



UP Environment

UPEC: THE UP'S OLDEST GRASSROOTS ENVIRONMENTAL GROUP

UPEC'S Mining Action Group (MAG) is the new SWUP.

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Winter 2016-17



Big Picture - A Wounded Land by Jon Saari



Winter in the Upper Peninsula

This winter issue of the newsletter is dedicated to the Big Picture, to zooming in and out in time, to see what has happened to the U.P. landscape and its myriad inhabitants, and also to imagine what may happen, or should happen in future decades. The good news is that 46.9 percent of the Upper Peninsula (in Bob Archibald's inventory) is to some degree protected, most of that public land that will not be converted to settlements or farms. This is a high percentage, envied by many activists in more populous regions of the country. In Edward O. Wilson's calculus, this large protected base should allow us to slow the extinction crisis and to preserve about 85 per-cent of our native flora and fauna.

But the U.P. is perhaps best characterized as a Wounded Land, scarred by past logging and mining and facing the thousand smaller cuts of on-going change, from fragmentation and invasives to new industrial developments. Dave Dempsey long ago characterized the main theme of Michigan's environmental history in his book *Ruin and Recovery: Michigan's Rise as an Conservation Leader* (2001). Ground zero was 1920 in the Upper Peninsula, by which time the Great Cutover and huge fires in its aftermath had transformed the landscape. We live in the era of recovery

and restoration within the Lake Superior basin. Will we, through our choices, live up to our reputation as an iconic natural region and become a model for sustainable lives and livelihoods?

Optimism and urgency are conveyed in the big-picture thinking of E.O. Wilson in his book *Half-Earth: Our Planet's Fight for Life* (2016). (see my review on pages 12-13). It roots our home in the planetary biosphere, as a single species that has become too dominant for the rest of life. Although he never gets close to discussing the Great Lakes, Wilson gives us tools and ideas that we can apply ourselves to understanding this region. He encourages us to look at the size and quality of the protected area and to create rich narratives of all the species around us. He documents the relentless

pressures of climate chaos and the loss of biodiversity, both worsened by human activity.

Our six contributors to this special winter newsletter are all wrestling with the history of this landscape. As scholars they want to get the story right, as concerned citizens they want to move us towards wise interventions. As Nancy Langston points out, Lake Superior is warming up faster than just about any other large lake; we are not spared the impact of climate chaos. The territorial ranges of our animal and plant species have shrunk, some of them existing only on life support; Bill Ziegler presents a nuanced picture of how the native brook trout has fared over 150 years of human impact. Randy Swaty looks at the unintended impacts of introducing earthworms and suppressing fire into our forested ecosystems. View these contributions as a start of an ongoing discussion of the State of the U.P., and join in yourself!

UPEC Board Meeting

9 - 1 CST, Saturday January 21st

Crystal Falls Library - 237 Superior Avenue

Traversing the U.P.: What Do You See and What Does it Mean?

by Randy Swaty - The Nature Conservancy's LANDFIRE team, Evanston, IL

Anyone who traverses the Upper Peninsula (U.P.) of Michigan can't help but notice the relative lack of development and agriculture, and the basic natural beauty. As a person who lived there for 14 years before moving to Chicago, I may see this contrast more keenly than most!

While undeniably beautiful, stunningly stark, and seemingly "unspoiled", the ecosystems of the U.P. are dynamic, changing constantly due to human management and natural processes (or lack thereof). Referring to the incredible logging of the late 1800's/early 1900's, a forester once told me "Ninety years ago 90% of the UP was recovering from a clearcut." While we still see timber harvests fairly frequently, I want to explore some changes in our forests you may not think of everyday. Between earthworms (yes, you read that right!), and fire suppression, our wonderful ecosystems are much different than they were historically.

Take the annelid (earthworms, marine worms, leeches) admired by Charles Darwin. Each individual earthworm is amazing, but collectively, and in the wrong places, they can wreak havoc. Once, while I was visiting renowned ecologist Lee Frelich, he received a call from a U.S. Geological Survey ecologist asking "could the earthworms used by fishermen be actually impacting the streams these anglers enjoy?" The answer is "yes". Earthworms are not native in the U.P. Their presence results in a great reduction in leaf litter. Think of this layer of leaves as a great sponge soaking up rainfall, and protecting the soil below. On a hillside devoid of this blanket, rain washes soil into the streams. The soil clouds the water and fills the nooks and crannies in the stream-bed where fish spawn. The irony is uncanny. Take a moment to imagine other species that evolved with this litter layer in the northern hardwoods forests (i.e. forests with hemlocks, yellow birches, sugar maples and beeches). Imagine 6-12 inches of decomposing leaves, then imagine none. Think soil microarthropods (insects, spiders, mites and ticks) and seed germination for starters.

One way that ecologists classify ecosystems is through their natural fire regimes. Some ecosystems are fire-dependent while some are not, and some are upland while others are lowland. Michigan has millions of acres of fire-dependent forests. The upland fire-dependent ecosystems are dominated by pines (i.e. Jack, Red, White) and oaks (mostly Northern Red), and typically occur on sandy, acid soils with moderate to low fertility. I have calculated that roughly 1.4 million acres would have burned annually across Michigan before major European settlement. These would have mostly been "surface" fires that would have burned off needles, branches, leaves and understory vegetation. While there have been some serious fires in the U.P. (e.g., Sleeper Lake and Duck Lakes fires in Luce county, combined for 40,000 acres recently), most fires have been effectively suppressed for the last 100 years. A quick calculation illustrates the potential impacts: twenty percent or 2,000,000 acres of the Upper Peninsula would have had at least one natural fire in the last 100 years if natural fire regimes were intact. At least 500,000 acres would have had 20 fires!

As you might expect the fires were not uniform in their impact, but instead left behind a highly variable mosaic of barely burned to severely burned patches. All in all, most of our fire-dependent upland ecosystems would have been "open-can-



Fig. 1 - © 2010 Richard Hamilton Smith

...the ecosystems of the U.P. are dynamic, changing constantly due to human management and natural processes (or lack thereof.)



