

IJC PUBLIC OPINION AND ENGAGEMENT REPORT

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Abstract

This report and analysis was performed in order to take an in-depth look at recent information collected from the public throughout the Great Lakes basin and provide an evaluation of key findings to help inform future public engagement initiatives for the IJC and relevant actors working within the basin and region. A comparative analysis was performed across three basin-wide polls (2013-2018), as well as across four nation-wide U.S./Canada polls (2015-2017). Additionally, a detailed review was performed on qualitative data received during public input forums commissioned by the International Joint Commission. Trends, divergences, and gaps were identified across these mediums of engaging with the public on issues related Great Lakes management and protections. Overall there is significant value placed on protecting our shared water resources and the Great Lakes by the public. However, there are priority areas which need to be addressed in future engagement initiatives including increasing awareness for top threats and emerging threats facing the Great Lakes. Additionally, priority areas have been identified where further education of the public is needed in respect to solutions for addressing top and emerging threats. Further education and awareness will aid in gaining buy-in and support for strengthening coordinated binational actions and strategies.

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Executive Summary

What is the purpose of this report?

This research has examined a wealth of information provided by the public which holds significant value for helping to inform the International Joint Commission in better understanding how it can strengthen its efforts for achieving the goals and objectives of the Great Lakes Water Quality Agreement, how to better inform the Parties of what is being learned during and from public engagement initiatives, and provide a holistic vision for actors to work collaboratively throughout the Great Lakes basin to protect the waters and the environment.

Why does this matter?

This is important given that *problems in our natural environment and the impacts of human interactions with the natural environment are becoming increasingly complex*. Today more than ever, the decisions we need in respect to our environment involve a number of affected stakeholders that cross multiple jurisdictions, political boundaries, societal needs and goals, and economic forces at play. This complexity calls for governments and governing agencies such as the International Joint Commission to continue to learn from previous public engagement initiatives to inform their decision-making and to continue to improve future public participation initiatives for optimal and effective knowledge transfer between all participants (e.g. citizens, impacted stakeholders, governments and governmental agencies, and non-governmental agencies).

Citizens, stakeholders, government agencies, and non-governmental agencies throughout the Great Lakes come from a wide background of experiences and knowledge and interact with the Great Lakes basin in many different ways. Therefore, they are critical in helping to provide governments and decision-makers with important societal context in order to advance goals and objectives that are required to protect, restore, and heal the Great Lakes.

Public engagement efforts in the Great Lakes basin are also critical for understanding common goals as well as conflicts of interest among stakeholders in the basin. With a better understanding of these issues, public engagement can help to achieve greater buy-in and ownership of the necessary actions required by citizens, all impacted stakeholders, governments, and non-government agencies in order to meet our objectives and goals in the Great Lakes basin. Public engagement efforts also help in giving the public a say in helping to set the agenda and desired outcomes.

In order for public participation to have far reaching impacts it is important that organizations and participants of public engagement efforts are provided with multiple avenues to provide their opinions, thoughts, and input. The IJC has been implementing various public engagement initiatives over the years in order to work towards achieving the objectives of the Great Lakes Water Quality Agreement. The polls are an example of a *one-way flow of information* where data and responses are collected from participants living in the basin. However, a *two-way flow of information and dialogue is also necessary between organizers and participants, which includes the organizer's role as not only organizer but also participant*. In this way, the International Joint Commission engages in a conversation with the public. The International Joint Commission public input forums during 2016 and 2017 which are examined in this report are an example of information flowing both ways between organizers and the public. Therefore, this report captures various mediums and degrees of public engagement that have taken place regarding issues occurring in the Great Lakes in order to provide a broader context that links these various public engagement efforts to one another.

Key Highlights from the Report

Across the polls and public input forums there were many trends as well as some divergences that were observed.

There is strong support to increase and strengthen collaborative binational efforts in order to protect the Great Lakes.

There is low awareness of the IJC however there is strong support and agreement for having the IJC lead binational cooperation and decision-making.

Ensuring adequate funding is in place to protect the Great Lakes is a top issue.

The high value placed upon protecting the Great Lakes for the benefit of the fish and wildlife as well as for the benefit of the general public health was commonly shared among residents.

Pollution and contamination are the top threats followed by invasive species in the polls and during the public input forums pollutants ranked 3 out of 27 of the main themes/issues raised and invasive species ranked 6 out of 27. It is notable that as of 2018 in the polls only 2% of respondents named climate change as a significant threat facing the Great Lakes. The issue of climate change showed up slightly more on participant's radar during the public input forums accounting for just under 5% of the issues raised (climate change rank 17 out of 27 of the main themes/issues discussed during the forums).

The number of residents using the Great Lakes for recreation such as swimming, boating, and fishing is high across all the Great Lakes polls (GLPRN 2013, IJC 2015, and IJC 2018) and the degree of concern and value placed upon recreation was significant during the public input forums as well (ranked 14 out of 27 of the main issues/themes raised). Similarly, fishing was a top activity across the polls and was a visible concern during the forums (ranked 18 out of 27 of the main themes/issues raised).

A significant number of respondents in the IJC polls believe there are too few regulations (rose from 46% in 2015 to 53% in 2018). A significant number of respondents also would be willing to increase protections even if they had to pay more for consumer products (55% in 2018). 53% of respondents believe there would be either no impact or a positive impact on the economy if protections were increased. A significant number of respondents in the polls (76% in 2015 and 78% in 2018) also believe the economy will suffer if the Great Lakes are not healthy. When these related data points are compared to one another it tells a story of the potential support to increase protections and environmental efforts in the basin while still keeping in mind the economic importance of the region. Additionally, the GLPRN poll provides insight into how much support residents indicate they would provide for various regulations, actions, and policies to meet certain goals in the basin.

Complementing these observations found across the three Great Lakes' polls is the strong emphasis given to regulations and increased regulations during the IJC public input forums. These comments mostly related to nutrient management, CAFOs, Lake Erie, sewer discharge, and ballast water.

Overall, respondents in the 2013 GLPRN poll favoured renewables, hydroelectric, onshore and offshore wind, more so than they favoured fracking, offshore drilling, and nuclear options. During public engagement forums, nuclear was the top mentioned concern ranking 1 out of 27 main themes/issues raised. Concerns over issues related to pipelines, the oil sector, and fracking collectively accounted for 10.6% of comments received. Multiple comments received during the public input forums also related to the use of renewables and the transition away from nuclear and fossil fuels in order to have a robust climate change strategy.

A common theme regarding public engagement which was brought up during the public input forums is the need to have more citizens present and engaged in the Water Quality Agreement process and not just the usual actors such as overwhelming presence of government people, academics, scientists, and policy-makers.

Throughout the 2018 IJC poll, Indigenous respondents often demonstrated a higher degree of concern in their responses to questions relating to threats facing the Great Lakes (e.g. pipelines, endangered species and fishing, algal blooms, climate change) and placed greater value on protecting the Great Lakes than non-Indigenous respondents. Indigenous respondents were also much more likely to say they would attend a public meeting organized by government or an NGO than non-Indigenous respondents (70% vs 26.5%) and much more likely to engage in an online forum or group than non-Indigenous respondents (70.7% vs 34.3%). Indigenous respondents were also much more likely to feel there are too FEW regulations or policies to protect the Great Lakes than non-Indigenous respondents (95% vs 50%). During the IJC public input forums there was also a strong sentiment echoed by several participants to recognize the sovereignty of Indigenous peoples, to better engage Indigenous peoples, and to include them more in the agenda-setting process.

