and plentiful water for people and nature where citizens and government are effective and courageous champions for the Huron River and its watershed.

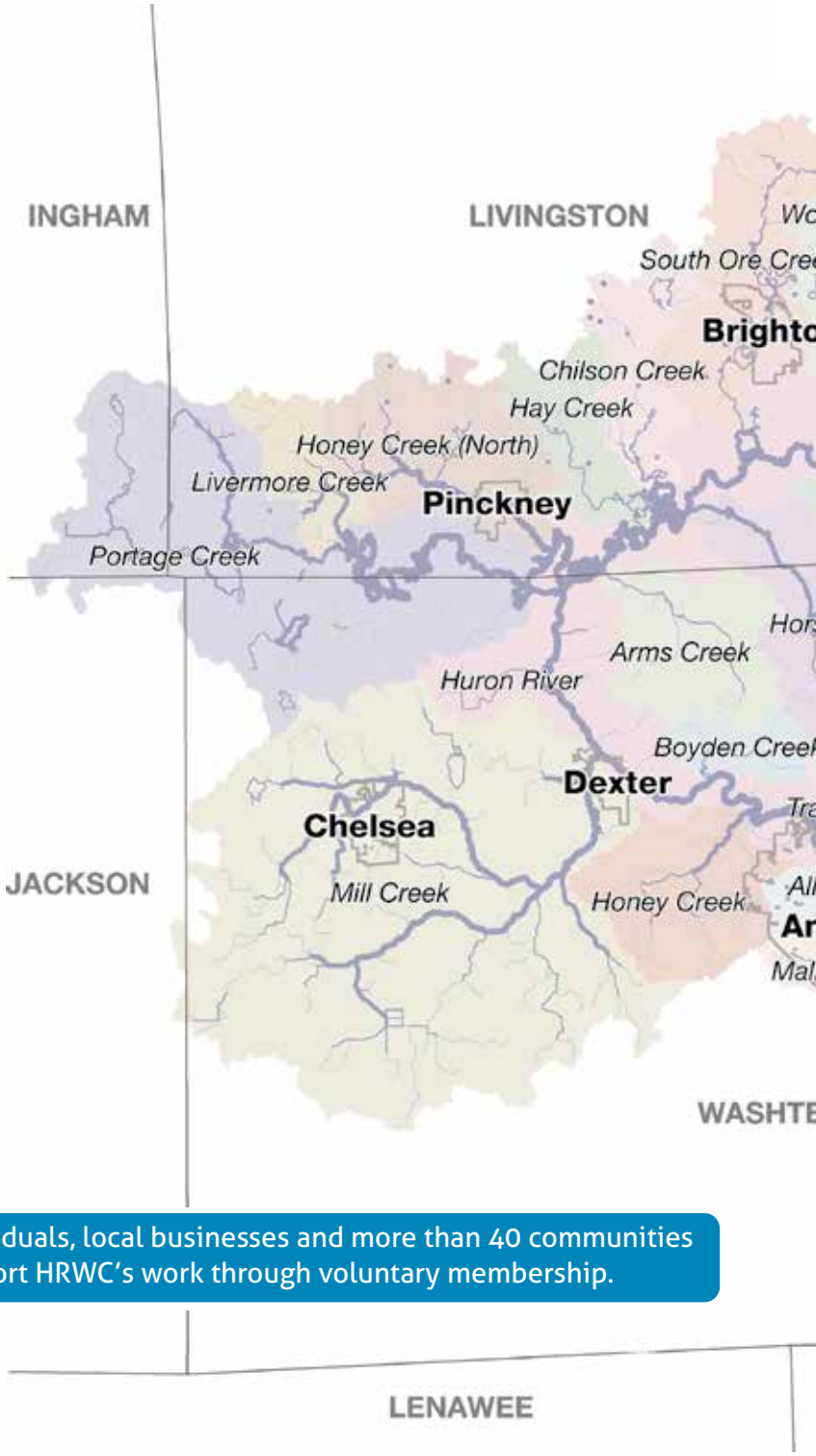
CORE VALUES
We work with a collaborative and inclusive spirit to give all partners the opportunity to become stewards.

