The Great Lakes Water Quality Agreement: Successes and Shortcomings

Yellow Jackets

Detroit Country Day School

United States of America

Maria Cheriyan, Nick Kalkanis, Dillan Lau, Sonya Zhang

Faculty Sponsor: Marc Drougel, mdrougel@dcds.edu

Abstract:

In efforts of restoration and preservation of the Great Lakes, 20% of the Earth's surface freshwater, Canada and America formed the Great Lakes Water Quality Agreement (GLWQA) in 1972, prompting powerful legislation, like the Clean Water Act. Despite many progressive actions to maintain the lakes, specific resolutions were not as effective due to government administration and economic constraints. This project will investigate the successes and failures of the GLWQA, analyzing the legislature economically and politically. To gain a holistic view of the GLWQA's impact, we interviewed water quality administrations, councils, and policymakers on a local, state, and federal level, including local cities' water administrations, Michigan's Department of the Environment, and federal EPA offices. The main questions of the interview focused on understanding how the GLWQA has changed over time, how it affects the interviewee, and the challenges the interviewee faces when working under the GLWQA. In addition to the interviews, we researched the history of the GLWQA. Using the information we gain from interviews and our background research, we propose new resolutions to the current problems under the GLWQA and present them to federal representatives. The project will also increase dialogue between officials in policymaking and the officials following the policies.

Key Words:

1. GLWQA: Great Lakes Water Quality Agreement
2. IJC: International Joint Commission
3. NOAA: National Oceanic and Atmospheric Administration
4. EPA: Environmental Protection Agency

Purpose of the research:

This investigation aims to evaluate the successes and failures of the GLWQA by interviewing organizations at a local, statewide, and national level from the following organizations:

- The Great Lakes Environmental Research Lab (GLERL), a branch of the National Oceanic and Atmospheric Administration (NOAA)
- The Cooperative Institute for Great Lakes Research (CIGLR), a branch of the NOAA hosted at the University of Michigan
- The Great Lakes Observing System (GLOS), a binational nonprofit which manages research on the Great lakes along with the NOAA and the Environmental Protection Agency (EPA)
- The Science Advisory Board (SAB) of the International Joint Commission (IJC) between the United States and Canada to regulate water quality
- Southeast Michigan Council of Governments (SEMCOG)
- Alliance of Rouge Communities (ARC), a local watershed that primarily focuses on the Rogue River, but encompasses other areas in southeastern Michigan.
- Local drain commissioners
- Any other organizations of areas of concern or government relating to the GLWQA

Method of the research:

To understand perspectives and form accurate conclusions about the GLWQA, our team conducted interviews over phone calls with many of the current officials and researchers working at the NOAA's branches – GLERL and CIGLR – and GLOS whose jobs are affected by the GLWQA.

All interviewees were asked seven questions (as well as follow-up questions):

1. Talk about your job and your experience/interaction with the Great Lakes.
2. How does GLWQA impact your job?
3. What are the successes of the GLWQA?
4. What are the shortfalls of the GLWQA?
5. What are the challenges to improving or overcoming those shortfalls?
6. What are the economic impacts under the current agreement?
7. How have government officials operated under the GLWQA, as opposed to before it was in place?

These questions were made concerning our framework of investigation – analyzing the GLWQA from an economic and policy-making perspective.

We used this qualitative research paired with the historical research in our previous paper and additional materials to form conclusions about the nature of the success of the GLWQA.

People our team interviewed include:

Local: Katherine Graham (environmental planner at SEMCOG), Annette DeMaria (executive director of ARC), Jim Nash (water resource commissioner), and Patty Troy (Co-chair of the St. Clair River Binational Public Advisory Council)

State: Ashley Elgin (research ecologist at GLERL), Richard Hobrla (Head of Great Lakes Management Unit within Michigan Department of Environment, Great Lakes, and Energy),

National: Becky Pearson (Chief Operations Officer at GLOS), Peter Alsip (ecological modeling data analyst at CIGLR), John Hartig (IJC), Rose Ellison (US EPA Great Lakes National Program Office), Craig Stow (NOAA)

Results of the research:

Changes over time:

Participants expressed that the GLWQA does not usually change or revise old material over time; instead, the GLWQA expands in scope, adapting to new circumstances and providing for a broader study of the Great Lakes (A.3, C.3). Despite political fluctuations, changes in the United States presidential party, and proposed funding cuts, the GLWQA has remained standing since 1972 (A.4, C.3).

Interpretations of the Agreement are discussed and officially prioritized every three years by the Science Advisory Board (SAB) of the IJC. This supervision allows the implementation of the Agreement to remain flexible and attend to pressing current issues by expanding the scope of research or beginning new research on a certain area (SCIENCE ADVISORY BOARD).