Across all RBC polls 2015-2017 as well as the U.S. Value of Water poll 2016, there was a strong emphasis on the public's perceptions, awareness, and attitudes towards critical water infrastructure including drinking water, stormwater, and wastewater management. This was lacking in the IJC polls.

Recommendations Highlights*

- There is a need to pay attention to the attitudes and support from the public that is present in the polls and the public input forums regarding implementing regulations and policies. Continue to monitor this data point across future polls. Pay attention to what is being said during public input forums in respect to what regulations and actions various participants support or do not support. Pay attention to what the majority of respondents are saying across polls and during public input forums.
- An area for future research includes looking into further strengthening current communications strategies beyond conventional mediums and methods. There is a need to work on communications strategies to increase the general public's awareness of the IJC and the work that it does which will also help increase awareness of binational efforts such as the GLWQA. This is important to gain buy-in for cross-border actions as well as the necessary uptake/action required by all stakeholders of the public. These strategies can include utilizing the vast network of ENGOs throughout the basin dealing with issues related to Great Lakes protections to help inform their followers, supporters, and networks of the work the IJC does as well as inform them of the GLWQA. This can also include further developing an online presence with strategic content that can appeal to identified audiences. This can be incorporated into social media accounts such as Twitter and Instagram. This requires the adequate funding, attention, and resources to effectively implement.
- There is a need to educate those who do not know where their drinking water comes from or their wastewater goes. Governments, NGOs, and water utility companies need to help educate the public in

* Detailed recommendations are located in the Recommendations section of this report.

order to increase the public's understanding, awareness, and value they place on having these critical water services which require upgraded and maintained infrastructure across the basin.

- There is a need to educate the public on the process and costs of providing safe drinking water, managing stormwater, and managing and treating wastewater. Include questions/new data points in future IJC polls which gauge the public's perception, knowledge, and attitudes towards critical water infrastructure (e.g. awareness of current state, awareness of costs to upgrade and maintain, support for upgrading and maintaining, willingness to pay).
- Ensure that an independent study by the IJC is commissioned to provide an up-to-date investigation into effects of nuclear on the basin so that concerns and perceptions can be addressed.
- Fish and wildlife are a top concern across polls and in public input forums; invest adequate resources into science, studies, and on the ground initiatives for protecting fish and wildlife to reflect the prominence of this concern across the polls and during the public input forums.
- Ensure adequate funding and resources are continued to be allocated towards public engagement efforts as a significant percentage of respondents in the polls indicate they are likely to take part in attending a public meeting or engaging in an online forum.
- There is a need to communicate to the Parties the concerns raised in respect to the Lake Erie basin (e.g. agriculture, Fermi 2, CAFOs, proposals for a declaration of impairment, and proposals for stronger regulations).
- Need to continue to work on how to effectively engage and collaborate with Indigenous communities (e.g. how to effectively tap into existing Indigenous transboundary networks across the basin, work on cultural and competency education and training for non-Indigenous water managers for a better understanding of Indigenous traditions, governance, and laws).
- Respondents are most concerned about the lake closest to them. Leverage local concern by increasing collaboration, coordination, and engagement between binational governance agencies and municipal governance agencies – e.g. leveraging municipal governments and local ENGOs capacity to carry out engagement efforts for the lake and waterbody closest to them.
- Strengthen engagement and public consultation processes with communities impacted by proposal development projects where there is a high concern for environmental harm and public health.
- Based off of the information revealed, future polls should incorporate new questions/data points that address specific issues such as a new question to gauge respondent's support and concern over various energy options and new poll questions that are more specific to climate change/extreme weather (e.g. What negative impacts do you think climate change and extreme weather could have on the environment in the Great Lakes basin?).

- There is also a need to focus more on educating residents about climate change and extreme weather in the basin (e.g. predictions, impacts, adaptation, mitigation) as a general low awareness of climate change and extreme weather was demonstrated in the Great Lakes basin polls.
- Communicate in future polls the facts about Line 5 (e.g. age, potential risks) to better gauge public opinion on Line 5. Communicate to the Parties the high degree of concern over Line 5 during the public input forums.
- Based on comments on the draft TAP, examine and incorporate recommendations from public input forums regarding how to more effectively communicate future TAPs to the public. Specific comments can be found in the Recommendations section.

Introduction

Public engagement in the context of environmental policy making is understood as a way to provide an inclusive, transparent, and deliberative process for setting the environmental agenda by allowing citizens to influence the outcome of decisions and ideally allows for a more efficient and effective use of resources. Public engagement in the environmental policy making context also provides an opportunity for greater degrees of environmental justice to occur since citizens are involved in setting priorities. Polls and public meetings are methods of public engagement which both have their strengths and weaknesses for helping decision makers to shape their policies and agendas.

Public input meetings can provide a depth of information from an actively engaged, organized, and informed segment of the population. Ultimately, the purpose is to ensure that a wide range of stakeholders, citizens, and interested parties can bring forward issues, concerns, and ideas which can help improve planning through more informed decision-making (European Environment Agency 2014, 6). Deliberation and a two-way exchange of information can aid in increasing a culture of transparency and trust. This is important for increasing buy-in among citizens and other relevant stakeholders which can provide greater chance of success and effectiveness for policies and their implementation (European Environment Agency 2014, 13-15). Public polling in contrast is a scientific method which allows for a sampling of the general population. This differs from traditional public consultation forums which tend to provide access to hearing from the more opinionated, organized, and most readily accessible members of society (Manza, Cook, and Page 2002, 222). Thus, public polling helps to address one of the limitations of public consultation meetings which is ensuring that the traditionally “unengaged” members of society can be reached. It is important to understand some of the limitations of public polling however, such as the reliance on participants to provide responses which reflect their honest attitudes, beliefs, and behaviours. Another limitation rests on the response bias which can occur with telephone surveys such as those which were conducted for the purposes of the polls examined in this report; those who refuse to participate or do not answer the phone can distort the view of public opinion (Manza, Cook, and Page 2002, 227). It is important to employ large samples to offset this issue (Manza, Cook, and Page 2002, 231).

Three public opinion polls in the Great Lakes basin have been carried out over the past five years to gauge the public’s level of awareness, as well as perceptions and attitudes towards Great Lakes management and protection. For this report, longitudinal analysis was possible due to similarities across sampling frames as well as survey instruments which allowed for trends to be identified and helped to give greater credibility to participant’s responses across the three polls. In addition, public input forums (traditional and online) commissioned by the International Joint Commission (IJC) during 2016 and 2017 have helped to add to the depth of public engagement information and knowledge collected on issues pertaining to Great Lakes management and protection during a similar time frame as the polls. As a result, these differing mediums of public engagement are able to be compared and analysed to provide further depth and understanding of the public’s opinions, awareness, and concerns over issues related to Great Lakes management and protection. This analysis can help to inform current and future public engagement initiatives commissioned by the IJC as well as aid in priority and agenda setting for addressing issues and threats occurring in the Great Lakes basin. This analysis can also help inform where predominant attitudes, beliefs, and perceptions are occurring. This is important not only for a more informed decision-making process, but also helps decision makers to understand where certain

misconceptions are present and where further education efforts need to be directed to address these misconceptions or a general lack of awareness.