Fig 2 - Balsam fir under dense canopy of red pine by Eli Sagor

Upper Peninsula Wild Lands by Robert Archibald

“Like it or not, and prepared or not, we are the mind and stewards of the living world. Our own ultimate future depends upon that understanding. We have come a very long way through the barbaric period in which we still live, and now I believe we’ve learned enough to adopt a transcendent moral precept concerning the rest of life. It is simple and easy to say: Do no further harm to the biosphere.” 1

Upper Peninsula residents treasure wild lands that undergird the quality of life we enjoy. Yet, there are tensions between employment and environment that sometimes inflame discourse.

Why are wild lands important? They are important to the existence of healthy ecosystems and interconnected webs of living species that exist in symbiotic relationships that we only dimly understand. They are crucial for the existence of a healthy planet. Wild lands also have a spiritual importance for humans because they define our place on the planet and allow us to occasionally escape ourselves, and our human-centered lives.



Rim Lake fungi - Hiawatha National Forest

I have ranked below the categories of wild lands in the Upper Peninsula beginning with those that have the highest level of protection from development and exploitation. The ranking is somewhat arbitrary but defensible. In addition to the lands listed below there are 509 miles of river designated as “Wild and Scenic.” (all figures in acres.)

Federal Wilderness Areas

Isle Royale National Park – 571,000

Although not formally classified as a Federal Wilderness, Isle Royale is managed as wilderness and thus is included here.

Located within national forest boundaries:

- Big Island Lake Wilderness - 5856
- Sylvania Wilderness and Recreation Area – 18,327
- McCormick Wilderness – 16, 998
- Sturgeon River Gorge Wilderness – 14,500
- Rock River Canyon Wilderness – 4,640
- Mackinac Wilderness – 12, 230
- Horseshoe Bay Wilderness – 3,790
- Round Island Wilderness – 378
- Delirium Wilderness – 11, 870

Located within Pictured Rocks National Lakeshore:

- Beaver Basin Wilderness – 11,740

Total Federal Wilderness – 671,329 acres

Privately Protected Lands

Land or easements owned by the Nature Conservancy, Michigan Nature Association, Keweenaw Land Trust, Yellowdog Watershed Partnership, Audubon Society and the Upper Peninsula Land Conservancy. Some organizations own land in fee simple title, others own easements and some own a mix of fee simple and easements. Only collective total acreage owned or protected by each organization is listed. Within these totals, there are dozens of parcels of privately owned land, not listed individually.

- Nature Conservancy – 41, 329 (in thirteen parcels)
- Michigan Nature Association – 4,031 (fifty+ parcels)
- Keweenaw Land Trust – 4,950 (in twenty-five parcels)
- Yellowdog Watershed Partnership – 688
- Audubon Society – 5,647 (in four parcels)
- U.P. Land Conservancy – 5,892 (twenty-five+ parcels)
- Gratiot Lake Conservancy -- 3,600 acres

Total Privately Protected Lands – 66,137 acres

State Wilderness areas

- Porcupine Mountains State Wilderness – 59,000

Total State Wilderness – 59,000 acres

State Natural Areas

- Craig Lake State Park – 8459 - Managed by Van Riper State Park
- Bois Blanc Island – 968 - Managed by Mackinac State Forest
- Carney Fen – 2,325 - Escanaba State Forest
- Crow River Mouth – 520 - Lake Superior State Forest
- Deer Park – 60 - Lake Superior State Forest



Legion Lake - Pictured Rocks National Lakeshore

Laughing Whitefish Falls Scenic Site – 360 - Managed by Michigan DNR

Little Brevort Lake – 542 - Lake Superior State Forest

Little Presque Isle – 430 - Escanaba River State Forest

Maxton Plains – 2017 - Lake Superior State Forest

McMahon Lake Strangmoor – 1770 - Lake Superior State Forest

Rocking Chair Lakes – 240 - Escanaba River State Forest

Seiner's Point – 2,502 - Lake Superior State Forest

Shakey Lakes – 1,520 - Escanaba River State Forest

Tahquamenon Natural Area – 19,005 - Tahquamenon Falls State Park

Union Springs Scenic Site – 160 - Included in the Porcupine Wilderness State Park

Wagner Falls Scenic Site – 23 - Michigan Department of Parks and Recreation Division

Total State Natural Areas- 40,901 acres

Biosphere Reserve

The University of Michigan Biological Research Station owns 3,200 acres on Sugar Island. This land is one of only forty-seven biosphere reserves in the United States.

Total Biosphere Reserve – 3,200 acres

Research Natural Areas

Hiawatha National Forest

Dukes - 233

Grand Island – 59

Horseshoe Bay – 2065

Ottawa National Forest

McCormick – 3675

Sturgeon River Gorge – 351

Total Research Natural Areas – 6,383 acres

Experimental Forest

Dukes Experimental Forest – 5,500 managed by the U.S. Forest Service. Total is 5,500 minus the Dukes Research Natural Area within the Experimental Forest

Total Experimental Forest – 5,267 acres

National Park/National Lakeshore

Isle Royale National Park – Isle Royale is not included in this total because it is included under Federal Wilderness above.

Pictured Rocks National Lakeshore – 73, 216

This total is 644,216 acres, but requires the subtraction of 11,740 acres of federal wilderness located within the boundaries of Pictures Rocks National Lakeshore to achieve a total of:

Total National Park Service – 61,475 acres

National Forests

While logging still occurs in Upper Peninsula national forests, the cut is smaller in recent years due primarily to public opposition.

Hiawatha National Forest – 894, 836

Ottawa National Forest – 993, 010

This total is 1,887,846, but requires the subtraction of 102,087 acres of federal wilderness listed above that is within national forest boundaries.