Successes:

When evaluating the successes of the GLWQA, all participants were largely satisfied with the Agreement itself.

The main purpose of the GLWQA was to unify the various levels of government on the affairs of the Great Lakes (J, L). Before the implementation of the GLWQA, the surrounding states and organizations took their stance on water regulations, often resulting in conflict between them or in the direct damage of the Great Lakes (F.3). Participants were grateful that the GLWQA has now allowed for the cooperation of various organizations to protect the Great Lakes, and forced them to adhere to the same guidelines and regulations (F.3). In Oakland County, the cooperation of volunteers and local watershed groups have largely eliminated most point sources in the surrounding area (F.3). On a larger scale, the GLWQA has historically allowed the EPA to act with a concentrated effort to stem pollution problems in the Great Lakes (A.7).

One of the Agreement's strongest points is how scientists can use it to organize information in a standardized way, especially when establishing binational thresholds and targets for pollution levels. During the effort to clean up Lake Erie in the 1980s, the GLWQA-established targets for nutrient loading, a form of pollution, decreased the overall amount of nutrient loading taking place (B.2). Efforts were specifically targeted toward phosphorus runoff. Since the beginnings of these efforts, algal blooms, a direct

result of phosphorus runoff, and pollutants have significantly decreased in the Great Lakes (D.2). These targets remained even after the Erie cleanup effort, helping in the 1990s and further efforts as well (A.3).

Another success of the GLWQA is its flexibility. With regards to technology, the GLWQA does not control specifics or monitor the types of technology any party to the Agreement uses; this allows for easy adaptability to and adoption of new technology. Researchers and staff also appreciate that the rules regarding technology are more open to interpretation for this reason (A.3). Because of this flexibility, further development and innovation in technology have led to areas having some of the best water facilities in the world (D.3). The GLWQA has also been flexible regarding amending the annexes in the agreement. Whenever new challenges arise, authorities have been able to change annexes in the GLWQA to reflect the real issues facing the Great Lakes at any given time (L). The agreement included dozens of annexes when it was first conceived. To date, that number has been shortened to ten, changing to reflect the issues of the Great Lakes today, rather than those of thirty years ago.

Lastly, the Agreement successfully sources funds for water quality issues from many federal programs, including the Great Lakes Restoration Initiative (GLRI); the GLRI is specifically targeted to raise funds for restoration and conservation (C.5). For example, the GLRI has funded the St. Clair River organization, allowing for a great boost of water conservation efforts in the area (G.4). Funding, flexibility, and organization under the GLWQA have resulted in increased delisting, and the removal of an organism from the federal list of endangered or threatened species, in the Great Lakes area (A.7, B.2).

Through achieving all of the above, the Agreement is a strong example of a successful binational agreement. It has remained in place for a long time and has facilitated coordinated government efforts for water cleanup and regulation as well as setting standards in the United States and Canada for water quality research (A.4). Additionally, the regulations under the Agreement require American and Canadian cooperation, ensuring that both America and Canada take responsibility regarding the conservation of the Great Lakes (B.2).

The SAB Advising Report on priorities for science in 2020-2022 commends the United States and Canada

for their collaborative work on stemming the spread of invasive species and monitoring habitats and native species in areas of concern; the GLWQA's call for organization and collaboration in studying species related to the Great Lakes is therefore successful in this area as well.

Shortfalls:

Participants were mostly concerned about the implementation of the GLWQA when evaluating its shortfalls. The GLWQA acts as a set of guidelines or suggestions to adhere to, rather than a set of laws to obey. For the most part, the government has followed the guidelines, but some state authorities fail to enforce them strictly, and some local organizations disregard them (H). For example, several large companies such as Ford are still pouring solid waste into the lakes (D.4). Two of the participants wanted stronger provisions and enforcements for the Agreement; specifically, stronger protections for the Agreement against increasing political pressure to disregard climate change and enforcements and clearly defining the number of fines an offender would have to pay (A.3, C.5). This would uphold the integrity of the Agreement and make it less subject to interpretation during enforcement.

Additionally, there was concern over continued funding for the Agreement's operations. The GLWQA owes its successes to adequate funding, but the GLRI, while effective now, has almost been cut down twice in Congress. Bipartisan support has previously ensured that the GLRI remains fully funded, but an increase in partisanship and political tension during the past few years make the GLRI's position less stable (B.4, C.5). For example, SEMCOG has not been able to take on many high-scale projects, as the current administration has limited the funding for the GLRI (D.4). However, another participant expressed that the GLWQA's long history and previous successes protected it from political attacks and efforts to decrease government funding (A.4). In the future, the participants hope that the GLWQA will remain secure through adapting to new information and the above stressors, strengthening its current ability to do so (B.6).

