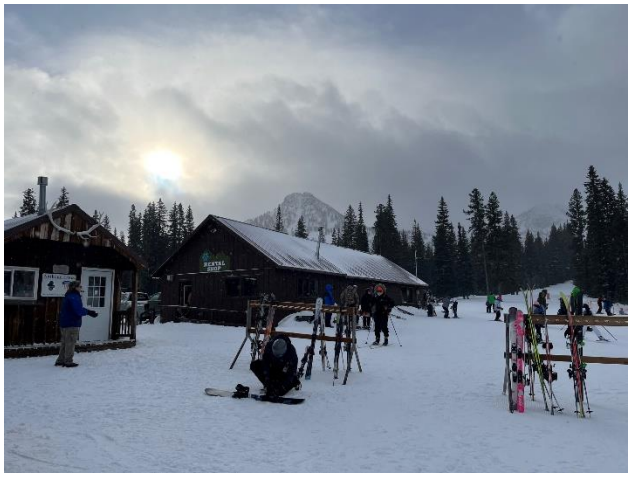
Winter 2023



Skiing in Oregon's Blue Mountains.

Punxsutawney Phil may have seen his shadow, but here in southwest Idaho it had recently felt like spring was well on its way. That is until yesterday afternoon when a snowstorm blew in! I was enjoying the warm sun and dreaming of time on non-frozen water… oh well.

There is some good stuff in this issue of the newsletter: Section news, updates on U.S. Environmental Protection Agency actions, water in the news, water reuse in Israel, water quality in Ohio rivers, and information about fish kills. Note that we're looking for new Section officers and for contributions to a symposium at the annual American Fisheries Society meeting. Please consider contributing to one or both. Membership involvement is what makes it all work.

- Paul Kusnierz

Officers' Elections

Elections for President-Elect and Communications Officer are coming soon. Information about both positions can be found at (https://waterquality.fisheries.org/bylaws/). If you would like to throw a name in the hat, please contact pkusnierz@alumni.nmu.edu.

Water Quality Section Symposia for the 2023 AFS Meeting

The American Fisheries Society (AFS) Annual Meeting will be held in Grand Rapids, Michigan August 20-24, 2023. The Water Quality Section is sponsoring a symposium, "Modeling Linkages Between Clean Water Act Administration and Fisheries Management"' organized by Jonathan Leiman, Paul Kusnierz, and Yetta Yager. The abstract for the symposium is as follows:

The Clean Water Act supports a variety of designated uses, fisheries are one of the most pronounced in terms of their ecological and socio-economic value. Therefore, administrators of the Clean Water Act have an interest in enumerating linkages necessary to mend water quality habitat models (e.g. TMDLs) with commercial, recreational, and conservation fisheries models used by natural resource agencies. Coupling water quality and fisheries management models can be done by identifying: (1) regulatory initiatives (e.g. environmental justice, toxins in fish tissue, stormwater management), (2) natural resource policies and (3) data generated by these activities. This symposium will seek to cultivate these three links between Clean Water Act administrators and fisheries professionals. If there is enough interest, sessions will be broken out by waterbody type (small lakes and impoundments, large lakes and impoundments, streams and rivers, estuaries, open ocean, etc.).

Please consider contributing an abstract to the symposium and encourage your students to participate and become eligible for the WQ section poster award. This symposium will provide a forum to:

- collaborate on applied science between AFS and the Association of Clean Water Administrators (ACWA) members;
- discuss operational concerns;
- share technical information;
- collaborate on research interests.

Additionally, other AFS sections, water quality-focused organizations, and government agencies are being invited to participate.
Please contact Jonathan Leiman (jonathan.leiman@maryland.gov), Paul Kusnierz (pkusnierz@alumni.nmu.edu), or Yetta Jager (myjgoo@gmail.com) if you are interested in helping with or contributing to the symposium.