Total National Forest Land – 1,785,759 acres

National Wildlife Refuges

Seney National Wildlife Refuge – 95, 296

Huron National Wildlife Refuge – 147

Total National Wildlife Refuge – 95,443 acres

State Forests

Timber harvests are required to be certified by the Sustainable Forestry Initiative and by the Programme for the Endorsement of Forest Certification (PEFC), which is the

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Environmental Scorecard - 2016 by Grant Fenner and Maggie Scheffer



Beaver pond - Kingston Plains

UPEC made a promise early in 2016 to publish an Environmental Scorecard specific to both UPEC's achievements, as well as publishing an overall State of the U.P. It illustrates the overall environmental progress achieved in our region relative to the loss or gain of quality protected lands, the viability of wildways, the vitality of our top predators, the control of invasive species, the status of biodiversity and the adaptation to climate change.

Our 2016 year-end winter newsletter is dedicated to this purpose, including several articles which illustrate the State of the U.P. and a partial listing of the combined accomplishments of UPEC and Save the Wild U.P. (SWUP), made possible by your membership dues and donations.

UPEC's foremost achievement in 2016 has been the integration of SWUP into the organization by way of a merger that became effective December 31, 2016. The future of SWUP's dynamic grass roots anti-sulfide mining efforts are assured to remain "alive and well" as a consequence of this merger by way of the new UPEC Mining Action Group led by Kathleen Heideman and Alexandra Maxwell.

ACHIEVEMENTS

UPEC

- Awarded \$30,000 in Community Conservation Grants to the U.P. Land Conservancy, Keweenaw Land Trust & Yellow Dog Watershed Preserve
- Distributed \$4,000 in educational grants across the U.P.
- Hosted its 7th annual Celebrate the U.P. event and for the first time in Baraga
- Published four position papers in response to environmental threats to the U.P.
- Maintained three trail segments of the North Country

Trail (NCT) through its affiliation with the Peter Wolfe Chapter of the NCTA

- Publication of quarterly newsletters focused on issues of environmental importance that were distributed to its members, friends, supporters, libraries, media, regulators and political people
- Created UPEC's new ONE VOICE brochure, which is integral to our campaign to build membership in the organization, thereby increasing the impact citizens have through engagement with environmental issues in the U.P.

SWUP

• Maintained fact-based opposition to building of County Road 595 that threatened the Yellow Dog Watershed. This work was rewarded with a Federal judge's support for an earlier EPA decision to disallow construction of the road in June, 2016; a decision that still remains subject to possible future appeal

- Reviewed a NPDES permit in opposition to authorized release of untreated & waste water discharges at the White Pine Mine into Lake Superior
- Submitted written comments in opposition to mineral leases requested for Ottawa National Forest
- Organized opposition to the Back Forty open-pit sulfide mining application/mill proposal submitted by Aquila Resources on the Menominee River, the U.P.'s largest watershed. Actions include:
 - 1- Speaking at public meetings
 - 2- Participating in the Save the Menominee River Speaking Tour
 - 3- Hosting local informational seminars/providing activist training
 - 4- Tendering evidenced-based comments to the State following a "red flag" analysis of Aquila's mining permit
 - 5- Finalizing DEQ comments per Back Forty's NPDES, Clean Air Act, and mining permit applications in cooperation with the greater Menominee communities

"Find your place on the planet. Dig in, and take responsibility from there."

Advice from Poet Gary Snyder

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largest forest certification system in the world. State Forests are broken into management units.

Baraga – 142,900

Gwinn – 278,000

Crystal Falls – 300,000

Escanaba – 142,000

Shingleton – 380,000

Newberry – 352,000

Sault Ste. Marie – 322,500. Total is 1,917,400 minus 26,828 managed by state forests but included in natural areas.

Total State Forests – 1,890,572 acres



Lake Superior State Forest

Northern Great Lakes Forest Project

In 2010 the State of Michigan, the federal government, several private foundations, the Nature Conservancy and the Forestland Group, LLC reached an agreement to protect a total of 270,000 acres of land in the Upper Peninsula. The Nature Conservancy acquired 23,338 acres in the Two Hearted River watershed and purchased working forest conservation easements on approximately 248,000 acres. Timber harvesting follows sustainable forestry standards, development is limited and the lands are protected from fragmentation. The Two Hearted River Watershed purchase of 23,338 acres is included in the Nature Conservancy total above.

Northern Great Lakes Forest Project – 248,000 acres

The Upper Peninsula includes 10,529,280 acres. Of these 4,940,160 acres have some level of protection from development and exploitation, ranging from federal wilderness areas to commercial forests with working forest easements. 46.9% percent of the Upper Peninsula land area has some level of protection.

REFERENCES

1 Edward O. Wilson, *Half Earth: Our Planets Fight for Life* (New York, 2016), 212.

2 Dr. Jon Saari gently encouraged me in this research and generously shared his “A High- Low Protection Scale for Michigan’s Forested Landscape.” He also read a draft of this work and made important suggestions for improvement. Ernie Houghton of the Michigan Department of Natural Resources in Gladstone patiently explained the Commercial Forest Program and the Forest Stewardship Program. Mike Smalligan, Forest Stewardship Coordinator, Michigan Department of Natural Resources in Lansing also took time to answer my email queries regarding Commercial Forests and Forest Stewardship.

3 Other lands in the Upper Peninsula enjoy some limited and non-permanent levels of protection, including city and county parks and other green spaces, commercial forest lands, and land enrolled in the Qualified Forest Program.



Robert R. Archibald is a native of Michigan’s Upper Peninsula and a graduate of NMU’s History Department. He became one of the leading public historians in the United States, especially during his long tenure at the Missouri History Museum in St. Louis. A few years ago he returned to the Upper Peninsula, where he is engaged in teaching and writing on local history; in particular he is working on an environmental history of the U.P.