Methods

This analysis of the study first included a detailed review of three basin-wide polls that have been carried out in the Great Lakes during the years of 2013-2018 followed by an additional review of three Canadian national water attitudes' polls (2015-2017) and one U.S. national water attitudes' poll (2016). Overarching themes were identified across polls in order to perform a systematic comparative analysis. Great Lakes polls were cross-examined for key findings derived from trends in the polls and the national U.S./Canada polls were also cross-examined for additional binational insights. The next phase of the study involved an in-depth review of comments received from the public which were part of a Great Lakes public engagement initiative during a similar time period as the polls (2016-2017) that was commissioned by the IJC. Thus, it is able to compare content from each data source to provide a more in-depth context and understanding of public awareness and attitudes across these differing mediums of engagement methods during this time period. This is of importance as it allowed for analysis which gauged public opinion and attitudes of a typically less engaged cohort of the population during the polls and a typically more engaged cohort of the population who participated during the public input forums. The final phase of the study involved an overarching analysis of all information and data reviewed in order to provide recommendations for future IJC polls and public engagement initiatives.

Comparative Analysis of Great Lakes Public Opinion Polls 2013-2018

Three polls were used to compare public opinion in the Great Lakes which spanned the time period of 2013-2018. The IJC conducted two basin-wide polls in 2015 and 2018 and the Great Lakes Policy Research Network conducted a basin wide poll in 2013. Each poll was compared by its methodology and the results of survey questions were analyzed and compared thematically for similarities and differences. Themes were generated in relationship to specific and general Great Lakes water quality and governance related issues.

Figure 1. Summary of Polls Compared

Organization and Dates	Research Design	Purpose
GLPRN and CLOSUP 2013	Canada-US academic research team from 8 universities	Gauge public opinion on the value, current health and success of efforts to manage this shared resource, as well as measure residents' support for a number of policy options. Several reports generated from the findings.
IJC 2015 Binational Public Poll	Commissioned to Oraclepoll in consultation with participants of the Water Quality Board	Establish baseline data across an array of perceptions ranging from perceived threats to the Great Lakes and the importance of watershed and Great Lakes protection, to awareness of the IJC and cross-border water protection efforts.
IJC 2018 Binational Public Poll	Commissioned to Oraclepoll in consultation with participants of the Water Quality Board	Follow-up to the 2015 poll. In addition to tracking several key indicators, it also established new data points. When and where possible, findings were compared over time to determine any variances.

Figure 2. Summary of Survey Instruments

Poll	Instrument Features	Sampling Frame	Sample Size	Other
GLPRN 2013	Person to person telephone interview	Basin-wide Canada and US residents Random sample of phone numbers	1247	Conducted November and December 2013 Over-sampled in Michigan and Ontario for comparative sub-national analysis. Interview numbers by province: Ontario 408; Michigan 267; Illinois 138; Wisconsin 122; Ohio 116; New York 110; Indiana 44; Minnesota 25; Pennsylvania 17 Binational demographics were provided
IJC 2015	Person to person telephone interview	Basin-wide Canada and US residents Random sample of phone numbers	3950	Conducted November and December 2015 Interview numbers by province: Ontario 1100; Michigan 1100; New York 450; Ohio 350; Illinois 350; Wisconsin 280; Indiana 120; Pennsylvania 100; Minnesota 100 Demographics were provided for: province/state; gender; income; political leanings; age
IJC 2018	Person to person telephone interview	Basin-wide Canada and US residents Random sample of phone numbers A quota was set of N=300 to ensure Indigenous, (CDA-First Nations) (US-Native American or Tribes) or Métis respondents were reached.	4250	Conducted January 2018 Interview numbers by province: Ontario 1180; Michigan 1160; New York 475; Ohio 375; Illinois 375; Wisconsin 305; Indiana 140; Pennsylvania 120; Minnesota 120 Demographics were provided for: province/state; gender; income; political leanings; age; Indigenous/non-Indigenous identity

Figure 3. Summary of Phases for Comparative Analysis of Great Lakes Public Opinion Polls 2013-2018

Phase 1	Phase 2	Phase 3	Phase 4
GLPRN poll and IJC polls each reviewed Methods, themes, and survey questions across polls were compared and initial cross comparison notes were made	Common themes/categories across polls were identified and categorized Themes/categories were identified using the sections generated by the IJC polls as a baseline (e.g. policies/regulation; responsibility to protect)	Questions and responses from each poll were entered into Excel and separated by spreadsheets which pertained to the identified themes/categories (e.g. a spreadsheet for questions from each poll related solely to recreation; a spreadsheet for questions from each poll related solely to policies/regulations)	Questions were then compared across poll by their respective themes (e.g. what type of questions were being asked for each theme/category; how did questions relate to one another; how did questions differ from one another) Responses to questions were compared for trends and divergences

Canadian and US National Water Surveys

The Royal Bank of Canada conducts national water attitudes surveys each year and for the purpose of this report surveys between 2015-2017 were reviewed to provide insights into Canadian water attitudes during a similar time period for when the IJC conducted its two basin-wide Great Lakes polls. The Value of Water Coalition conducted a national water attitudes survey in 2016 and this was used to provide insights into U.S. water attitudes during a similar time period of the IJC basin-wide Great Lakes polls. The purpose of reviewing Canadian and US water attitudes surveys is to provide added insight for the IJC as a binational organization responsible for helping the Parties to cooperate and collaborate on transboundary water governance.

Figure 4. Summary of Methods for Comparative Analysis of RBC and U.S. Value of Water Polls

Phase 1	Phase 2	Phase 3	Phase 4
RBC and U.S. Value of Water Poll each reviewed Methods, themes, and survey questions across polls were compared and initial cross comparison notes were made	Common themes across polls were identified and categorized	Questions and responses from each poll were entered into Excel and separated by spreadsheets which pertained to the identified themes/categories (e.g. a spreadsheet for questions from each poll related solely to infrastructure; a spreadsheet for questions from each poll related solely to knowledge of water sources)	Questions were then compared across poll by their respective themes (e.g. what type of questions were being asked for each theme/category; how did questions relate to one another; how did questions differ from one another) Responses to questions were compared for binational trends and divergences

Analysis of Qualitative Data from IJC Public Forums

Qualitative data from public input which was provided through several in person and online IJC public engagement forums was analyzed and categorized thematically in relationship to the General Objectives of the Great Lakes Water Quality Agreement 2012. The public input from these forums was gathered in October 2016 and March 2017. Each comment provided was categorized by issues specifically and generally related to the Great Lakes. The issues were then categorized in accordance to its respective relationship to the General Objectives of the Great Lakes Water Quality Agreement 2012. Issues brought up in comments which did not fall under a General Objective were categorized as ‘Other’. These issues are highlighted in their own subsection of the report. An additional subsection was created for comments pertaining specifically to public engagement.