Water News

USEPA Denies Permit for the Pebble Deposit Area

On January 20, 2023, the USEPA finally denied a Section 404(c) permit for Northern Dynasty Minerals to dispose of mine wastes in the Bristol Bay headwaters because of the potential adverse effects of those wastes on Bristol Bay's world-class fisheries. That decision was preceded by decades of environmental assessments, litigation, and reversals between Democratic and Republican federal governments, as well as multiple comments on those documents from AFS and AFS subunits. For more information, see: https://www.epa.gov/bristolbay/final-determination-pebble-deposit-area

USEPA and USACoE Define Waters of the United States

On January 18, 2023, the USEPA and USACoE published their final revised definition of what constitutes the waters of the USA. The new rule ends decades of litigation, alternating rules between Democratic and Republican federal administrations. It is more science-based than the preceding rule, but is less protective of non-permanent waters than their ecological roles merit. For more information, see: https://www.epa.gov/system/files/documents/2023-01/Revised%20Definition%20of%20Waters%20of%20the%20United%20States%20FRN%20January%202023.pdf

Consuming Freshwater Fish likely results in PFAS exposure

https://www.smithsonianmag.com/smart-news/freshwater-fish-contain-harmful-forever-chemicals-180981467/

New Hampshire Fish Hatchery will be Upgraded to Reduce Pollution

https://apnews.com/article/new-hampshire-fish-pollution-water-quality-8b75d9cce2f80aa81525df4452dc7419

Colorado River Drought

https://www.washingtonpost.com/climate-environment/2023/02/05/colorado-river-drought-explained/

Water Quality Improves in the Middle Scioto River and Lower Olentangy River, Ohio

Midwest Biodiversity Institute (MBI) announces the release of a major report on the historical ecological success story of Central Ohio's two major rivers. This report is titled: *Biological and Water Quality Assessment the Middle Scioto River, Lower Olentangy River, and Selected Olentangy Tributaries 2020: Including a 50 Year Retrospective Analysis of Available Biological and Water Quality Data. Franklin and Pickaway Counties, Ohio*. It is a major milestone in the management and assessment of rivers and streams as affected by 50 years of Clean Water Act (CWA) implementation by private, local, state, and federal agencies and organizations.

One of the most important lessons learned from examining 50+ years of monitoring results in the Scioto River mainstem is that the CWA-mandated reductions in loadings of sewage pollutants from the Columbus sewer system via water quality-based permitting resulted in water quality improvement sufficient to allow for what is essentially a full biological recovery. This recovery happened despite the serious doubts about the treatability of sewage and attainability of the biological goals of the CWA that prevailed at the time they were first introduced in 1972.

Water pollution was documented in the Scioto River as far back as the 1880s and it took

more than a century before sufficient actions to reduce pollution enough to fully meet CWA goals actually took place. Part of the delay was due to the costs of wastewater treatment and the almost constant pursuit of the engineering technology that was required to reduce pollutants to the levels necessary to meet the 1972 CWA goals. These achievements did not come easily nor without a significant expenditure of public funds at the federal, state, and local levels. The consequences of the original doubts about the efficacy of advanced wastewater treatment and the attainability of CWA mandated water quality standards (WQS) in an effluent dominated river were exemplified when the Scioto River was proposed as a limited aquatic habitat in the 1978 WQS (i.e., Limited Warmwater Habitat). This designation represented a lower water quality goal than that envisioned by the 1972 CWA and it was disapproved by U.S. EPA in 1978, which illustrated the critically important role of federal agency oversight of state and local actions at that time. Once it was demonstrated to be achievable and effective by sustained biological monitoring, advanced treatment became the accepted minimum technology for municipal wastewater discharges in Ohio and much of the U.S.

Perhaps the most unheralded part of the demonstrated success of water quality-based permitting are the contributions made by the individuals that were directly involved in achieving improved wastewater treatment by the City of Columbus. This includes people in the city, state, and federal agencies and private sectors that were involved in debating and making the policy decisions, setting the WQS, developing the permits, designing the treatment facilities, and financing the capital improvements. However, its success also depended on the water utility rate payers and advocates for improved water quality, all of whom can take a share of the credit for the resulting improvements that all can enjoy today. The sum total of these accomplishments is the legacy left to today's counterparts to protect and uphold. The extent of improvements in recreational opportunities have tracked that of the fish and macroinvertebrate assemblages as evidenced by an increased use of the river for fishing, canoeing, kayaking, and related forms of recreation including multiple new public access points, trails, recreation areas, and new organizations dedicated to improving access to these benefits within the greater metropolitan area.