Community Conservation Grant Deadline Approaches

The application deadline for UPEC’s Community Conservation grants is March 10, 2017. Grants up to \$10,000 each may be awarded annually by the UPEC Board. This fund is designed to enable communities in the U.P. to step up a level in their promotion of conservation values in their watershed or locality. Grants will help protect natural areas for public benefit and safeguard significant populations of fish, wildlife, and plants and the ecosystems which support them. The UPEC grants are to facilitate planning and enable activities. Examples include restoration projects, heritage days, protection campaigns. This grant program was made possible by a bequest from former UPEC member Tom Church. For more information, see our website:

<http://upenvironment.org/conservationgrants/>

Sustaining the Lake Superior Basin by Nancy Langston

While I'm sitting on the cliff over Lake Superior drinking my morning coffee, a pileated woodpecker comes for a visit. The bald eagles nesting nearby perch on an iceberg drifting down from the winter's ice pack. One eagle lifts off and dives for a lake trout, and a swarm of ring-billed gulls shrieks and mobs her, trying to drive her away from a gull colony that's expanding along the cliffs. Eight young loons paddle by, practicing their calls. Last spring, my neighbors were arguing over whether that was really a mountain lion they saw the other night (doubtful). Sometimes I'm lucky enough to hear the howls of the wolves that are now denning in the county forest across the road. Bears are so abundant that they have become a pest.

Forty years ago, few people figured any of these species had a chance up here. Deforestation and failed farming had destroyed the habitat of many birds and mammals, while the erosion that followed had clogged tributaries and estuaries with pollutants and sediments, devastating fisheries. Following World War II, industrial production had boomed across the globe. Mines and pulp mills along the shore of Lake Superior had dumped their toxic waste into local waters.

Distant industries had released toxic chemicals that had moved from their sites of production and consumption into Lake Superior, making their way into fish and then human bodies. By the 1960s, the lake was at a tipping point, with the possibility of irreversible pollution.

Much to everyone's surprise, Lake Superior has witnessed significant recoveries in my generation. Forests and many of their inhabitants have returned after the devastation of the lumber era. The toxic waste sites left after the paper and mining booms have partially been cleaned up. Lake trout—once nearly extinct—spawn abundantly in the lake once more, one of conservation's great success stories. None of these recoveries are complete, to be sure. The new forests are very different than the forests that were logged so quickly, while invasive species threaten aquatic ecosystems. Local women still wrestle with concerns over how much lake trout is safe to eat when they're pregnant. New mining developments throughout the basin threaten water and wetland resources. The largest lake in the world (by surface area), Lake Superior contains 12% of the world's freshwater, a resource of enormous importance for a world where the supply of clean, drinkable water is increasingly threatened

by climate change. Climate change is now warming Lake Superior more rapidly than almost any other large lake on earth (For overview, see http://www.mlive.com/weather/index.ssf/2015/12/new_study_shows_great_lakes_wa.html).

Treaties negotiated to pave the way for copper and iron mining in the 1830s and 1840s began the process of dispossessing the Anishinaabeg from their lands. Copper ore refining processes required huge amounts of water for the stamp mills—large machines that crushed the rock containing valuable copper. Water was returned to the lake contaminated with particles of copper-bearing tailings that filled bays, harbors, and inland lakes. By 1882, stamp mills were dumping about 500,000 tons of stamp sands to local

waterways each year. The Keweenaw Peninsula near Hancock and Houghton was soon largely deforested to fuel the copper smelters and remained bare for three quarters of a century.

By 1898, the federal forester Filbert Roth, estimated that only 13 percent of the white pine in northern Wisconsin and the Upper Peninsula region was still standing. Roth noted that deforestation had diminished the flow of larger rivers. Swamps had dried up, while hardwood thickets replaced wetland forests. Log drives scraped streambeds clean, spring dams destroyed

riparian habitat, and dams for logging blocked the passage of fish upstream for spawning. Sawmills dumped vast quantities of sawdust and wood scrap into nearshore estuaries and rivers. The sawdust floated on the surface and then became waterlogged and sank, clogging harbours, covering spawning and feeding grounds for fish, and filling in the critical nearshore estuarine habitat. Large quantities of sawdust on the shallow bottoms could consume enough oxygen to kill fish.

As forests fell, farms briefly replaced them. The geologist, Faith Fitzpatrick's, research suggests that, along the clay plain of Wisconsin's south shore, erosion from farming dwarfed the contribution from logging. Nutrients bound to sediments moved off the farmland into the estuaries and streams, lowering levels of the oxygen critical to fish reproduction and adulthood. Clear bottoms became smothered with silt, which harmed spawning of cold-water fisheries (and later offered a perfect habit for developing sea lampreys). Many contemporary observers were concerned that stream flow seemed to change after logging and farming,



Photo by Michael Olson - Genesis Graphics

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Galvanizing the Grassroots: The Role of Local Institutions in Promoting Environmental Action by Sarah Mittlefehldt

In January 2017, the United States will be led by an administration that denies the science of climate change. Donald Trump's 100-Day Plan, "**Contract with the American Voter**," centers on policies meant to sustain an ever-expanding economy fueled by nineteenth- and twentieth-century energy sources: coal, oil, and natural gas. These policies cast a dark shadow over what had started to seem like progress: a Clean Power Plan, a sustained commitment to protecting public lands, racial and social justice. Yet while federal leaders plan significant rollbacks on environmental regulation, local institutions in the U.P. and around the world are demonstrating the power of grassroots action to address the environmental challenges of the twenty-first century.

Institutions of higher education have a particularly important role to play in helping to prepare future generations for the environmental, economic, and social problems that they will face in their lifetimes. Over 660 schools have signed on to the American College and University President's Climate Commitment, pledging to become carbon neutral as soon as possible; many have done so or plan to be carbon neutral within twenty years. These schools are doing what state and federal leaders cannot: enacting relatively quick and meaningful changes to address the very real threat of climate change.