Figure 5. Summary of Methods for Analysis of Qualitative Data from IJC Public Input Forum

Phase 1	Phase 2	Phase 3
<p>Summary of Public Comment Appendix for the First Triennial Assessment of Progress Report of the Great Lakes Water Quality Agreement was reviewed (emails and comments via IJC online platform ParticipateIJC; 4 in-person meetings to comment on the Great Lakes Public Forum in the fall of 2016; 9 in-person meetings to comment on TAP in March 2017)</p> <p>All comments received during these public forums were reviewed individually and examined for central and key issues being raised</p>	<p>Comments were coded and categorized and entered into an Excel spreadsheet</p> <p>Categories were generated in relation to the nine Objectives of the Great Lakes Water Quality Agreement.</p> <p>Issues brought up in comments which did not fall under a General Objective were coded according to their broader implications (e.g. public engagement, governance, funding, legislation/regulations).</p> <p>Issues which took on a prominent role during the public input forums (online and in-person) were given their own categorization and emphasis in the analysis (e.g. nuclear, Lake Erie)</p>	<p>Issues were additionally given a ranking according to total times an issue was brought up out of 307 total comments received from online and in-person public forums</p> <p>The public input themes and comments were then compared to key findings from the comparative analysis of the Great Lakes basin-wide polls to identify relationships, trends, and points of divergence</p>

Comparative Analysis of Great Lakes Polls and Qualitative Public Input[†]

Introduction

Key findings from the comparative analysis of the Great Lakes public opinion polls (GLPRN 2013, IJC 2015/2018) and key findings from the qualitative public input collected by the IJC (Great Lakes public meetings, online/ParticipateIJC) were compared in order to identify additional trends and divergences present across these two mediums of public engagement. One notable general finding pertaining to this comparison is drawn from a new question asked in the IJC 2018 poll. A new data point was added which asked which actions respondents would be *likely* to take in order to protect the Great Lakes. Of the responses provided **29% indicated they would attend a public meeting organized by government or an NGO and 37% indicated they would engage in an online forum or group showed 37% of respondents indicating yes.** This speaks to the value of providing these mediums of engagement for the public to take part in.

Binational Awareness and Support

There is general low awareness of binational efforts and the IJC in the IJC polls. Those engaged in the public input forums (online and in person) clearly are much more aware of binational efforts and of the IJC. Between the two mediums of gauging public concerns the polls provide a balance for those who are typically less engaged and aware in contrast to those who contribute to the public input forums.

Additionally, a strong support for funding for the IJC to adequately meet its goals was mentioned in the polls (65% in 2015 and 70% in 2018) and funding for the Great Lakes was a top concern in public engagement forums accounting for 12.4% of total mentions. This speaks to a common support and concern for adequate funding to be provided to Great Lakes' initiatives and protections. This is further demonstrated in a 2017 Canadian public opinion poll conducted by Forum Research and a 2016 U.S. public opinion poll conducted by Healing Our Waters-Great Lakes Coalition which both show strong support for continued adequate funding to protect the Great Lakes. The Canadian public opinion poll showed among 1479 Canadian voters, a majority (57%) believe that if the United States cuts funding to the protection of the Great Lakes, that Canada has a responsibility to increase Great Lakes funding in response. Only (23%) say no, Canada does not have a responsibility to increase funding, with (20%) saying they don't know. Those most likely to support the funding were aged 34 and younger (61%), the least wealthy (63%) or earning \$80,000-\$100,000 (63%), living in Ontario (62%) or BC (60%), those supporting the Green Party (70%), and those with a post-graduate (61%) or college/university degree (59%) (Forum Research, 2017). The U.S. public opinion poll showed among 1,535 people living in the eight Great Lakes states: Ohio, Illinois, Indiana, Michigan, Minnesota, Wisconsin, New York (excluding the New York City metropolitan area), and Pennsylvania (Erie County, only) that large majorities (86 percent) living in the Great Lakes strongly support the federal

[†]Further details of the comparative analysis of the Great Lakes public opinion polls (GLPRN 2013, IJC 2015, and IJC 2018) as well as details of the public input data are discussed later on in the report in the sections titled *Comparative Analysis of Great Lakes Public Opinion Polls 2013-2018* and *Analysis of Qualitative Data from IJC Public Forums and Channels*.

government’s annual investment of \$300 million in Great Lakes restoration (Healing Our Waters-Great Lakes Coalition, 2016). Additionally, people polled feel that there are threats that remain in the lakes which they are very concerned about such as bacteria from untreated sewage, toxic pollutants such as mercury, invasive species like Asian Carp, toxic algae blooms in the Lakes, and polluted run-off from farms and that these should be addressed by continued federal government investments (Healing Our Waters-Great Lakes Coalition, 2016).

Figure 6. Summary of Findings Related to IJC and Great Lakes Funding

2015 IJC Public Opinion Poll	2018 IJC Public Opinion Poll	2016/2017 IJC Public Input Forums	2017 Canadian Public Opinion Poll	2016 U.S. Public Opinion Poll
65% support the IJC is adequately funded to meet its objectives	70% support the IJC is adequately funded to meet its objectives	Sixth most raised issue with 12.4% of total mentions pertaining to adequate funding for the IJC and/or the Great Lakes to meet basin goals	57% believe Canada has a responsibility to increase funds if the U.S. were to cut GLRI funding	86% of respondents living in the Great Lakes states strongly support the federal government’s funding for the GLRI

General Water Attitudes

The top value statements in the IJC polls are that the Great Lakes should be protected for the benefit of the fish and wildlife who depend on the lakes with 76% of respondents in 2015 and 79% in 2018 stating this as well as the concern that the economy will suffer if the Great Lakes are not healthy with 76% of respondents in 2015 and 78% in 2018 in agreement with this statement. 72% of respondents in 2015 and 74% in 2018 believe the health of the residents of the Great Lakes will suffer without the health of the Great Lakes.

During the public engagement forums 7.8% of participants made mention of issues related to habitat and wildlife and 7.8% of participants made mention of issues related to public health. As stated previously some of the common mentions in respect to habitat and wildlife were the need to protect and restore wetlands and stop development over wetlands; the need to look at forest degradation, focus on reforestation and dendro- and phytoremediation; and the need to focus on fish stock. Common mentions in respect to public health were concerns over microplastics and their impacts on fish and public; concerns over recreation related diseases/illnesses; TAP should better link issues to how they impact public health for people in affected area; concerns of nuclear on public health; and concerns over emerging pollutants such as persistent organic pollutants, PBDEs, and pharmaceuticals.

Figure 7. Summary of Findings Related to General Water Attitudes

2015 IJC Poll	2018 IJC Poll	2016/2017 IJC Public Input Forums
76% Great Lakes should be protected for benefit of fish and wildlife	79% Great Lakes should be protected for benefit of fish and wildlife	7.8% of total mentions pertain to habitat and wildlife concerns
72% believe a healthy Great Lakes is important to healthy communities	74% believe a healthy Great Lakes is important to healthy communities	7.8% of total mentions pertain to the Great Lakes and public health issues

Water Quality and Threats

The GLPRN 2013 poll found that pollution and contamination in general were of highest perceived concern of threats currently facing the Great Lakes with 55% mentioning it as the top concern and 74% mentioning it as one of the top three concerns. Asian Carp were the second most mentioned top threat by 8% of respondents and mentioned by 21% of respondents as one of the top three threats.

In the IJC polls pollution was the most mentioned top concern in both polls with 20% in 2015 and 19% in 2018. Invasive species ranked the second most mentioned top concern at 16% (2015) and 17% (2018). Water levels, water quality, industrial/business waste, the fishing industry, and sewage/waste were also among some of the issues that showed up on respondent’s radar for issues affecting the Great Lakes during the time of the study, albeit these issues accounted for a small percentage for respondents who see these issues as a top concern (2% to 5% respectively of mentions) or one of the top three concerns (6% to 16% respectively). Issues which were mentioned by some respondents but only accounted for 1% or less of top threats mentioned were chemicals, water diversion, toxic/nuclear waste, runoff/farm waste, algae, climate change, beach issues, and pharmaceuticals.