Furthermore, a large imbalance exists between the distribution of funds to various regions around the Great Lakes. In the original GLWQA, several areas were designated as "areas of concerns" that were primary areas of focus. St. Clair River, one of the Areas of Concern, has received sufficient funding and is ready to be removed as an Area of Concern, yet

other Areas of Concern such as the Saginaw Bay and Detroit River have been heavily neglected by state and federal governments (G.5). For example, in the Detroit River, detecting the presence of tumors in fish took much longer than it should have because the processes of researching the fish in specific affected areas were not up-to-date with the needs of the water and the ecosystem. Not enough funding and agency resources were directed to the Detroit River (K). Stemming from concerns over the GLWQA being jeopardized due to funding or political reasons, participants would like to learn how progress made in environmental research or as a result of the Agreement affects each nation's continued participation in the Agreement – for example, would the Agreement be endangered if there was no progress in a particular year (C.4)?

The SAB Advising Report on priorities for science in 2020-2022 also highlights the need for greater enforcement of the stipulations of the Agreement. The GLWQA calls for binational collaboration on issues regarding the Great Lakes, but in certain instances, the United States and Canada have worked on projects independently; for example, nearshore management is currently being completed separately by the United States and Canada. The SAB lists this as an issue of high priority that needs to be addressed (Science Advisory Board). Additionally, the report calls for greater accuracy in addressing known issues; for example, the SAB argues that when the PFAS (perfluoroalkyl) family is known to be harmful to water quality, water commissions under the Agreement should study all molecules in the family instead of just focusing on individual members (Science Advisory Board). Greater specificity is also needed in the language of focus issues, including an explicit mention of the consideration of Indigenous knowledge when studying water quality and an emphasis on climate change (Science Advisory Board).

Economic Impacts:

Despite any shortfalls in GLWQA, the Agreement still has a significant economic impact. Firstly, the environment both directly and indirectly affects the economy; areas with higher water quality have higher values for recreation, which results in increased property value. Water quality also has an impact on human health, which directly affects the economy (B.5). Major recreation industries like boating and fishing are also dependent on water quality; one year, algal blooms in Lake Erie caused charter boats to lose

20% of their business (A.5). Therefore, the GLWQA, which ensures higher water quality, has a positive effect on the economy. Also, SAB investigations study how upcoming issues under the scope of the GLWQA, like climate change, might lead to increased costs and economic impact (Science Advisory Board). However, some economic issues dependent on the Great Lakes remain outside of the GLWQA's scope, notably regulations on oil pipelines like Enbridge Line 5, which passes under the Great Lakes (A.5).

Conclusion:

Since its creation in 1972, the GLWQA has achieved and maintained its original goal of protecting and restoring the waters of the Great Lakes from both a political and an environmental standpoint.

The binational agreement firstly ensures that both the United States and Canada take responsibility to maintain and protect the Great Lakes. It also unites the two countries and has guarantees that each country fulfills shared environmental goals.

Within the United States, both parties support the Great Lakes Restoration Initiative, the GLWQA's main source of funding. Bipartisan agreement on various issues is becoming increasingly rare, so the GLWQA fosters unity in the American political system. On all levels of government (local, state, national), there is a general agreement on rules and regulations that maintain the Great Lakes.

The GLWQA has drastically improved the physical condition of the water (more clarity and lack of debris and algal blooms) by limiting the sources of pollution and pollutants that enter the lakes, namely phosphorus, which triggers and accelerates algae blooms. This success has been the result of improved sewage treatment, stricter standards for water treatment, and setting target concentrations to maintain the proper nutrient balance. New water treatment facilities have also been erected. Other measures such as limiting the phosphate content of detergents and a movement towards conservation tillage also improved the overall quality of the water [1].

The GLWQA has also positively impacted the economic well being of industries that rely on the Great Lakes, most notably in recreation. The estimated annual value of recreational activities such as boating, fishing, and tourism in the Great Lakes has grown to 12 billion dollars [1].

Although the GLWQA has positively impacted water quality, pollution remains a large issue to this day. Even now, some industries still dump raw sewage into the lakes, despite the laws against the act. Algal blooms still occur in the Great Lakes (especially Lake Erie), but now it is to a lesser degree than before the regulations were enacted (now algal blooms are believed to be a result of zebra mussels instead of runoff or pollution [1]).

These transgressions can be attributed to the lack of enforcement of the rules in the GLWQA. According

to local representatives from around the state, the laws are not implemented and are rarely enforced well everywhere. However, this concern falls short of the scope of the agreement, so it is up to the government to implement external protections for the GLWQA. The agreement itself has already established advisory boards (like the International Joint Commission's Science Advisory Board) so the policy can easily adjust to changes and continue to address issues in water quality.