Why are schools taking the lead? According to one survey by the Princeton Review, 69% of college applicants reported that a school's commitment to the environment influenced their decision to apply to that school. In the past year, enrollment in program at Northern Michigan University in- at Northern declined. Students demand,

Sustainability—commonly defined as without compromising the ability of future now embedded in Northern's "Core Values" created the Sustainability Advisory Council. president on sustainability-related matters, operations on campus, and funding for sus- of the group has been to conduct a cam- measurement of everything from Northern's carbon footprint to the affordability of tuition, to the number of faculty who teach and research sustainability-related topics. The purpose of this effort is to get baseline data to track Northern's sustainability performance over time, and to plan initiatives that will help Northern become a recognized leader in campus sustainability.



ment influenced their decision to apply to the Environmental Studies and Sustainability creased by 144% as total student enrollment schools respond.

actions that meet the needs of the present generations to meet their own needs—is and in June 2016, President Fritz Erickson The purpose of this group is to advise the including new academic opportunities, tainability initiatives. One of the first tasks pus-wide sustainability audit—taking careful

More than a marketing strategy, however, a commitment to sustainability is a powerful tool for organizational transformation. Universities are training grounds for the future. As such, they have a responsibility to prepare today's students for the environmental and economic challenges that they will face in their lifetimes. In doing so, schools like Northern can cultivate innovative partnerships with forward-thinking local and regional organizations. Efforts by groups such as Marquette County's Climate Adaptation Task Force, the Northern Climate Network, UPEC, and the many active individuals and organizations associated with grassroots environmentalism in the U.P. demonstrate that our communities will be able to withstand shifts in the national agenda. After all, in the past decade it has been smaller-scale institutions like schools and municipalities that have taken the lead on addressing environmental problems like climate change. Mayors of major U.S. cities like Rahm Emanuel of Chicago have joined the United Nation's Compact of Mayors to help achieve emissions goals outlined in international climate accords, and cities like Burlington, Vermont now run on 100% renewable power. These efforts demonstrate the power—and the necessity—of decentralized action and local leadership.



Sarah Mittlefehldt teaches in the Department of Earth, Environment and Geographical Sciences at Northern Michigan University. Her research focuses on the history of environmental policy related to public lands and renewable energy. Professor Mittlefehldt is currently co-chair of Northern's Sustainability Advisory Council and she looks forward to becoming more involved in the U.P.'s vibrant environmental community.

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with floods and erosion becoming more common, as well as late summer drought.

The abuses fostered by the lumber era motivated the development of the American forestry movement and motivated an intense debate over the relationships between water and deforestation that transformed American conservation. From the earliest years of American forest conservation, the purpose of forestry was not only to produce timber, but also to protect watersheds. When local citizens



Little Portal - Pictured Rocks National Lakeshore

complained about pollution from growing industries such as logging, pulp and paper, and mining, they weren't ignored. Rather, governments eager for economic development partnered with scientists who believed pollutants essentially stayed in place, so they would remain local concerns that could be managed with local agreements. State and provincial experts could partner cooperatively with industry, encouraging the adoption of technologies that would contain pollution enough to allow jobs and communities to thrive.

After World War II, new persistent, mobile, synthetic contaminants such as DDT, toxaphene, and PCBs were produced and released in extraordinary quantities, and Lake Superior, like other northern ecosystems, became a sink for pollutants that had traveled thousands of miles. In the late 1950s, new understandings of mobility and global interconnections began to change the conversation about pollution and its spatial relations to centers of development. Local concerns became global concerns, and global concerns

became local concerns. Governance institutions struggled to adapt, and those challenges persist, particularly for the indigenous peoples around the basin who eat contaminated fish.

How can communities help sustain the health of Lake Superior, in the face of global warming, invasive species, and emerging chemicals of concern? The challenges facing Lake Superior are many--yet local, regional, and international communities overcame enormous threats to the watershed in the past century. We have much to learn from the conservation recoveries of Lake Superior over the past century, as we face new interconnected challenges of climate change, synthetic chemicals, and forest change. We need action at many levels: individual consumers working to pressure global corporations to make real changes; and local and tribal governments working with the states, nations, and the International Joint Commission to pressure Canada and the United States into concrete actions to uphold the Great Lakes Water Quality Agreement. Lake Superior's history teaches us that human histories are intimately linked to the watershed, and the quality of water determines the quality of life.



Nancy Langston is Professor of Environmental History at Michigan Technological University. She has also worked as a forestry professor, and as the King's Professor of Environmental Science in Umea, Sweden. Nancy has written three books and dozens of articles, and is

now completing a book on Lake Superior's environmental history titled *Sustaining Lake Superior*.

UPEC's Mission

"As the longest serving environmental organization in Michigan's U.P., the Upper Peninsula Environmental Coalition (UPEC) strives to preserve the unique cultural and natural resources of the Upper Peninsula through public education, the promotion of sound land stewardship, and reasoned dialogue with communities, governments, industries and others with whom we share this land."

Ways to Support UPEC

Consider contributing to UPEC (including the Mining Action Group) in honor or memory of a special friend or loved one. When you make a gift on behalf of another person, we will send an acknowledgment of the gift to that person or his/her family, so please enclose mailing information. When you contribute on behalf of someone else, encourage them to become a UPEC member through your gift. Do you or someone you know have a wedding or other special celebration in the future? Consider making it a "green occasion" by designating UPEC as a recipient of honor gifts.

UPEC has a JustGive link at its website that can help you to do this.

Thank You!

Historical Synopsis of Environmental Factors Affecting U.P. Brook Trout by Bill Ziegler



Michigan is blessed with numerous cold and exceptional water quality trout streams. The state has over 38,000 miles of rivers and streams of which over 12,500 miles are classified as trout streams. The majority of U.P. streams support brook trout populations, which are native to Michigan. The geology of the state is a major factor. Deep glacial till is the prime geological formation to support strong ground water input to and optimum water quality of the streams. This leads to a stable yearly flow regime without significant summer warm-ups, slightly warmer winter water temperatures, and rare flood events - in short, ideal habitat for trout. The Northern central portion of the Lower Peninsula (Grayling area) and the Southwestern U.P. (Iron and portions of Dickinson Counties) feature these ideal geological conditions.