However, once prompted on specific issues in the polls, respondents show a higher degree of concern for what were some of the various less mentioned top threats. A new data point in the 2018 survey found that respondents all believe that climate change, flooding, nuclear waste, loss of wetlands, manure or animal waste, municipal wastewater runoff, impact of heavy rainstorms, algae blooms, invasive species (E.g. Asian carp, zebra and quagga mussels), the petroleum industry, pipelines, drilling, and fracking, will all have a high to extreme negative impact on the health and water quality of the Great Lakes (ranging across issues between 66-80% of respondents in agreement with this statement). The issues with the highest perceived negative impact to the Great Lakes are heavy rainstorms (72%), fracking (73%), climate change (73%), municipal wastewater runoff (74%), algae blooms (76%), and invasive species (80%).

During public engagement forums pollutants accounted for 16.6% of mentions. Invasive species accounted for 11.1%. Asian Carp accounted for 3.6% of total mentions. Additionally, many of the less mentioned top concerns in the polls showed up with more prominence during the public input forums including issues such as chemicals, toxic/nuclear, waste/ runoff/farm waste, climate change, the fishing industry, and beach issues. Some common mentions included for pollutants included concerns over PBDEs, emerging contaminants of concern, microplastics, pharmaceuticals, and the links between these

pollutants and public health concerns. Common mentions for Asian Carp included the Chicago Ship Canal is a threat for Asian Carp entering Lake Michigan and we need to better enforce ballast regulations to deal with Asian Carp. Common mentions for chemicals included adding radionuclides as a Chemical of Mutual Concern. Common mentions for farm waste included the need to address the threat of CAFOs. Common mentions for climate change included the need to take climate change more seriously and have a basin-wide strategy.

Figure 8. Summary of Findings Related to Top Concerns Facing the Great Lakes

2013 GLPRN Poll	2015 IJC Poll	2018 IJC Poll	2016/2017 IJC Public Input Forums
Pollution/contamination most mentioned top concern with 55%;	Pollution most mentioned top concern with 20%;	Pollution most mentioned top concern with 19%;	Pollutants third most raised issue with 16.6% of total mentions
Asian Carp second most mentioned top concern with 8%	Invasive species second most mentioned top concern with 16%	Invasive species second most mentioned top concern with 17%	Invasive species eighth most raised issue with 11.1% of total mentions (Asian Carp specifically accounted for 3.6% of total mentions)

Recreation and Activities

In the GLPRN poll 40% had gone swimming, 40% had gone boating, and 29% had gone fishing in the last twelve months. In the IJC polls participants were also asked which activities they had engaged in in the last six months. 38% of respondents in 2015 and 35% in 2018 had gone swimming or to the beach, 28% in 2015 and 27% in 2018 had gone boating, 19% in 2015 and 20% in 2018 had gone fishing. Across all three polls visits to the beach/swimming, fishing, and boating, were one of the top recreational activity among respondents.

During public engagement forums 6.5% of comments made mention of recreation and activities and 4.2% made mention of consumption of fish or other wildlife, with the focus on fishing. Some common mentions included the need for more information regarding beach closures and to know the exact criteria and have set standards across the lakes; concerns about recreational based diseases and human health; the need to engage more with subsistence anglers; and the need to focus on which communities are facing great issues - E.g. Concerns over moves to delist fish advisories in the area given high levels of mercury and PCBs in anglers around Detroit and Flint.

Figure 9. Summary of Findings Related to Top Responses for Recreation and Activities

2013 GLPRN Poll	2015 IJC Poll	2018 IJC Poll	2016/2017 IJC Public Input Forums
40% had gone swimming in last 12 months;	38% had gone swimming/to the beach in last 6 months;	35% had gone swimming/to the beach in the last 6 months;	6.5% of total mentions pertained to recreation and activities concerns;
40% had gone boating in last 12 months;	28% had gone boating in last 6 months;	27% had gone boating in the last 6 months;	4.2% of total mentions pertained to consumption of fish or other wildlife with a focus on fishing
29% had gone fishing in last 12 months	19% had gone fishing in last 6 months	20% had gone fishing in the last 6 months	

Consumer Actions and Behaviour

In the IJC polls the top action that respondents indicated they would be *willing* to take was conserving water (14% in 2015 and 18% in 2018). Actions which showed an increase in respondent’s willingness to take included properly disposing of waste (9% in 2015 to 15% in 2018) and taking political action (9% in 2015 to 20% in 2018). New responses in 2018 included *voting for a political candidate who supports Great Lakes protections/the environment (11%)*; volunteering time and money (6%); *fighting or protesting harmful development projects (3%)*; *not using bottled water (1%)*; and pollute less/waste less (5%). *Although protesting or fighting a harmful development project, as well as not using bottled water showed to be less likely actions individuals mentioned they would take in the polls, these issues both came up multiple times throughout the public input forums. Concerns over leadership and what impacts leadership would have on funding were also raised in the public input forums.*

Government Actions, Policies, and Regulations

Respondents in the IJC polls were asked if they felt there are too few, too many, or the right amount of policies and regulations in place. Those who believe there are too few rose from 46% in 2015 to 53% in 2018. Those who felt there are too many slightly declined from 7% in 2015 to 5% in 2018. During public engagement forums 11.4% of comments related to regulations and legislation. Common mentioned included: we disagree with mandatory regulations for agricultural pollution and believe voluntary initiatives are sufficient; or we support the 4R nutrient management and voluntary initiatives (Ohio Farm Bureau). More commonly mentioned however, was a call for mandatory regulations to accomplish nutrient reductions. Other common mentions included for the IJC to make specific proposals so compliance in respect to phosphorus runoff reductions is accomplished; current ballast water regulations should be strengthened for ocean vessels and Great Lakes vessels; and we are opposed to the US Commercial Vessel Incidental Discharge Act.

From the GLPRN poll:

- * Rebuild sewers to improve Great Lakes water quality, even if it requires an increase in your property taxes, 84%;

- * increase efforts to improve Great Lakes water quality, even if it requires higher taxes, 76%;
- * Reduce runoff from farm and the agricultural sectors even if it increases the cost of food, 77%;
- * Prevent new construction on wetlands, even if limits economic development, 73%;
- * Reduce the rate at which farmland or other natural areas are being paved over, even if it limits local economic development, 69%;
- * close the shipping channel near Chicago that may allow Asian carp to enter Lake Michigan, even if this harms the local economy, 53%;
- * enforce laws to reduce water diversion from the Great Lakes, even if it means citizens outside the Great Lakes face water shortages, 49%

During the public engagement forums, the need to improve sewage issues and water infrastructure was brought up on multiple occasions with 4.6% of total mentions. Wetlands, natural systems, and Asian Carp were also common issues brought up during the forums. Although it accounted for a small percentage, some participants also expressed their opposition and/or concern for any more diversions out of the basin as the climate warms.

Figure 10. Summary of Findings Related to Government Action, Policies, and Regulations

2015 IJC Poll	2018 IJC Poll	2016/2017 IJC Public Input Forums
46% believe there are too few regulations;	53% believe there are too few regulations;	11.4% of total mentions pertained to regulations with a focus on increasing, maintaining, or strengthening current regulations
7% believe there are too many regulations	5% believe there are too many regulations	

Energy Policy

The GLPRN 2013 poll also asked for participant’s degree of support for energy policy options in the Great Lakes basin. Respondent’s statements for ‘somewhat support’ to ‘strongly support’ were as follows: increase the use of renewable electricity in the Great Lakes Region, 86%; increase the use of onshore wind power, 84%; increase the use of offshore wind power, 80%; increase the use of hydroelectric power, 71%; increase the use of nuclear power in the Great Lakes Region, 32%; allow more offshore oil and gas drilling in the Great Lakes, 29%; increase drilling for natural gas and oil through hydraulic fracturing, also known as “fracking,” in the Great Lakes Region, 33%.