In recent years, funding for the GLWQA and its legislation has declined, mostly due to a lack of public awareness and increasing bipartisanship. The existing funds allocated towards the GLWQA are unevenly distributed. Most of the funds do not end up going towards GLWQA-designated areas of concern or important projects. The EPA gives grants to various projects, but it is rarely sufficient. Just recently, the federal government limited the Great Lakes Restoration Initiative (GLRI), resulting in a lack of funding for these various projects.

To mitigate these weaknesses, the GLWQA officials and governments can implement various measures. For example, officials can evaluate funds and evenly distribute them to areas with greater concerns or pertinent projects. Raising public awareness can help bring attention to the relative importance of the Great Lakes and help with the funding issue with more taxpayer money allocated towards efforts in preserving the Great Lakes. The more people that understand the need for preservation of the Great Lakes, the more the preservation effort can be sustained and the Great Lakes can thrive. More attention and government boosts towards the IJC along with stricter fines and punishment can help enforce the existing laws.

Overall, the Great Lakes Water Quality Agreement is successful as legislation, has remained stable so far, and will likely remain adaptable to current problems due to self-supervision by advisory boards. However, until the GLWQA gains more protection and power, it remains vulnerable to changing national politics and international relations.

Acknowledgments:

Thanks to: Katherine Graham, Annette DeMaria, Jim Nash, Patty Troy, Ashley Elgin, Richard Hobrla, Becky Pearson, Peter Alsip, John Hartig, Rose Ellison, and Craig Stow for agreeing to participate in an interview.

We would like to thank our faculty advisor, Mr. Drougel, for his unwavering support throughout this project. We would also like to thank the school and the administration for giving us the opportunity to submit this report.

References:

[1] Botts, Lee, and Paul Robert Muldoon. *Evolution of the Great Lakes Water Quality Agreement*. East Lansing, Michigan State UP, 2005. pp. 187-237

[2] Science Advisory Board. “Advice on Parties' Draft Priorities for Science (2020-2022).” Great Lakes Science Advisory Board, International Joint Commission, 6 Nov. 2019, ijc.org.

Appendices:

Appendix A: Complete Notes on Interview with Ms. Becky Pearson (full transcription unavailable)

Q1: Talk about your job and your experience/interaction with the Great Lakes.
A1:

- Ms. Pearson is the Chief Operations Officer at GLOS; she leads the management of daily operations of the Great Lakes Observing System
- She looks at budgets, makes sure people get paid; she is in contact with many researchers and makes sure they follow up on promises or goals
    - Research composition: half is university research, other half is government + federal agencies (NOAA/EPA), NASA satellites, and small portion of private sector
- About GLOS:
    - Part of a national network
    - GLOS gathers environmental data across the Great Lakes: storing/processing, publishing for public access

Q2: How does the GLWQA impact your job?
A2:

- She helps organize governments to improve GLWQA
    - Federal government programs will promote data collection of GLERL
- Her job involves: monitoring the Great Lakes
    - Are they improving?
    - Health issues?
    - GLWQA provides basis for data analysis (thresholds, etc.)

Q3: What are the successes of the GLWQA?
A3:

- Before her career, there was an effort in the 80s under the GLWQA to clean up Lake Erie; this was very successful, and impacted other cleanup efforts in the 90s
    - Established guidelines for nutrient pollution
- Annex related to nutrient control
- Are there changes in technology with regards to what is monitored?

- Technology is pretty much the same – but researchers/GLOS is trying to use new technology/push funding
- GLWQA is more vague with regards to monitoring
  - This is a good thing, because the Agreement has lasted so long and allows for open interpretation/changes
    - At speed technology evolves it's good that it's not prescriptive

Q4: What are the shortfalls of the GLWQA?
A4:

- Ms. Pearson didn't find any shortfalls
- Because of its long history, it's widely accepted by governing agencies
  - The GLWQA is like a "golden rule" of legislation
    - § Model for other binational agreements:
    - § It's an international agreement in place for a long time, and has helped organize people effectively
- Its strengths are greater than its weaknesses

Q5: What are the economic impacts under the current agreement?

