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Addressing Chemicals of Emerging Concern (CECs) in the Great Lakes Region 2020-2021

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Executive Summary

The Great Lakes play a critical role in providing drinking water, transportation, recreation, and livelihoods for the millions of people in the Great Lakes basin. Yet, the health of the Great Lakes is in great danger, as chemicals of emerging concern (CECs) are being detected more and more frequently in Great Lakes water. CECs refer to a long list of compounds that are unregulated, yet are suspected to pose health threats to humans and wildlife. To address this urgent issue, the Graham Sustainability Institute Scholars program partnered with the National Wildlife Federation (NWF) Great Lakes Regional Center to investigate what is currently known about CECs and to develop recommendations for stronger chemicals management in the Great Lakes region. Each scholar was assigned a topic to research, and together compiled a report that covers the following topics: uses and sources of CECs, human exposure and effects, community concerns, research and monitoring programs, regulatory programs, non-regulatory programs, and recommendations. This research was conducted through literature reviews, online searches, and stakeholder interviews.

Our research found that current CEC management practices are insufficient in preventing and addressing CEC contamination. This inadequacy stems from a lack of collaboration across programs, an absence of comprehensive CEC research, and slow regulatory processes, among other reasons. To address these challenges, we created a number of recommendations, which include the following:

- Manage and assess CECs in classes, rather than on a chemical-by-chemical basis
- Expand the range of involved stakeholders in the chemicals management process
- Increase collaboration and communication between the U.S. and Canada, government agencies, research institutions, and other key stakeholders
- Expand research efforts to further investigate CEC cycling, breakdown products, health effects, green chemistry solutions, and environmental remediation practices
- Industry should be more transparent about sustainability goals and be open to participating in third party self-regulating programs

We anticipate that this report will be available for public use, or that it will aid NWF in producing a more comprehensive report for public use. With this report, we aim to increase public awareness and understanding of CECs. Additionally, we hope that our recommendations are used by stakeholders, including NGOs, policymakers, government agencies, and industry, to make more informed decisions regarding CEC management.

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Introduction & Background

Chemicals of emerging concern are a group of chemicals broadly defined as synthetic or naturally occurring chemicals that are not commonly included in monitoring programs, not widely regulated by government agencies, occur persistently in the environment, and pose a potential risk to human or ecological health. Examples of CECs are per- and poly-fluoroalkyl substances (PFAS), pharmaceuticals, detergents and other chemicals used in home cleaning supplies, and chemicals used in agriculture and pesticides.

CECs have several different names and group classifications. For this report, CECs are grouped in the following categories:

- Pharmaceuticals and personal care products (PPCPs)
- Pesticides
- Water disinfection byproducts (DBPs)
- Industrial and household chemicals
- Microplastics and nanomaterials
- Metals

Most CECs come from nonpoint source pollution pathways, making it difficult to track where they are coming from, and how intensely they affect a local environment. When CECs are successfully tracked to point-source locations, government action against polluters is slow and ineffective. Many CECs such as PFAS are bioaccumulative and do not break down naturally in the environment. This causes even more degradation to the environments they are released into and poses severe health risks to wildlife and humans. The Great Lakes serve approximately 48 million people in both the US and Canada for drinking water and support a \$6 trillion economy through tourism and recreation. The Great Lakes are particularly susceptible to CEC contamination due to widespread agricultural and manufacturing industries present in the region disposing of industry waste in the Great Lakes (such as Lake Erie).

Concern surrounding CECs, and particularly PFAS, has heightened throughout the region in recent years. While research and remediation efforts regarding CECs have increased, a monumental amount of work still remains in order to fully understand how CECs interact with the environment, identify priority chemicals or classes of concern, and encourage regulatory action through state or federal legislation.

This report will highlight what is known about chemicals of emerging concern in terms of their usage, risks to fish and wildlife, risks to people, and effects on communities. Additionally, this report will summarize existing tools in place to address CECs, including research and monitoring programs, regulatory programs, and non-regulatory programs. Finally, a number of recommendations will be suggested for a more effective approach to CEC management in the Great Lakes region and beyond.

Methods

The main method employed during our internship was a literature review. We agreed that individual cohort members were responsible for different aspects of the research required for a project of this magnitude. As such, each of the five members chose the topic that most interested them. The topics were divided into categories including sources and cycling of CECs, human and wildlife health outcomes of CEC exposure, regulatory programs, non-regulatory programs, research and monitoring programs, and community concerns. Research tasks were divided as shown in the table below.