Historically little occurred environmentally prior to “European development” to significantly affect brook trout habitat on a large scale. Fur trapping to support foreign fur markets would have removed beaver that generally degrade trout habitat conditions in the relatively low gradient U.P. streams. It has been said that brook trout and beaver cohabited for thousands of years, and in a sense that is true. One important point is that most U.P. stream watersheds and stream riparian zones were dominated by climax tree species like maple, hemlock, and cedar. Beaver can only maintain very limited populations in streams running through climax tree species and conifer forests. They need early successional tree species like aspen and tag alder to build up their populations. Pre-development beaver populations were fairly low, as indicated by their severe depletion through relatively crude and non-mechanized trapping efforts with difficult access.

Brook trout fishing across the U.P. was generally reasonably good pre-development. A book that sheds considerable light on that is *Trouting the Brule*, written in the

1870's by anglers from Chicago who traveled the Central and Southwest U.P., trout fishing by canoe with Indian guides. They describe good trout fishing in a number of rivers that are considered marginal trout waters currently, and a couple of streams that are currently non-trout waters. It is not clear entirely what changed although some of those rivers on the Menominee River Watershed did have considerable development of hydro dams and reservoirs during the period from about 1900 to 1953 on the Menominee Watershed.

The first human “development” to significantly affect watersheds and trout habitat was the logging activities entirely aimed at pine stands across the U.P. The initial logging activity in most U.P. watersheds occurred post civil war in the 1870's. Pine logs were the desired tree to provide building materials for the saw mills and it was the only wood that could be floated down the rivers to the mills. This was important since there was no developed transportation system present in the U.P. Pine logs were



Log drive of pine logs down trout tributary streams were a widespread occurrence in the U.P. (Dickinson County Soil Conservation District photo)

driven down most mainstream rivers, as well as with many of their tributaries. For example, log drives occurred on at least 30 of the named Michigan streams, in the Menominee Watershed (largest in the U.P.). It is important to remember that the pine logging was “spotty” across the landscape since pine dominated tracts were only present on a portion of any watershed.

Although pine harvest and log drives undoubtedly had an effect on trout rivers, George Premo (noted U.P. outdoorsman and conservationist) wrote that many Iron County streams, such as the Fence River, remained as good trout streams after pine logging and drives had run their

Edward O. Wilson, *Half-Earth: Our Planet's Fight for Life* (2016)

A Review and Reflection by Jon Saari

Environmental activists are often down in the trenches, fighting the latest industrial threat or regulatory capture or political myopia. We need to come up for air more often, to breathe in visions, ideas, assessments of where we are on these seemingly endless battlegrounds.

Edward O. Wilson is one voice we should listen to and reflect upon. One of the world's preeminent biologists and naturalists (ants are his specialty), he has frequently crossed over from scholarship to activism on behalf of nature. Now in his eighties, this latest book, *Half-Earth*, is both an assessment and an appeal: an assessment of how our human species has created a global endgame for the estimated eight million species in our biosphere, and an appeal that we mend our ways and give the rest of life the space and security it needs to thrive.

The Endgame of Extinction and Numerical Targets

The idea of an endgame is useful. We know biodiversity is slipping away, but have not had targets to know what it might mean to slow the rate of extinction and "win" this endgame. Wilson gives us numbers, based on field-tested theories that correlate areas of suitable habitat with sustainable populations of species. Protecting half of the earth's surface, it turns out in the modeling, would permit about 85 percent of planetary species to survive and evolve. But it has to be the right Half-Earth that would be set aside in "inviolable natural reserves" to potentially achieve this outcome.

Almost all countries on the planet have set aside some protected lands; the total is about 15 percent of the Earth's land, far short of what is necessary to win the biodiversity endgame and avoid the irreversible shredding of the web of life. Wilson assumes that the majority of additional protected lands will be restored areas that have been cleansed of invasives and returned to a less disturbed pre-human landscape. This would need to be accomplished steadily over the next century. Developments favorable to this outcome are the expected stabilizing of the world's population around year 2100, and the digital revolution that is reducing the human ecological footprint.

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The U.P.'s Protected Area: 46 Percent and Growing

The concept of half-earth caught my attention because the region we call home, the U.P., is not very far from this goal. Bob Archibald's inventory of protected lands documents that the Upper Peninsula is currently at 46.9 percent. By far the largest share of that is public lands (97 percent), the smaller share is private conservancy lands (three percent). The public lands date back to the 1920s, and most conservancy lands only to the 1990s. While all these lands preclude settlement and crop agriculture (some do permit the growing and harvesting of trees), even the most restrictive federal wilderness areas permit human activities, from non-motorized recreation to hunting and fishing. Whether highly restrictive or less restricted (such as the state and federal forests), all these lands are dedicated in part to conservation values: the protection of water, the fertility of soil,

the preservation of wildlife habitats, the promotion of biodiversity.

Most of the U.P. is heavily forested, meaning that it is a permeable landscape. Wildlife have many choices about where they may want to live and establish territories: more or less remote wildlands; interior or edge habitats; close or distant to human camps, small towns, or cities; proximity to water bodies, shorelines, and wetlands. The whole U.P. is in a sense a large corridor for wildlife migration. Although there are still large clear cuts and tree plantations on industrial forestlands, gone are the days of the Great Cutover when woodpeckers were advised by pundits to carry their lunch with them, as they wouldn't find anything to eat for miles in any direction. The restoration of these cut-over lands has

given us the legacy of the national and state parks, forests, and wildlife sanctuaries; they are the core of our protected lands. We only need to make sure that this legacy is valued and improved, not degraded and squandered, as it once was.

Population of the U.P. Steady for Over a Century

The U.P. has almost one-third of Michigan's land but contains only three percent of its population. Even though the U.P. is connected to the larger world, which consumes its minerals and timber products, its small population means less pressure on its landscape for housing, food, and infrastructure. Imagine the pressure on resources if the pop-



Spring Freshet

ulation dramatically increased, as in Austria and Taiwan, which are similar in area but have respectively eight million and 23 million inhabitants. We have legacy contamination to deal with from past logging and mining and industrial sites, but so far not incessant new development that swallows and sometimes poisons the non-urban landscape.