We generate science-based, trustworthy information for decision makers to ensure reliable supplies of clean water and resilient natural systems.

We passionately advocate for the health of the river and the lands around it.

HRWC BOARD OF DIRECTORS

The Huron River Watershed



Individuals, local businesses and more than 40 communities support HRWC's work through voluntary membership.

Visit www.hrwc.org for detailed maps, monitoring data and creekshed status updates.

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As leaves turn and fall, please remember to rake them up and keep them out of stormdrains, creeks, and the river.
credit: PSart Design Studio

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Swimming in Plastic, Redux

Microplastics are prevalent, but mysterious

Plastic is a part of life for 21st century humans. What happens when plastic items begin to break down? Unfortunately, much of it reaches our waterways. Tiny plastic pieces have infiltrated lakes, rivers, and wetlands, and are often small enough to avoid notice without specialized equipment. Researching the impact of these microplastics on humans and the aquatic environment is becoming a focus of study in the environmental community. HRWC has produced three short educational videos on microplastics, distributed balls and bags to catch microplastics from washing machines, and given an overview of the problem in the *Huron River Report*, Summer 2017. (Check it all out at hrwc.org/our-watershed/threats/microplastics-pollution/) This article is a sequel to the 2017 report.

HRWC wants to stop behavior that contributes to microplastic contamination in our waterways, but furthermore, is interested in the scientific and management side of the problem. In particular, HRWC's scientific goal is to determine the source of microplastics to stop pollution before it enters our waterways.

Several studies have considered how microplastics are delivered to aquatic systems. Plastic fragments from thin films, foam, and line segments (like from fishing line) enter the system via trash from accidental and purposeful dumping—eventually breaking down into smaller pieces through physical degradation. Trash is a type of non-point source pollution since it comes from many different places (like sediment and nutrients) and not a single source (like discharge from a wastewater treatment plant).

Microfibers are tricky; their source is not obvious. Since washing machines cause microplastic pieces to slough off of clothing and the wastewater is delivered to municipal facilities, wastewater treatment plants (WWTPs) are a seemingly obvious source. Scientific studies, however, have not been able to strongly connect WWTPs and microplastics. Baldwin et al. (2016) did not find a statistical relationship between the amount of wastewater effluent and microplastic concentrations. Another study by Carr (2016) reported that nearly all microplastics (including microfibers) were removed from the process at the end of tertiary treatment at one WWTP, while at a second WWTP, plastics were released at a rate of about 1 piece per 1,000 liters. This is a very low amount compared to the abundances that HRWC is finding, implying that while WWTPs can be a source, they are not a major contributor.

HRWC summer 2019 interns look for microplastics through the scopes! credit: HRWC

Microplastics removed by primary and secondary treatment phases end up in wastewater sludge. Dried sludge (aka 'biosolids") is applied to agricultural fields as fertilizer. This is a regular practice in Michigan. Rain can pick up plastics from the biosolids, washing them into creeks and rivers (Nizzetto 2016, Baldwin 2016). Therefore, sludge is another possible source of microplastics; although, this is also not strongly confirmed in the literature.

Baldwin's 2016 study showed the Huron River is high in microplastic but could only speculate on the source of it. Other scientific studies have contributed to this knowledge base, but the question of microplastic sourcing certainly is not settled. HRWC, operating on a local scale, is interested in finding specific sources so that we can work with government and landowners to shut down or at least alleviate the problem. In 2018, HRWC began to experiment with microplastic monitoring procedures and in 2019 launched its first summer microplastics monitoring program.

HRWCs sampling finds an answer but opens more questions

In July and August 2019, HRWC filtered 1,000 gallons of water and kept the resultant debris from 31 sites at the mouths of Huron watershed streams as well as the river itself. The filtered debris was trapped on gridded filter paper and lightly dried on a hotplate. The samples were kept covered as much as possible to prevent air contamination as microplastics are in dust and fall off clothing. Microplastics on the filter paper were counted under a stereoscope and classified into five different types: fibers, films, beads, foam, and fragments. HRWC also ran several blanks with different sources of drinking and distilled water to understand possible sources of sample contamination.