Overall, respondents in 2013 poll favoured renewables, hydroelectric, onshore and offshore wind, more so than they favoured fracking, offshore drilling, and nuclear options. During public engagement forums, mentions of nuclear 28.3%; mentions of pipelines/oil sector 8%; mentions of fracking 2.6%. Common mentions in respect to nuclear included concerns over the Deep Geological Repository in the Lake Huron basin. Common mentions in respect to pipelines included concerns over inaction on the threats of Line 5. Common mentions in respect to fracking pertained mostly to fracking waste contamination.

Figure 11. Summary of Findings Related to Energy Policy

2013 GLPRN Poll	2016/2017 IJC Public Input Forums
86% support the increase of the use of renewable electricity in the Great Lakes Region;	28.3% of total mentions pertained to concerns over nuclear in the region;
84% support the increase of the use of onshore wind power;	8% of total mentions pertained to concerns over pipelines and the oil sector in the region;
80% support the increase of the use of offshore wind power;	2.6% of total mentions pertained to concerns over fracking in the region
71% support the increase of the use of hydroelectric power;	29% support more offshore oil and gas drilling in the Great Lakes Region
33% support the drilling for more natural gas and oil, i.e. fracking;	
32% support the increase of the use of nuclear power in the Great Lakes Region;	
29% support more offshore oil and gas drilling in the Great Lakes Region	

Notable Issues Raised During Public Input Forums and Not Present in the Polls

Comments mentioning Lake Erie accounted for 10.4% of total comments. Common comments related to Lake Erie included Fermi 2; CAFOs are the real problem in Lake Erie with around 150 of them in the watershed, no one talks about this nearly enough and is doing anything about it; Lake Erie needs to be declared impaired to force people who are creating the problem to change their actions.

Comments mentioning science accounted for 11.4% of comments. Common comments related to science included overall better collaboration is needed in the science community of the Great Lakes; we need to share data more openly.

Comments mentioning TAP, PROP, and GLWQA accounted for 9.4% of comments. Common TAP and PROP comments included: TAP should provide information about each lake individually, how much change has occurred, and the reasons for the change; provide clear measurements of where changes (good or bad) have occurred; it is important to include lay-person input but also to communicate the science to the public effectively; the TAP provides an opportunity to provide non-scientific members of public an explanation of why policy decisions cannot always be made in ways that reflect the public preferences, hypotheses, or popular beliefs.

Comments mentioning environmental justice issues accounted for 6% of comments. Common commented related to environmental justice included the IJC should continue adding experts on social science, environmental justice, and economics to its boards and research committees; you can't just focus on scientific aspects of clean water, we need to focus on how to improve access to clean water; we need to pay more attention to Flint and Detroit.

Public Engagement

Comments related to public engagement and citizen engagement accounted for 11.4% of total comments. Common comments included: this is overwhelmingly government people, academics, scientists, policy-makers, and so on; we need more citizens here, on the ground citizens, to be engaged in the Water Quality Agreement process; we need to communicate with those who want to be engaged about how they can act for example on Annex 2 and this has been taking a long time to establish a plan for how people can act.

Comments related to Indigenous engagement accounted for 4% of total comments. Examples of comments included: the need for IJC to recognize jurisdiction and inherent treaty rights of First Nations in all governance matters affecting First Nations across the Great Lakes; the need for engagement with First Nations on development of reports of health of Great Lakes; the need to encourage more Indigenous subcommittee participation; in order to encourage meaningful engagement, resources need to be provided to participate and be fair and equitable; where are the regulators and the polluters when we are at these public forums?; for First Nations engagement you need to come to us directly and not just at these meetings; is there ever going to be room for an Aboriginal commissioner on your board?

Analysis and Insights from Canadian and US National Water Polls

RBC commissions water attitude studies on a yearly basis to gauge the Canadian public on their awareness, attitudes, and perceptions towards some of the issues facing Canadian water resources. The Value of Water Coalition also recently commissioned a study in 2016 to gauge the U.S. public on their awareness, attitudes, and perceptions towards some of the issues facing U.S. water resources. The RBC polls change in their focus slightly each year with topics ranging from awareness of water sources, support and attitudes regarding critical water infrastructure, support for policies and regulations, recreational use of water resources, among other topics. The U.S. Value of Water Coalition study took a focus on critical water infrastructure. For years that are not mentioned in comparisons (e.g. in the RBC polls), this is because some questions change year to year in the RBC survey instrument.

RBC Canadian Water Attitudes 2015-2017 Survey Highlights[‡]

Water Quality and Threats

Both the 2016 and 2017 polls asked respondents to name current threats to Canada's fresh water supply. Roughly a third of respondents in both years named climate change, as well as illegal dumping of toxins. Run-off was mentioned by 26% of respondents in 2016 and 27% in 2017. Wasteful use by industries was mentioned by 20% of respondents in 2016 and 24% in 2017. Mass exports of water to the US were mentioned by 19% of respondents in 2016 and 27% of respondents in 2017. Mismanagement of water by municipal, provincial, and fed governments was mentioned by 18% of respondents in 2016 and 19% in 2017. Wasteful use by individuals was mentioned by 17% of respondents in 2016 and 17% in 2017. Legal release of toxins was mentioned by 15% of respondents in

[‡]Responses pertaining to respondents from Ontario and Quebec are italicized to reflect these province's geographic relation to the Great Lakes basin.

2016 and 12% in 2017. Inadequate infrastructure (leaking pipes) was mentioned by 14% in 2016 and 17% in 2017. Other responses which accounted for 10% or less respectively, included lack of knowledge about Canada's fresh water, oil sands, wasteful use by agriculture, and newly mentioned in 2017 was HABs accounting for 8%. *Quebec was the least likely to have least concern over mass exports to US with 13% of respondents expressing this concern vs British Columbia as the most concerned accounting for 29% of respondents. Quebec was also least concerned over legal release of toxins with 9% of respondents compared to Ontario and the Prairies as the most concerned both with 18%. Quebec was also least concerned about mismanagement by governments and least concerned about lack of knowledge. However, Quebec was among most concerned about the oil sands with 10% and Ontario among the least concerned with 5%.*

In 2017 participants were asked questions to gauge their perceptions and attitudes towards threats to Canada's water resources. 25% felt 'very confident' that Canada could meet its long-term fresh water supply needs. Respondents were more confident about being able to meet their needs in their own region with 31% being very confident. 30% of respondents 'strongly agreed' that parts of Canada are at risk of a fresh water quality problem and 25% 'strongly agreed' that parts of Canada are at risk of a fresh water supply shortage. 67% indicated they believed climate change will have a negative impact on Canada's fresh water supply and quality. *Both Ontario and Quebec respondents provided statements of agreement that close to the national average. However, in respect to climate change, Quebec respondents are more likely to perceive climate change will have a negative impact on Canada's fresh water supply and quality and Albertans are the least likely to believe there will be a negative impact.* Younger respondents are also more likely to believe climate change will have a negative impact on Canada's fresh water supply and quality.