Name	Topic
Eden	Sources, Uses, Cycling, Research & Monitoring Programs
Madeline	Non-Regulatory Programs
Georgina	Human and Wildlife Health Effects
Christina	Regulatory Programs
Harry	Community Concerns

The cohort gathered research from peer-reviewed scientific journal articles from various academic databases as well as from the public online resources of leading environmental agencies such as the Environmental Protection Agency, the United States Geological Survey, the Center for Disease Control, and the Michigan Department of Environment, Great Lakes, and Energy, though this is by no means an exhaustive list. The cohort members researching regulatory and monitoring programs cited both state and federal legislation, as well as international agreements between the United States and Canada, who share stewardship of the Great Lakes region. Business and industry initiatives were also discussed as non-regulatory programs.

In order to better understand the needs and struggles of people who reside in the Great Lakes region who are directly affected by CECs, the cohort member researching community concerns also conducted interviews with Cathy Wusterbarth, a contact from Need Our Water (NOW), a local environmental activism organization focused on CEC pollution out of Oscoda, Michigan.

Results and Recommendations

The impact CECs have had on the Great Lakes Region has already been detrimental to both the health and safety of people and aquatic ecosystems. If left unchecked, current CECs could leave a lasting impact on the Great Lakes and the communities that would require significant effort to repair. In light of this, we recommend that more aggressive policy action needs to be taken, through both a governmental lense and through institutions that are most responsible for CEC pollution. We also recommend diverting more research into areas concerning sources, effects, and remediation strategies concerning CECs.

Government and policy action concerning CECs includes strict plans to manage chemical classes and implement product-lifecycle management approaches. This work also needs to be done in unison with affected groups, such as indigenous communities, to foster equitable solutions. In terms of aggressively managing chemical classes, we recommend that the EPA amends the Safe Drinking Water Act to allow for monitoring of over 30 chemicals at a time. Accelerating monitoring and regulatory determination cycles would also help allow data collected in a specific cycle to be used as support for regulatory determinations in the same cycle. Policies should impose third party self regulatory programs for industries such as the auto industry, which provides a large percentage of CEC pollution, in order to hold them accountable and determine mitigation strategies. The communities affected should also be invited to town hall events where they can voice their concerns and have active participation in determining these criteria, as government agencies have been slow to aid them in the past.

Research concerning CECs also needs to be expanded to include health concerns, remediation practices, and how CECs cycle through different environmental media. We recommend forming multi-agency teams to work on this research in order to allow for a larger consolidation of data and more transparency between agencies. Researching the ways these chemicals interact with the environment would allow for more concerted remediation efforts in the future and the ability for agencies to determine which areas are at risk in order to offer protection.

Anticipated Impacts

From the publication of our *Chemicals of Emerging Concern in the Great Lakes Region* report, we expect that our client, the NWF, will be able to utilize our research as a synthesized source of information as the organization continues its effort to protect the Great Lakes. The NWF has been advocating for the conservation and improvement of our nation's water quality since 1937 for the benefit of aquatic ecosystems and human health from small streams to vast iconic areas like the Great Lakes. Therefore, through the collaboration of the NWF and our team within the Graham Institute, we anticipate that our report can help drive the NWF's goal forward to increase monitoring programs and regulation to decrease CEC pollution within the Great Lakes.

Ideally, our paper will contribute to the galvanization of citizens and policymakers alike to learn more about the potentially detrimental impacts of CECs and increase overall awareness of its presence in the Great Lakes region. Ultimately, we hope that this increased awareness will extend into the creation of explicit regulations to limit their pollution levels in our national waters.

Currently, there is still a lot that is unknown about CECs within the Great Lakes and other national waters including their environmental and health effects, monitoring programs, and any existing regulation to limit CEC pollution. Through our research and analysis on the current CEC, we hope that the information surrounding CECs in the Great Lakes become more accessible through our sourced compilation of different policies, programs, and existing regulations of the chemicals.

Therefore, we anticipate that our published report will help progress the initiative to better research and understand the greater impact of CECs internally within the National Wildlife Federation and externally to any Great Lakes region citizens that are interested in learning more about how these contaminants can affect their environment and communities. We hope that our work through the Graham Institute will build upon the momentum to increase awareness and understanding of how CECs can affect the ecosystems and communities of the Great Lakes.