Of the top ten microplastics sites in the project, six are from the immediate Ann Arbor area, all but one of which (Fleming Creek) are urban streams (see box on the next page). Of the other top sites, Norton Creek and the Huron River in Ypsilanti are also in urban watersheds, and South Ore is a highly suburban creek (Brighton). The rest of the sites spread further into Livingston and Oakland counties and generally are more rural or even in natural areas. In every sample, there was at least some plastic. Nowhere is pristine though, as Horseshoe Creek and Chilson Creek samples had very low counts (2-3 pieces per 1,000 gallons).

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Microfibers were far and away the most plentiful type of plastic captured, comprising about 97% of the total amount. Fragments, beads, film, and foam were all found, but not consistently. As HRWC does not sample right on the surface of the river but rather 60% from the top of the surface, it makes sense that the samples do not have much foam and film, which are more likley to float. Surely this does affect the result to some unknown degree, but in any case, HRWC findings also match similar studies which show that fibers are the "most found" microplastic constituent in river environments (Baldwin 2016, Koelmans 2019) indicating that they are either the most transportable in streams or that there are far more of them out there.

HRWC staff setting out the fine meshed net that passes water through while trapping debris for the summer 2019 study. credit: HRWC

Top Ten in the Watershed

Ten microplastics sites surveyed in the Huron River watershed based on 2019 sampling, ranked by the average number of microplastics pieces per 1,000 gallons.

Swift Run (Ann Arbor): 127
Millers Creek (Ann Arbor): 61
Huron River (Ann Arbor): 57
Malletts Creek (Ann Arbor): 34
Norton Creek (Wixom): 28
Fleming Creek (Ann Arbor): 21
Traver Creek (Ann Arbor): 21
South Ore Creek (Brighton): 20
Huron River (Wixom): 20
Huron River (Ypsilanti): 18

As mentioned previously, research in the scientific literature has not been able to confirm a positive correlation between WWTPs and microplastic abundance. Similarly, the top hot spots for microplastics in this study are not below wastewater treatments plants (an exception is the Huron River in Ann Arbor, but even this is a far distance; the closest upstream WWTP would be in Dexter, about 12 miles away). The highest plastics counts were in Swift Run, Millers Creek, and Malletts Creek, all of which are small creeks that are not downstream of WWTPs. It is possible there are illicit washing machine connections to these creeks, but it seems unlikely such connections would be present in high numbers. As mentioned earlier, another possible source of microplastics hypothesized by Nizetto (2016) is biosolids spread on agricultural fields—the theory being that during rain events, the microplastics are carried away in the runoff. However, our highest-count locations are urban creeks with nearly no agriculture in the creekshed, plus there are agricultural watersheds sampled with hardly any microplastics. The microfibers are also presumably not coming from a standard piece of trash found in the river like food packaging, as this type of trash does not degrade into microfibers but more typically into fragments, foams, and films. Where, then, are the fibers coming from?

Studies by Allen et al. (2019) and Brahney et al. (2020) have shown that microplastics settle out of the air, even in remote mountain watersheds. If fibers are showing up on the tops of mountains, certainly we would expect them to be found in the dirt and dust covering city streets in the summer. Brahney reports that fibers in particular are transportable through the atmosphere. Therefore, it is possible that fibers settle from the air, wash out from rain, and arrive to streams via storm drain systems in urban environments. If atmospheric deposition is to blame, then plastic particles are also settling in forests and fields, but these pieces are more likely to get trapped in soils and less likely to run-off into surface water. In our samples, there is correlation between microplastic pieces and the amount of impervious surfaces in a site's watershed (r= 0.54). The microplastics could be peaking in abundance in our waterways after rain events wash them in, much like sediment and other non-point source pollution peaks in rivers after rain events.