In the 2017 poll participants were also asked how serious they thought water management issues in Canadian communities would be ten years from now. For those who believed issues would be 'somewhat' to 'much more' urgent, 74% of respondents indicated this would be the case for protecting drinking water sources; 69% indicated this would be the case for deteriorating sewage infrastructure; 68% indicated this would be the case for deteriorating water distribution infrastructure; 68% indicated this would be the case for the increasing consumption of water supplies by users; 64% indicated this would be the case for managing wastewater treatment costs; 64% indicated this would be the case for managing purification treatment costs; 61% indicated this would be the case for declining groundwater levels; 61% indicated this would be the case for the loss of treated water through leaking infrastructure; 60% indicated this would be the case for government regulations related to water infrastructure; 60% indicated this would be the case for emergency preparedness (for floods, extreme weather, etc); 60% indicated this would be the case for the condition of stormwater management systems; 56% indicated this would be the case for vulnerability of the built environment to water damage; 50% indicated this would be the case for the loss of water permeable surfaces to pavement; and 49% indicated this would be the case for urban/city flooding. *Ontario and Quebec compare in their answers with other provinces, with roughly two-thirds or more feeling these issues will be more urgent in ten years. Ontario and Quebec respondents showed less urgency in their answers pertaining to loss of water permeable surfaces to pavement and urban/city flooding with only half of respondents in these regions feeling these will be more urgent.*

Responsibility to Protect Water Resources

Participants in the 2017 poll were also asked questions related to responsibility to protect water resources. When asked who is responsible for clean, fresh water management in Canada, participants were provided with an aided list of responses. It is the federal government's responsibility 79% said and 64% said it is the province's responsibility, 57% said it is the municipal government's responsibility, 28% said it is corporation's responsibility, 27% said it is the individual consumer's responsibility, 18% said it is NGOs responsibility, 13% said it is the IJC's responsibility, and 3% said none of the above. *The Ontario and Quebec respondents showed similar agreement with the national averages.*

Government Actions, Policies, and Regulations

In the 2015 and 2016 polls, participants were asked if they would agree with a stormwater surcharge being levied by municipalities on property owners with large paved surfaces. 32% of respondents in 2015 and 39% in 2016 'somewhat' to 'strongly' supported this statement. *Respondents in Ontario showed 26% in 2015 and 40% in 2016 that were somewhat to strongly in support of this action. Respondents in Quebec showed 27% in 2015 and 37% in 2016 supporting this action.* Although this represents less than half of respondents, it does suggest that a concern over paved surfaces and their impact on water management may be on the rise.

In the 2016 poll, participants were also asked if they would support or oppose water diversions to stressed regions that are experiencing water shortages (e.g. California who we depend on for food supply crops). 38% 'somewhat' to 'strongly' favoured this action and 30% 'somewhat' to 'strongly' opposed this. The remaining respondents were unsure or neutral. *Ontario and Quebec respondents showed similar levels of support and opposition as the national average.*

In the 2016 and 2017 polls participants were also given a list of ideas of ways that Canada could better protect fresh water resources. Roughly nine in ten respondents 'somewhat' to 'strongly' agreed that Canada could develop stricter rules and standards to manage water use by industry, commercial enterprises should pay for the full costs of delivering and treating all the water they use, commercial enterprises should have to obtain licenses for groundwater use, water management decisions should be better informed by science, and that we should require industry and municipalities to monitor and report all water use. In both year roughly six in ten respondents 'somewhat' to 'strongly' agreed that water costs for consumers should include the full costs of water delivery, sewage, and treatment and roughly three in ten respondents 'somewhat' to 'strongly' agreed we should charge more for household water use to encourage conservation. *Ontario and Quebec respondents showed similar levels of support as the national average.*

Consumer Actions

The 2016 poll asked participants were asked to give their agreement or disagreement towards statements pertaining to their behaviours towards products. 82% would not use or purchase personal care products containing microbeads due to the effects on environment, 68% take expired/unused medications back to pharmacy for disposal, 62% are willing to pay more for personal care products that are labelled as natural and/or organic, and only 11% sometimes flush medications down the toilet. *Ontario and Quebec respondents showed similar agreement to each statement as the national average.*

Participants in the 2017 poll were also asked if they consume more, less, or the same amount of bottled water compared to a year ago. 58% stated they consume about the same, 36% said less, and 6% said more. This shows there is an increasing trend to move away from bottled water consumption by Canadian. Participants who drank more bottled water or less bottled water were also asked reasons for doing so. Of the respondents who said they drink less 26% indicated they do it for the environment, 26% indicated they do it to save money, 23% indicated they have a home filter, 13% indicated they use reusable bottles, 7% indicated they have seen their tap water improve, 2% do not support bottled water companies, 2% and have concerns about toxins in plastic. Of the respondents who said they drink more 22% indicated they do so out of convenience, 22% substitute bottled water instead of soda, 20% indicated the water tastes better, 19% have a fear of tap water contaminants, 7% indicated their tap water is not drinkable, and 4% indicated they have been on too many boil water advisories. *Respondents from Ontario and Quebec showed similar response levels as the national average.*

Extreme Weather

All three RBC polls asked participants a series of questions pertaining to extreme weather. In the 2015 and 2016 polls 72% of respondents in 2015 and 76% in 2016 believed they lived in area vulnerable to flooding. 59% of respondents in 2017 felt that the seriousness of droughts and flood compared to ten years prior was somewhat to a lot more serious. Participants were also in 2017 how serious they felt issues would be in ten years from now such as preparedness for extreme weather events, floods, and droughts. 60% felt they would be somewhat to a lot more urgent. Participants in 2017 were then asked what their greatest concern over extreme weather events was. 47% mentioned water pollution, 38% mentioned drought affecting farmers, 37% mentioned forest/wildfires, 29% mentioned decreased water supply levels, 24% mentioned flooding, 13% mentioned water damage to property, and 11% mentioned damage to property from high winds 11%. *Ontario and Quebec respondents showed similar degrees of concern to these issues as the national average.*

Drinking Water Sources

All three polls asked participants what their level of confidence in their tap water was. 36% in 2015, 40% in 2016, and 42% in 2017 indicated they were 'very confident'. A majority of respondents indicated they were only 'somewhat confident' with 47% in 2015, 44% in 2016, and 47% in 2017. 16% in 2015, 15% in 2016, and 11% in 2017 were 'not very' or 'not at all confident'. *Ontario and Quebec respondents showed similar levels of confidence as the national average.*

Participants who answered 'not very' or 'not at all confident' were also asked in 2017 their reasons for their lack of confidence. 25% indicated fear of contaminants, 12% indicated bad taste/smell, 11% indicated they were unsure if the water was safe to drink, and 11% indicated old water infrastructure and lead in pipes. These were the top three concerns however other mentions which accounted for 6% or less respectively were a lack of competency by government to manage water systems, boil water advisories, concerns about source water, tap water is unfiltered, and hard water.

The 2016 and 2017 polls asked participants if they had ever experienced a boil water advisory. 24% in 2016 and 28% in 2017 indicated 'yes' they had experienced a boil water advisory. *The Prairies and Quebec were more likely to indicate yes. The number of respondents in Quebec who indicated yes increased from 33% in 2016 to 46% in 2017.*

In 2016, participants were asked about whether or not they had seen any information about pharmaceuticals or personal care products being found in water systems in Canada and around the world. 44% had heard of pharmaceuticals and 39% had heard of personal care products being found in water systems. Participants were then asked their level of concern towards the impact of fish and wildlife, drinking water, and human health of pharmaceuticals and ingredients found in personal care products. 90% were concerned about impacts to fish and wildlife, 87% were concerned about drinking water quality, and 84% were concerned about human health. *Respondents from Ontario and Quebec showed similar levels of awareness and concern as the national response average.*

The 2016 poll also asked participants to indicate their level of concern for First Nation's water issues. 45% indicated very concerned, 38% indicated somewhat concerned, 11% indicated not very concerned, and 6% indicated not at all concerned. *Ontario and Quebec residents showed similar levels of concern as the national response average.*