- The Great Lakes area has a really big recreational industry (boating, fishing, etc)
  - As water quality has improved, those industries have gained benefits
  - However, issues with algal blooms in lake Erie led to decrease in businesses as algal bloom season occurred
    - § Last year Ms. Pearson was at a meeting and someone represented Lake Erie charter boats; he said that charter boats saw a 20% decrease in business
- Lakes themselves are a conduit for shipping and spurred other industries (mining, energy – Enbridge Line 5)
  - Enbridge is a historic way of piping oil to tip of LP (there's other infrastructure that would have to be put in place if one was to change the method, so that's why Enbridge still has it)
  - How is this issue addressed by GLWQA?
    - § States + provinces own bottom of great lakes, and US Army Corps of Engineers issue permits for building
    - § So controversy surrounding Enbridge falls outside of jurisdiction the agreement

Q7: How have government officials operated under the GLWQA, as opposed to before it was in place?
A7:

- The GLWQA was established after EPA (1970, 1972); allowed for a concentrated effort (since there was already a government agency to supervise environmental issues)
- Pollution problems from industries were able to be addressed in concentrated areas
    - Agreement helped organized cleanup very effectively by targeting AOCs (areas of concern)
- More recently, the Great Lakes Restoration Initiative helped clean up the Great Lakes, many AOCs were delisted (meaning 'unendangered')

Appendix B: Complete Notes on Interview with Ms. Ashley Elgin (full transcription unavailable)

Q1: Talk about your job and your experience/interaction with the Great Lakes.
A1:

- Ms. Elgin is a research ecologist at the GLERL lab (researches the Great Lakes)
    - HQ at Ann Arbor, but she is based on Lake Michigan at Muskegon
    - Focus: Studying invasive specie
        - § Studied Drycined Kuaga and Zebra Mussels
        - § NOAA: monitoring programs on invasive species (before the mussels and after mussels
- She also helps set the science priorities for GLERL
    - Priorities for science: 2020-2022:
        - § Documents that decides priorities of science and decides most pressing topics based on annexes: How does the US and Canada come together to decide?

Q2: What are the successes of the GLWQA?
A2:

- The GLWQA set the target for how much nutrient loading should occur/be accepted (e.g. in Lake Erie)
    - => Control over nutrient loading improved
- Delisting (removing a species from the "endangered list") is positive—happens more than addition to list under GLWQA
- Agreement causes the US and Canada to coordinate together often: it needs both parties' cooperation

Q3: What are the shortfalls of the GLWQA?
A3:

- Sometimes it's challenging to decide on how to set targets/threshold levels

- Hard to identify a target level for a lake (ex. phosphorus concentrations); not so much a shortfall of the Agreement as just something that's challenging about research

· You can have the most perfect laws and regulations but without enforcement, they do not work

- GLWQA needs more provisions and enforcements
- Clearly define amount of resources/fines needed from law breakers

Q4: What are the challenges to improving or overcoming those shortfalls?
A4:

· Funding and regulations
· Great Lakes Restoration Initiative has been almost cut down twice
- However, there has been a lot of bipartisan support
- Congress has not been successful in cutting funding

Q5: What are the economic impacts of the GLWQA?
A5:

· Reducing nutrients leads to reducing harmful algal blooms, which saves money (drinking water can be more easily produced/used)
· Areas with higher water quality have higher values for recreation as well as heightening of property value
- Property values go up, taxes go up, and therefore more resources go into the community

· The environment can directly and indirectly affect economy in an area
· Water quality impacts people in a medical and economic sense
- Human health impacted as well
- We live off of the environment, so we're affected by any changes to the environment – everything is affected!

· By showing we [GLWQA workers] have coordination with another country, we can give more weight to the GLWQA in public policy

Q6: What questions would you ask to a legislator/policymaker about the GLWQA?
A6:

· Ms. Elgin wants to make sure that the agreement adapts to the new information and new stressors
- Improve the GLWQA's ability to adapt (not currently failing—she would just like to see it confirmed/strengthened)

Appendix C: Complete Notes on Interview with Mr. Peter Alsip (full transcription unavailable)

Q1: Talk about your job and your experience/interaction with the Great Lakes.
A1:

- Mr. Alsip is an Ecological Modeling Data Analyst (has worked at CIGLR for 3 years total). Works on:
  - Computer Models to understand ecosystem processes
  - Focused on Asian Carp (IS) suitable habitats
  - Areas of concern
  - (Currently) Computer models for hypoxia in Lake Erie

Q2: How does the GLWQA impact your job?
A2:

- Annex I, Annex of Remediaton, Annex 6 (invasive species), currently: Annex 4 (nutrients)
- Implementing the restraint of Asian Carp (proposed an $8 million project to add another barrier preventing Asian Carp from entering the Great Lakes); confirmed by Michigan Dept of National Resources in November 2019

Q3: How has the GLWQA changed over the time you've been working with CIGLR?
A3:

- GLWQA doesn't change its existing content as much as expand its scope; that expansion might affect how scientists interact with it
- Changes (in 3 years): a point of concern was the 2016 change of presidential administration, but it turned out to be fine/have no effect (GLRI – Great Lakes Restoration Initiative stayed)

Q4: What questions would you ask to a legislator/policymaker about the GLWQA?
A4:

- Mr. Alsip doesn't think about it on a daily basis – it's not a daily concern
- He would like to ask: "How does the current progress made affect the continued commitment to the agreement?"
  - I.e. "Is the progress we've made enough for them to be convinced the GLWQA is a good idea, and when is it enough?"