To get a better understanding of how rainwater runoff may have affected our results, we obtained rain data from the City of Ann Arbor's rain gauge, located on the University of Michigan's North Campus. Unfortunately, these rain/microplastic correlations did not suggest that the runoff volume is related to microplastics in the direction that we would anticipate. Actually, the correlations were negative, indicating that higher rainfall is associated with lower microplastic counts, which is the opposite of what we expected. This discrepancy in our expectation versus reality means it is a good avenue for further study. Going back to the same sites several times over the course of a field season and covering all of the sites on the same days will give us a much better understanding of how variable the samples can be in regard to flow

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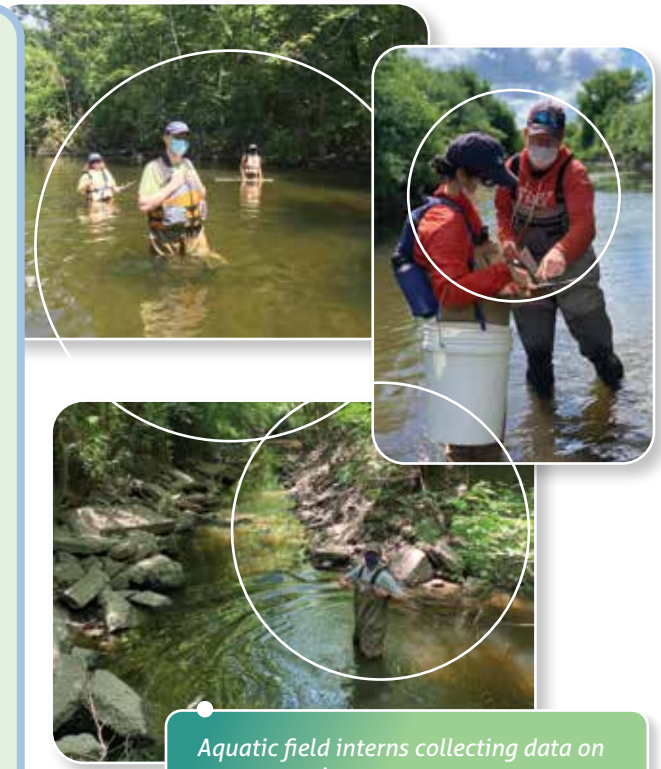
2020 Interns • 25 Intrepid Heroes!

credit: G. Hieber

Thank you for your dedication!

Alan Ching
Caleb Willette
Charlotte Reader
Chloe Hernandez
Claire Bott
Daniel Miller
Destiny Bullock
Erin McCargar
Gabrielle DeMott
Hannah Pascual
Hannah Paulson
Jacob Inosencio
Jesse Evers
Kaitlyn Bowen
Katie Pascoe
Kerra Janis
Lauren Swain
Lute Smith
Patrick Fegan
Patrick Pinkowski
Quentin Davis
Sophie Lin
Paige Schurr
Susan Shell
Tiffany Wu



Aquatic field interns collecting data on stream erosion.
credit (top left): J. Inosencio
credit (center, bottom): A. Paine

HRWC interns are always amazing, inspiring, and hard-working. This year, the 25 interns who joined us are especially inspiring due to their diligence and patience as we implemented COVID-19 safety procedures in our field projects and worked remotely from our homes. Summer field season has been different and slower to implement this year. Some programs were canceled and many were drastically altered. All of the interns were understanding of and assisted in creating solutions to the challenges that arose. Most of them participated in our BANCS erosion study, many helped educate the public about invasive stiltgrass, a few helped with our youth snorkeling project as well as our new E.coli study, and two interns helped from home doing marketing and communications, GIS, and program research. Our heartfelt gratitude goes to each and every one of these students for their enthusiastic contributions to HRWC's mission of protecting and restoring the Huron.

—Jason Frenzel

Swimming in Plastic, Redux *continued from page 9*

conditions and weather. Furthermore, if the samples are highly variable over the course of a summer, this will strengthen the hypothesis that the sourcing of microplastics is non-point rather than point source pollution, such as WWTPs. This is because a WWTP should produce more stable microplastics numbers as its effluent will be stable over time, except during overflow events.

Next steps

The 2019 sampling was widespread in order to find hot spots but we were only able to collect two samples from each location, and thus did not get any indication of the possible sampling variation in our microplastics collection.