For more information about the water quality of the Scioto and Olentangy rivers, visit: https://midwestbiodiversityinst.org/publications/reports/biological-and-water-quality-assessment-the-middle-scioto-river-lower-olentangy-river-and-selected-olentangy-tributaries-2020

- Chris Yoder
Research Director, MBI

United States Environmental Protection Agency Water Reuse Delegation in Israel

Water reuse is one potential method for regaining assimilative capacity for water quality models (e.g., fish habitat models like total maximum daily loads), assist dischargers with permit compliance, and potentially reducing energy consumption. The U.S. Environmental Protection Agency (U.S. EPA) co-lead a water reuse technology tour in Israel October 31–November 4, 2022. The tour was a collaboration among the U.S. EPA, WateReuse, the U.S. State Department and the State of Israel. The U.S. EPA provided delegate spots for state regulators to help disseminate components of the Water Resource Action Plan. Along with Maryland, regulators from New York, Oklahoma, and Texas were present. Jonathan Leiman of the Maryland Department of the Environment was selected as one of 40 delegates for the tour. The tour and associated tasks are a component of the National Water Reuse Action Plan, which is the U.S. EPA's policy framework to increase water reuse in the United States (https://www.epa.gov/waterreuse/national-water-reuse-action-plan-online-platform?action=11.1). Some key takeaways from the tour include:

1. Manage water as a resource, and not as a liability; diversifying water supplies increases

resilience. For Israel, water scarcity, food security, energy costs and a constant existential crisis are drivers to reclaim water resources.

2. Evaluate volumetric water loss across macro and micro networks when modeling water reuse potential. In Israel, the water source (i.e., primarily desalination), and the reuse of that primary resource (mostly for agriculture) are paired at various scales.

3. The nature of the source will influence the character of the reclaimed water. Reuse is determined by source characterization, and combinations of treatment to meet the application.

4. Agricultural cooperatives are potential markets for reclaimed water. Water reuse can help stabilize socio-economic strife by making agrarian communities economically stable, whereas if a reclaimed water product were not available, a community may not be economically viable.

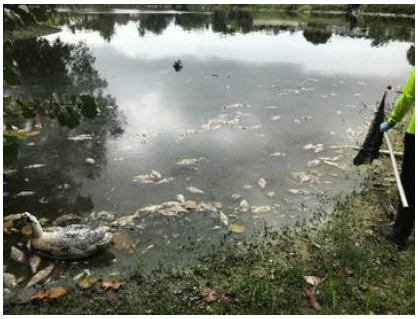
5. Research (e.g., crop testing) is needed to evaluate the end-user/product suitability, because end user acceptance (via regulatory screening) of reclaimed water demands innovation. In Israel, creating a reusable water product that is stable in quality and quantity has been critical for the product to be accepted on the water market in Israel.

Press release from WaterReuse:
https://watereuse.org/watereuse-leads-successful-delegation-to-israel/

U.S. EPA summary of the delegation:
https://www.epa.gov/waterreuse/water-recycling-israel-us-lessons-israels-water-reuse-approach

- Jonathan Leiman
Water and Science Administration, Maryland Department of the Environment
Jonathan.Leiman@maryland.gov

Understanding South Florida Fish Kills



Few things create as much alarm for homeowners living on a lake than being greeted by the sight of numerous dead fish floating behind their home first thing in the morning. The image generates thoughts of toxic chemicals and water pollution but although man caused fish kills do happen, they are more of an exception than the norm. Initial thoughts are often to blame those who work to control algae and aquatic weeds, but licensed applicators are trained to work in balance with the aquatic environment. They follow strict regulations and take precautions like avoiding treating when oxygen levels are low, and breaking larger treatments up into multiple smaller ones over time to avoid oxygen depletion from large quantities of decomposing vegetation at once. Hundreds of fish kills, on average, are reported annually in Florida and the vast majority are due to natural causes. For some lakes it can be a regular occurrence every year, for others it may be a rare response to particular weather conditions or fish populations.

Although we do occasionally get weather cold enough to affect certain populations of fish in our lakes, most fish kills in South Florida occur during our rainy season when temperatures are hotter. Cold weather fish kills tend to affect populations of non-native fish that are not able to adapt to the occasional temperature fluctuations like our native species. Peacock bass are an example of a non-native fish in our lakes that are particularly sensitive to cold weather. One of the most common culprits behind our kills is lack of sufficient dissolved oxygen in a lake.