Q5: Do you believe the GLWQA could ever be discontinued, and under what circumstances?
A5:

· Funds that support the Agreement are from associated federal programs (a major fundraiser is Great Lakes Restoration Initiative); funds stay pretty robust even given fluctuation in politics

· Science/management institutions + legislators have made sure that funding doesn't get disbanded

· However, the continued existence of the GLWQA shouldn't be taken for granted, especially regarding climate change and increasing political pressures

Appendix D: Complete Notes on Interview with Ms. Katherine Grantham

Q1: What exactly is your job and what role do you play in dealing with water quality in the Great Lakes?
A1:

- environmental planner at SEMCOG
    - revolved around water and water resources
    - looks at green infrastructure, air quality, and how the state is doing in terms of trash/recycling
    - mainly deals with **four areas**: storm water (big focus on the Great Lakes, issue ex. with algae bloom) + green stormwater infrastructure, drinking water + quality, waste water
- storm water, infected (nitrogen, phosphorus, polluted, cause algal bloom)
- also works in water publication (educate people about water and water waste system, people don't know how vast the system is, people don't think about it and don't try to take care of it)

Q2: How does the GLWQA affect your job?
A2:

- several other plans (*Lake Erie Domestic Action Plan*) for water quality in the Great Lakes
- interacts the majority of the time with **Lake Erie** (SEMCOG deals with this area)
- sets standards on how much can be dumped into the Great Lakes (reduce phosphorus dumping by 40 percent, major problem)
- grants given out by the EPA (environmental protection agency)
- Huron Erie Drinking Water Monitoring Project (looks at water quality within the great lakes through that corridor, can see if there are algal blooms and so on)
- train municipalities and county governments to look for certain discharges (when big manufacturing companies could have a large pipe and drains right into the Great Lakes water)

Q3: What do you think are the successes?
A3:

- in the past 20-50 years, improved water quality in the Great Lakes massively
- reduced the amount of **algal blooms** (but still causing a problem, also due to climate change)
- reduced the amount of beach closures (monitoring for these pollutants, addressing them more quickly)

- did a before/after survey about water quality (rise in people thinking the drinking water is poor)
- actually have one of the best water quality treatment facilities in the entire world
- after the campaign, more people would be taking water related actions
- **Water Resource Plan for Southeast Michigan** (work with local municipalities to develop certain plans and how to improve water quality)
- more funding and projects (from national efficient wildlife)

Q4: What do you think are the shortfalls?
A4:

- largest problem dealing with right now is a **lack of funding** (projects cost a lot of money)
- lack of water infrastructure funding (very complicated system, people running the system don't know the types of underground pipes, people don't really know what's happening underground)
- the underground water system is aging (need funding to improve)
- need to replace all of the lead pipe lines (because of everything that's happened in Flint)
- by 2025/2030 (all lead service lines will have to be replaced, so lead can't run off into the water system)
- need funding for this!!!!! (huge issue)
- Trump administration has limited the **Great Lakes Restoration Initiative** (GLRI)!!!! (basis for a lot of projects)
- lots of people stood up against this (not all of the funding was cut)
- need to look at taxpayer money (rewiring money so that infrastructure projects can be funded)
- work with large companies (such as Ford) who can contribute money (but can also be one of the largest polluters)

Q5: What are the challenges to improving or overcoming those shortfalls?
A5:

- Again, funding challenges

Q6: What are some of the economic impacts under the current agreement?
A6:

- don't know the specifics, don't work with the economic side of things

Appendix E: Complete Notes with Annette DeMaria

Q1: What exactly is your job and what is your experience dealing with the Great Lakes?
A1:

- Environmental work for various clients, local governments
    - advise them of various environmental regulations and environmental projects (Southeast Michigan, Detroit River, Saint Claire, connecting to Sainte Claire and Lake Huron, all goes down to Lake Erie)
    - Most work done on the water resources side

Q2: How does the GLWQA impact your job?
A2:

- limited contact with the GLWQA
- most of the work is done under the **Clean Water Act**

Q3: What do you think the GLWQA does well to address, and what does that agreement fail to address?
A3:
- plenty of regulations
- sometimes don't get implemented or enforced very well throughout the state
    - (she doesn't really address why or how)
- Most problems are being relatively dealt with

Q4: What are the challenges to improving or overcoming those shortfalls?
A4:
- funding is another big problem
- have to help municipalities with the **Clean Water Act** (don't have the funding to be able to implement the various projects and initiatives enacted)
- dramatic point-source pollution
    - very diffuse throughout the Great Lakes for the last 30 years when the Clean Water Act was established, especially in water treatment plants and industries
- major focus now is on storm water (hard to address storm water because it's so diffuse)
- lots of noise and distortion in the data (hard to interpret, hard for her and her job)
    - (she doesn't really address why?)