In 2020, HRWC will sample with more intensity on fewer places to understand how weather, flow, and the natural variability in sampling affects the microplastic counts. This may further elucidate details on their source. Determining the source of microplastics—or at least how they are delivered to the Huron River system—remains the ultimate goal.

Acknowledgments

Retired plastics engineer and HRWC volunteer Dennis Kittel led monitoring teams, helped build and test the monitoring procedures, donated much of the equipment for the study, helped find funding, and quite plainly was the initial driving force behind this entire project. Many 2019 HRWC summer interns helped filter and count samples, with Tina Lin and Willow Krupin contributing substantial hours to the effort. Also thank you to Dr. Melissa Duhaime and Rachel Cable from the University of Michigan who provided HRWC with plentiful technical advice. This work was funded by the Bill and Mary Kinley Innovators Fund.

—Paul Steen

Note: References, tables, and graphs can be viewed at hrwc.org/our-watershed/threats/microplastics-pollution/fall2020-addendum

Lights, Camera, Analyze!

HRWC pilots low-cost spectrophotometer to analyze water pollution

Around this time of year, neon green algal blooms begin to form in Lake Erie, undermining recreation, water quality, and community well-being. The Huron River is undoubtedly a part of the problem as it carries polluted runoff containing phosphorus and nitrogen (aka "nutrients") to Lake Erie. That also means the Huron can be part of the solution to mitigating these nasty blooms and improving water quality. With new technologies, HRWC is testing inventive new means to improve water quality monitoring and reduce nutrient runoff.

Citizen scientists are key

In collaboration with partners from across the Lake Erie basin, HRWC is testing a new low-cost spectrophotometer device to bolster water quality data collection by citizen scientists. The high cost of laboratory-grade nutrient testing and analysis typically inhibits community-based citizen science groups like HRWC from collecting nutrient data. Developed by researchers at the University of Akron, these new spectrophotometer devices would enable HRWC and partners to increase the scale and speed of nutrient testing, and arm partner organizations with the essential data to drive policies and investments that tackle polluted runoff and reduce nutrients going into Lake Erie.

This spring, HRWC was selected by the Cleveland Water Alliance as the Southeast Michigan Local Champion for this larger regional collaboration, called the Smart Citizen Science Initiative. Each Local Champion is sponsored by an area community foundation, with HRWC's efforts supported by the Community Foundation for Southeast Michigan. This year and next, HRWC will pilot the spectrophotometer devices among its own monitoring programs, including the Chemistry and Flow Monitoring Program and the River Roundup macroinvertebrate collection, and look for opportunities to distribute the devices to other southeastern Michigan water organizations working with citizen scientists. Starting this past June, HRWC staff collected bimonthly samples from 20 sites in Wayne and Washtenaw counties, bringing the samples back to their newly established home "labs" for analysis using the device. Staff will continue to sample and send duplicate samples to a professional lab for side-by-side evaluation. Such comparison will help the team determine the devices' overall precision and accuracy.

Accessible tools in the field

The 3D-printed spectrophotometer shines light beams through water samples and a diffractor to produce visible light spectra that are brighter or darker depending on the sample's nutrient concentrations. A smartphone camera and app analyze the light spectra to produce an absorbance value (a measurement of the light wavelengths passing through a sample). HRWC then converts the absorbance values into nutrient concentrations for use in water quality analyses.

While testing the devices this past summer, HRWC identified potential challenges with more widespread use. In the offseason, HRWC will work with project partners to remedy these issues in time for the 2021 monitoring season. HRWC looks forward to continued partnership on this innovative project to improve water quality data accessibility and advance new technology.

—Andrea Paine and Ric Lawson

With low-cost spectrometer technology, classrooms such as the one pictured above can study water quality more readily.
credit: Cleveland Water Alliance 2019

Seven partners throughout the Lake Erie basin, including HRWC in Metro Detroit, are advancing new initiatives to increase collaboration, innovation, and data sharing among citizen science programs.
credit: Cleveland Water Alliance

Huron River Watershed Council

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