Harsh winters, voracious insects, and a boom and bust extractive economy have all had a role in limiting the U.P.'s population to around 300,000 (plus or minus ten percent) over the past century. Of the U.P.'s 15 counties, all but Marquette County lost population in the last census.

Newer migrants are often retirees or young profes-



U.P. camp within State Forest

sionals who are environmentally aware and attracted by quality of life issues, such as outdoor recreation, clean air and water, cultural and artistic offerings as well as hospitals and clinics. The small city complexes (Marquette, Houghton, Escanaba, Sault Ste. Marie, Iron Mountain, Ironwood) are more likely to offer these amenities, while the small towns suffer a comparative disadvantage and more out-migration.

In Wilson's perspective, not only a steady or declining population is important, but also the smaller ecological footprint achievable through the digital revolution. "Teleconferencing, online purchase and trade, e-book personal libraries, access on the Internet to all literature and scientific data, online diagnosis and medical practice, food production per hectare...raised by indoor vertical gardens with LED lighting...and...the best available education in the world free online to anyone, anytime, anywhere. All of these amenities...will yield more and better results with less per-capita material and energy, and thereby will reduce the size of the ecological footprint." (Half-Earth, p. 192)

The Cultural and Moral Shift

But more is needed than favorable demographics and a new digital economy. Humans must want to save the rest of life on its terms rather than continue to appropriate it only to serve human purposes. Wilson calls this latter perspective the Anthropocene (human-centered) worldview and sees it as a suicidal path. For him each human is insepa-

rable from the biosphere, that thin envelope on the surface of the earth that is the habitat for all of life. Each one of us inherits in our bodies 3.8 billion years of evolution on this planet, an epic history of all species that is our past and also our future. Wilson believes that once we understand our deep history and present predicament, we will opt to back off from activities harmful to the biosphere. He captures all this in one prescient sentence: "The biosphere gave rise to the human mind, the evolved mind gave rise to culture, and culture will find the way to save the biosphere." This is the pathway for humanity's collective salvation.

But one sentence is not convincing enough for most readers. Wilson devotes the middle portion of his book, between *The Problem* and *The Solution*, to *The Real Living World*. Here he lays out the full dimensions of the biosphere, and explodes the view of nature held by most amateur naturalists, this writer included. He discusses the unknown webs of life, the wholly different aqueous world, and the invisible empire of microorganisms. He takes us to microorganisms down below the seabeds and up on dust particles high in the atmosphere. He sketches in the vast unknown numbers of microscopic invertebrates, up to six million species, that provide the texture and infrastructure of life. Life in the oceans of the world, still wild and unbounded, seems almost like from another planet.

To inventory and understand all these species, Wilson projects, will occupy scientific naturalists into the 23rd century. This totality is much more complicated than the human brain, but we will need artificial intelligence and whole brain emulation projects to help us encompass it. Once we can understand life in all its intricacies, we will have come to know the biosphere on Planet Earth as our homeland, the place where we ultimately belong. Such is Edward O. Wilson's vision and commitment. Half-Earth is the means and pathway to fulfilling that vision. And it is not so remote or abstract or idealistic that it can't be grasped from our observation point on the south shore of Lake Superior. Activists are on the right path; we just need to set our sights higher to reflect the full magnitude of the biodiversity crisis.

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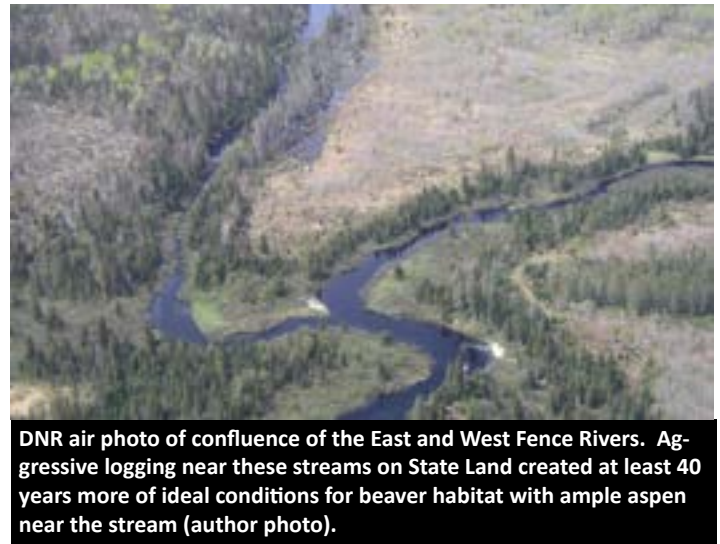
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Extensive clear cut logging of climax forest hardwood (maple etc) and riparian conifer had a very detrimental effect on UP trout watersheds. Many of the cut over slashings subsequently burned further degrading those watersheds. (US Forest Service - USFS photo)



DNR air photo of confluence of the East and West Fence Rivers. Aggressive logging near these streams on State Land created at least 40 years more of ideal conditions for beaver habitat with ample aspen near the stream (author photo).

course. He indicated that significant decline in the brook trout fishery followed the extreme clear cutting of hardwoods (maple, etc) and lowland conifers adjacent to streams that occurred after the pine logging period was over. Generally, this follow up clear-cut logging ran from about 1900 till the 1940's. It is interesting to note that the Fence River Watershed's historical reputation as an outstanding trout fishery still has not recovered. It has remained aggressively logged industrial and State Forest land since it was initially logged over in the early 1900's. DNR trout population surveys on the East Fence and Fence Rivers reveal that although those rivers have excellent

trout habitat, the trout population is relatively low. This is in large part due to warmer mainstream average summer water temperatures (above levels brook trout can tolerate) and limited access by trout to critical tributaries that provide cold water summer refuge and spawning habitat. Though it is not an exact comparison, DNR population surveys in Western Iron County on trout streams that largely run through the Ottawa National Forest (NF) reveal some of the highest trout densities in the State of Michigan. Although forest management practices on the Ottawa National Forest have not been perfect, overall the logging in the watersheds of those trout streams has been much