Appendix F: Complete Notes with Jim Nash

Q1: Talk about your job and your experience/interaction with the Great Lakes.
A1:
- water resource commissioner
    - oversees storm water sewage and drinking water in Oakland County
- all work done is protecting resources from pollutants
- sewage (mixed sewer systems) all have to be protected (from leaking bacteria, algae) and watched all over

Q2: How does GLWQA impact their jobs?
A2:
- **Great Lakes Compact** - limits pollutants
- All done to protect the lakes from pollution (so that great lakes water isn't shipped away, it's a natural resource that we have to protect)

Q3: What are the successes?
A3:
- 30 years ago, the rivers that come out of Oakland County were basically open sewers, there were no regulations
- rogue river caught on fire

- long history of polluting these waters
- After 1973 the **clean water act**, worked together to clean the water in a significant way
- -significant amount of federal money
- huron river, rogue river, clinton water, all now very clean water
- large part of volunteer effort (from watershed groups)
- stops the pollution from point source
- pollution sources have been eliminated
- forces people to collaborate to be on the same page
- before this agreement, it was up to each individual state to do their job
- stronger protection of the lake
- prevents the water from being withdrawn from it
- **collaborative way**
- if not on the same page, would try to outcompete each other
- commercial fishing hugely important (need to protect
- only one remaining is **stormwater sources** (non point source)
- newest push is to eliminate stormwater sources (new area of focus)

Q4: What are the shortfalls?
A4:

- most of the states and Canada are living up to the agreement
- hard to get the organizations to do some of the work (to get the phosphorus off of agricultural land, from nitrogen and fertilization)
- extra nutrients coming off the water, lake water bloom
- Toledo had to get off of their water in lake erie, algae was contaminated, poisoned the water
- bad things can happen if it's not enforced
- ensure that the states of Canada enforce this
- Ohio and Michigan

Appendix G: Complete Notes with Patty Troy

Q1: What exactly is your job and what is your experience dealing with the Great Lakes?
A1:
Paid Job - City of Port Huron working for waste management
US (US and Canadian) Co-chair of St. Clair River Binational Public Advisory Council

- Member of the DEPAC of 1992
- Bachelor's Degree in Environmental Health (Oakland University)
- Wastewater Plant Manager

Q2: How does the GLWQA affect your job (not her paid job, her volunteer work on the St. Clair River)?
A2:

- Public Advisory Council (Area of Concern Program, initiated by the GLWQA)

- mandated public involvement in the areas of concern (St Clair River is on the list, due to historical contamination of the river)

Q3: Contamination of the River
A3:
- Long history of industrial and history use in the watershed
- Discovery of petroleum
- Back in the 1860's (petroleum came into existence)
- Around WWII, infrastructure of the area sprang up trying to provide rubber substitutes (chemical manufacturing)
- Prior to 1970's no environmental regulations (would dispose of waste in the river, considered ok during this time)
- Was addressed in the 1985ish (diver discovered **blobs** of organic chemical on the bottom of the St. Clair River, messed up his equipment)

Q4: What are the successes?
A4:
- Established the Areas of Concern program (named 43 different areas of concern in the Great Lakes)
- Government committed to doing the work to provide necessary resources to clean up these areas
- Great Lakes Restoration Initiative (improved spending on the Great Lakes, big boost)
- St. Clair River has enough funding (ready to be removed as an Area of Concern), still requires time and work

Q5: What are the shortfalls?
A5:
- Not as much financial support (from the governmental agencies) as they would like but massive boost from GLRI
- Saginaw Bay and Detroit River are much farther behind (need more financial support, not all the areas of concern are receiving the attention that they need)

Appendix H: Complete Notes with Richard Hobrla (no questions written, just responses)

- Worked in state w/ water quality for 40 years
    - 22 yrs: in charge of Michigan programs (GLWQA)
    - Work under Annex 1 + Annex 2 of GLWQA
- Out of 43 areas of concern, MI had 14 (now has 12) [3 shared with Canada] [1 w/ Wisconsin]
- Largely dedicated to working under agreement
    - Receive $ from EPA from grant
    - Work to carry out programs under Annex 1+2
- Go to meetings with Public Advisory council, other agency