Another cause of fish kills in late summer and early fall is a phenomenon called lake turnover. During the summer the water in our lakes separate into two layers. The sun warms the surface but can only penetrate so deep. The cooler water, out of the suns reach, is denser and

begins to collect at the bottom with a layer of warmer, less dense water on top. This process is called stratification and the boundary between the cooler and warmer layers is called the thermocline. The top layer is where the oxygen is since that is where the lake has interaction with the atmosphere and sufficient sunlight for photosynthesis. Heavy rain events are common occurrences during our south Florida Summers. They dump large amounts of colder water into lakes, breaking the thermocline and mixing the low oxygen waters at the bottom with the oxygenated waters at the top. This rapidly spreads the available oxygen across the entire water body, resulting in levels too low to support fish. Extended periods of heavy wind can cause the layers to mix through turnover as well.

Even if it's never happened in a particular lake, a fish kill can occur if the correct conditions are present. Our lakes are not controlled like swimming pools. Things like water quality, usage, volume, nutrient inputs, and plant and fish populations change as the water body ages. Limiting excess nutrient inputs and installing aeration systems to reduce stratification can help reduce the chances of a fish kill, but they can still happen. Fortunately, it's unlikely that a naturally occurring fish kill will completely wipe out fish populations in a given lake and most rebound completely within a season or two. Being observant and educated about your lake and the conditions that affect it can help you to understand the difference between an unfortunate natural occurrence and a serious environmental concern.

- Stephen Montgomery
Allstate Resource Management, Inc.
info@allstatemanagement.com

Recent Member Publications

The most up to date list can be found at: https://waterquality.fisheries.org/wp-content/uploads/2023/02/Water-Quality-Section-Publications_2.14.23.pdf

Qu, X., J. D. Olden, W. Xia, H. Liu, Z. Xie, R. M. Hughes, and Y. Chen. 2023. Hydrology and water quality shape macroinvertebrate patterns and facilitate non-native species dispersals in an inter-basin water transfer system. Journal of Environmental Management 329:117111.

Salvador, G. N., R. M. Hughes, F. Vieira, R. Ligeiro, and L. F. A. Montag. 2023. Mine tailings storage dams modify upstream headwater fish assemblages. Water Biology and Security 2023:100136

Feio, M. J., R. M. Hughes, S. R. Q. Serra, S. J. Nichols, M. Callisto, D. R. Macedo, J. Harding, A. G. Yates, O. N. Odume, M. J. Baek, N. Mercado-Silva, K. Nakamura, Y. Jae, K. Chen, I. Campbell, R. T. Martins, F. O. Arimoro, B. J. Kefford, N. Moya, R. Devi, U. N. Keke, M. Lintermans, C. B. M. Alves, W. Monk, T. Mori, P. S. Pompeu, W. Robinson, D. N. Shah, and M. Sueyoshi. 2022. Fish and macroinvertebrate assemblages reveal extensive degradation of the world's rivers. Global Change Biology 29(2):355–374.

Kaufmann, P. R., R. M. Hughes, S. G. Paulsen, D. V. Peck, C. W. Seeliger, M. Weber, and R. M. Mitchell. 2022. Physical habitat in conterminous US streams and rivers, part 1: Geoclimatic controls and anthropogenic alteration. Ecological Indicators 141:109046.

Kaufmann, P. R., R. M. Hughes, S. G. Paulsen, D. V. Peck, C. Seeliger, T. Kincaid, and R. M. Mitchell. 2022. Physical habitat in conterminous US streams and rivers, part 2: Quantitative assessment of condition. Ecological Indicators 141:109047.

Mostafavi, H., A. Teimori, and R. M. Hughes. 2022. Habitat and river riparian assessment in the Hyrcanian Forest Ecoregion in Iran: providing basic information for river management and rehabilitation. Environmental Monitoring & Assessment 194(11):793.

In Closing

I hope that there was something in this issue for everyone. If you found it missing something that you'd like to see, please let me know and we'll get it in the next one!

Take care,

Paul Kusnierz
President, Water Quality Section, AFS
pkusnierz@alumni.nmu.edu

Section Webpage:
https://waterquality.fisheries.org/

Facebook page:
www.facebook.com/AFS-Water-Quality-Section-369954383031160/
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