less aggressive subsequent to the initial cutover in the early 1900's. Relatively speaking, many of the trout stream watersheds in the Ottawa NF have reasonably recovered. and much of the softwood (conifer) logging needed to be transported by rail because those wood species would not adequately float. Numerous spur lines and narrow gauge rail systems were set up to link log transport to the rail mainlines and the lumber mills. High demand for lowland conifers, such as cedar and tamarack, to provide timbers in mines resulted in extensive cutting along trout streams. It is still having long term effects on many trout stream corridors that were converted from shaded and relatively beaver resistant waters to degraded streams, many of which are lined with significant amounts of tag alder and aspen that now support very high beaver populations. Well-documented research has shown that excessive beaver dams greatly degrade trout habitat. In addition some mining had very detrimental affects on specific trout streams from acid mine water runoff and other mine input to trout streams. Trout and aquatic organism populations downstream of



Mining also had a significant detrimental effect on UP trout streams where ore deposits were found. This is an air photo of the confluence of the Iron (polluted) and Brule Rivers (clear). The trout stream degrading pollution was caused by large outfalls of acid mine water into the Iron River near the town of Iron River. (early 1970's DNR photo).

the city of Iron River, Michigan - in the noted brook trout stream, the Iron River - were largely wiped out in 1963 when a local mine pond failed. Although trout populations in the lower Iron River have recovered somewhat, remaining acid mine water input still likely limits trout populations from reaching their full potential.

Non-native fish species were widely introduced in the U.P. during the late 1800's through the early 1900's. Although that had an impact on some lakes and non-trout streams, it was not a major problem for U.P. brook trout streams. Some trout enthusiasts really believe that the

non-native brown trout will always displace native brook trout. Although some of this occurred in the Lower Peninsula this did not occur in many streams in the U.P. Brown trout were widely introduced in UP streams. For reasons not entirely understood by fisheries researchers, brown trout only established self-sustaining populations in a very limited number of U.P. Streams (about 6).

A number of other man-made factors still affect U.P. brook trout. Road crossings (especially culverts) and historical man made dams typically have a detrimental affect on brook trout streams. Relatively new Michigan DEQ regulations limit building new man-made dams on trout streams. Although many man-made dams still block trout movement and degrade trout habitat, some are being removed as they age and fail. Considerable effort has been put into educating road builders about proper installation of road crossings that allow for critical trout movement.

Climate change is also major threat to U.P. brook trout. I presented a trout habitat paper at a trout professional conference about 20 years ago. At that conference U.S. EPA researchers warned of coming losses in streams that would support trout across the Northern U.S., including the U.P. Over the course of my 35-year fisheries career, I have observed declines in significant sections of trout mainstreams in my former management unit. The noted trout streams of the Paint and Brule Rivers in Iron County lost about 50 miles of river that supported trout during the last 35 years. Fortunately, at this point, strong ground water stretches of the South Branch of the Paint River and its tributary, Cooks Run, are still supporting strong trout populations throughout the year.

Overall many U.P. brook trout fisheries remain relatively good, although climate change combined with many of the factors described above threaten their quality, especially in those without strong ground water input.

Bill Ziegler graduated from the University of Michigan School of Natural Resources with a B.S. Degree in Fisheries. He worked as a federal fisheries biologist in the Upper Peninsula of Michigan, Northern Wisconsin and Minnesota, the Upper Great Lakes, and Middle Mississippi River. Recently retired, he spent the last 24 years as a Michigan DNR fisheries management biologist in Crystal Falls, Michigan. Ziegler now writes for the Iron Mountain Daily News Outdoor Page and two Michigan outdoor magazines. He enjoys fishing, hunting, and numerous silent sports with his family in the Upper Peninsula.

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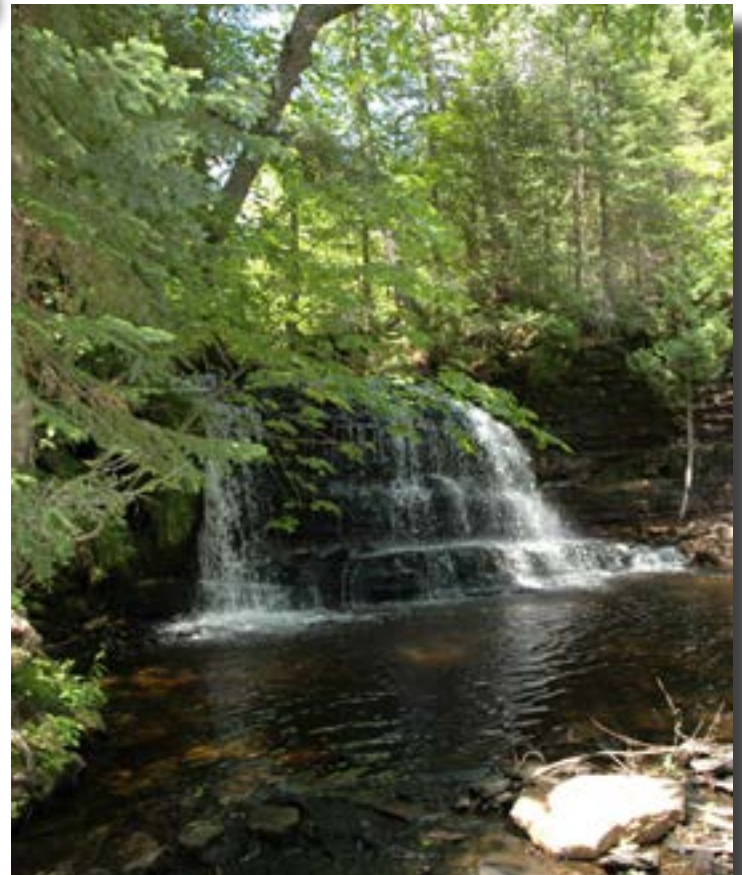


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