- Update remedial action plans, find funding to implement projects, coordinate work among various agencies
- Lots of data coordination (federal/state/binationally)
- US side: Success has been since 2010, because of investment by US fed gov. In GL restoration initiative
    - Prior: not a lot of funding (For GLWQA)
    - Provided 454M dollars in 1st year
    - Originally intended to maintain level for 5 years
    - After 1st year: dropped to 375M / per year in perpetuity (so far)
- Money goes towards: restore areas where contaminated sediments (in harbors) & Habitat restoration
- Detroit River / St. Clair river corridor = primary spawning ground
- Shortfalls: GLWQA doesn't have teeth, is promise between 2 gov. To try to restore GL
    - NO PENALTIES TO GOV. IF THEY DIDN'T COMPLY (Gentlemen's agreement, not actually happening)
- Nothing happens prior to 2010 (money)
- Canadian side: Much less funded, and thereby Canada is lagging behind US' work in restoration
- Realistically: shortfalls of GLWQA probably won't be fixed (1987 - 2012)
    - Perhaps GOV could commit to specific funding levels /
- Aimed to make existing agreement work as best as possible
- GLWQA can claim "partial credit" for reversing trend in GL
    - 60s 70s - Quality deteriorating
    - Series of things, including GLWQA , Clean Water Act, has reversed it
    - "GL are improving"
    - Science now allows us to identify new problems that we didn't know existed
    - Not "weren't there, we didn't know about them"
    - Improved methods of transportation have resulted in greater problems with invasive species, now we can control it
        - Zebra mussels
        - → Change biology of great lakes
- Agreement has helped strengthen public opinion about GL
- Discovered it isn't politically popular option to not be in favor of GL
    - Some more vocal than others, some turn into action
    - Reached point where no politician can say "I don't support GL"
    - → Maintained funding
- 60s: GL not used for recreation, didn't have public support now, didn't transfer to political support
    - Now recognized as world wide resource

Appendix J: Summarized Notes with Jon Hartig

“I think that the agreement is flexible enough to work with the International Joint Commission (IJC) so that specific problems can be addressed as they arise, in a quick manner, as opposed to the typical bureaucratic way that they would be”

“In the first ten years of the Agreement, $140 million was spent building the river lock, but the return on that investment since has been over $1 billion of economic activity along the river lock, so I believe that the economic aspect of the agreement has been a resounding success”

“In the new agreement, the roles and responsibilities have been split up among the ‘parties’ or the federal governments of the US and Canada, which is important because it lessens the strain of the Great Lakes on any one organization, and frees up the individual organizations to go above-and-beyond on their specific jobs, which in turn facilitated each annex of the agreement to be tended to quite efficiently”

Hartig believes that the GLWQA has many strengths, primarily being the cohesion between all levels of government that it produced, and says that it economically redefined the Great Lakes. Hartig suggests that in the future, more funding may be required for new areas of concern as they emerge, but the agreement is largely successful and should only be changed to make it more ‘enforced’ rather than suggested.

Appendix K: Summarized Notes with Rose Ellison

Ellison currently works under annexes 1 and 2 of the GLWQA, and she emphasized that her job was directly affected by the agreement in a multitude of ways.

Ellison suggested that a main flaw of the GLWQA is that it does not allocate enough funding or agency resources towards research of specific biological cases in the Great Lakes. For example, Ellison said that detecting the presence of tumors in fish in the Detroit River took longer than it should have, because the processes of researching the fish in specific affected areas were not up-to-date with the needs of the water and the ecosystem.

Despite the research drawback, Ellison agrees that the GLWQA is a very successful agreement that is responsible for the many of the benefits that have come to the Great Lakes in recent years. Ultimately, there could be more done to help scientists on the ‘front lines’, defending the Great Lakes from biological invaders, but Ellison agrees that the Great Lakes are protected by the agreement in a multitude of different ways.

Appendix L: Complete Notes with Craig Stow

Stow works at the NOAA Great Lakes Lab in Ann Arbor, and has worked on Great Lakes issues for 20 years.

Stow appreciates the fact that, from the outset, the GLWQA had an immense amount of work that needed to be accomplished to essentially ‘save’ the Great Lakes. Because of this, since 1972, the governments of the US and Canada have been under an immense amount of pressure on all fronts to address the annexes at all of the Great Lakes, which later on necessitated cohesion between federal, state, and local governments, as well as some help from the private sector to steward the Great Lakes.

Stow suggested that as time goes on and the Great Lakes change, so do the problems facing them. In this regard, he highlighted that the GLWQA has been rather flexible in allowing the proper authorities to face the new challenges, and specifically that the annexes under the GLWQA have been changed to reflect the real issues facing the Great Lakes at any given time. Ultimately, for Stow, the GLWQA is largely successful in targeting the majority of problems at the Great Lakes, and although much work needs to be done, the Agreement is a stable framework for that very change.