Infrastructure

All three polls asked participants a series of questions to gauge their level of concern, support, and awareness of infrastructure needs. Participants were provided a list for them to rank what Canada's highest priority for government funding for infrastructure should be. Drinking water infrastructure ranked in second after hospitals across all three years (2015, 14%; 2016, 14%; 2017, 31%). Other less mentioned water related infrastructure priorities included sewage collection/treatment, and stormwater management. *Ontario and Quebec respondents showed similar levels of government priority funding for infrastructure as the national average.* In 2016, participants were provided a list and asked to rank what the top three priorities for government funding for water infrastructure should be. 45% said water treatment systems, 41% said drinking water supply, 33% said sewage collection and treatment, 28% upgrading/repairing infrastructure to eliminate boil water advisories, 20% said green water infrastructure, 10% said repairing leaky water mains, 9% said stormwater management, 6% said infrastructure to protect against extreme weather and flooding, and 5% said none of the above. *Respondents from Ontario showed similar priorities for government funded infrastructure as the national average. Quebec respondents also showed similar priorities for government funded infrastructure as the national average; however, they were slightly less likely to mention drinking water supply and more likely to mention repairing leaky water mains than other provinces.*

All three polls also asked participants what their perceptions about the condition of their water treatment, delivery, and stormwater management systems were. 42% on respondents in 2015, 54% in 2016, and 40% in 2017 indicated they believed their water treatment and delivery systems in their communities to be in good condition. 10% in 2015 and 2016 and 21% in 2017 indicated they believed them to be in poor condition. 46% in 2015, 36% in 2016, and 39% in 2017 had no idea what condition their water treatment and delivery systems were in. In respect to stormwater management systems, 37% in 2015, 42% in 2016, and 49% in 2017 believed these systems to be in good condition. 11% of respondents in 2015 and 2016 and 17% in 2017 believed wastewater/stormwater systems to be in poor condition. Again, a significant percentage of respondents had no idea what condition wastewater/stormwater systems were in similar to the level of unawareness for water treatment and delivery systems (50% in 2015, 47% in 2016, and 35% in 2017). *Ontario and Quebec respondents showed similar perceptions of conditions as the national average.*

In the 2015 poll participants were asked two questions to gauge their knowledge and awareness of water infrastructure. The following highlights those who indicated somewhat to very aware of the conditions of the water systems serving their home: 54% of the water pipes servicing their home; 43% of the water treatment plants that service their community; 43% of the sewage system that manages wastewater leaving the home; 38% of the system that manages stormwater leaving their home; and 35% of underground municipal water pipes/mains that deliver water to their home. Participants were then asked questions to gauge their awareness of underground water pipes. In a question pertaining to lifespan, 30% indicated they did not know, 24% indicated 20-39 years, and 26% indicated 40-59 years. 7% indicated less than 20 years and 13% indicated 60+ years. In a follow up question, participants were asked how old they thought their pipes were. 19% believed they were less than 20 years, 35% believed they were 20-50 years, 13% believed they were 51-100 years, and 2% believed they were 100+ years. 31% did not know how old they were. Participants were also asked how much clean treated water they believed is lost to leakage in underground pipes in Canada's largest cities. 21% of respondents indicated 5-10%, 28% indicated 11-20%, and 22% indicated 21-30%. The remainder believed less than 5% or more than 50%. *Ontario and Quebec respondents showed levels of awareness to the national average.*

Participants were later asked how much they thought it would take to maintain and improve Canada's water infrastructure. The majority of participants believed it would cost \$59 billion or less. Only 17% believed it would cost \$60 billion or more. This is far less than the estimates given by the 2016 Canada Infrastructure Report that the combined replacement value of drinking water systems, stormwater systems, and wastewater systems is closer to \$270.6 billion. Broken down the report provides the following estimates by each respective system. The total replacement value for potable water systems of the assets reported by the 86 municipalities that provided data was \$84.4 billion. This corresponds to \$13,249 per household represented by the municipalities that responded to the potable water survey. Close to 75% of the total replacement value of water assets was for linear assets (transmission and distribution pipes). The breakdown of asset replacement values for the various asset types is shown in the following table. The total replacement value for wastewater systems of the assets reported by the 81 responding municipalities that provided data in this asset category was \$ 124.3 billion (including forcemains); this corresponds to \$18,462 per household served by the system. Seventy per cent of the total replacement value of wastewater assets was for sewer pipes (local pipes, trunk sewers and forcemains). The total replacement value for stormwater systems of the assets reported by the 84 responding municipalities that provided data for stormwater assets was \$61.9 billion. This corresponds to \$9,157 per household served by the system. Close to 91% of the total replacement value of the stormwater system was for pipes (collection pipes) (Canada Infrastructure Report, 2016).

In the 2015 and 2016 polls participants were also asked how they felt about various issues related to the replacement and repair of aging public infrastructure. 39% of respondents in 2015 and 48% in 2016 said they would be willing to pay more tax for upgraded infrastructure to ensure safe drinking water (9% increase). 28% in 2015 and 24% in 2016 disagreed with this statement. The remainder of respondents were neutral. For upgrades to wastewater/stormwater infrastructure 34% of respondents in 2015 and 42% in 2018 said they would be willing to pay more tax for the upgraded infrastructure to ensure safe treatment (8% increase). *Ontario respondents showed similar levels of agreement and support while Quebec respondents were least likely to support paying more taxes for infrastructure compared to other provinces.*

These results indicate that there are a significant number of respondents in the Canadian survey who are unaware of the conditions of their water systems, the cost for maintaining and replacing them, and the attitudes towards paying more in taxes to do so.

Recreation

Participants in the 2016 poll were asked which recreational activities they had the fondest experiences of when engaging in the outdoors. Top mentions included hiking (33%), swimming (33%), spending time on the beach (32%), and fishing (25%). Other mentions included skating, canoeing, powerboating, hunting, snowshoeing, and kayaking. Participants were also asked how concerned they were about water quality in rivers and lakes used for swimming. 22% indicated they were very concerned, 44% indicated they were somewhat concern, 27% indicated they were not very concerned, 6% indicated not at all concerned, and the remainder were unsure. *Ontario and Quebec respondents showed similar levels of concern.*

Communications

In the 2016 poll participants were provided a list of possible sources of information and asked how much trust they have for each source for providing them information about water quality and safety in Canada. 52% indicated they had trust in an NGO such as environmental and social advocacy groups. 51% indicate they had trust in their regional watershed/conservation authority. 48% had trust in a third-party water quality tester. 44% had trust in their municipal government. 39% had trust in their local utility. 38% had trust in their provincial government. 39% had trust in their federal government. Lastly, 35% had trust in the press and media.

Participants were also provided a list and asked where they would prefer to find information about water quality for beaches, lakes, and rivers from. With multiple answers accepted, a municipal website was the most frequently cited with 36%, at the beach with 29%, local TV/news with 25%, local newspapers with 19%, a regional watershed/conservation authority with 18%, an environmental NGO website with 17%, local radio with 15%, a mobile application with 5%, and don't know with 10%. 24% of participants indicated they do not check recreational water quality in their area. *Ontario and Quebec respondents showed similar preferences as the national response average.*

U.S. Value of Water Coalition National Water Attitudes 2016 Survey Highlights

Infrastructure

Participants were asked how important it is for public officials to make the necessary investments in water systems so that no other community experiences what has happened in Flint. 84% indicated it was very important with an additional 11% indicating it was somewhat important. Investing in the nation's water systems to avoid a public health tragedy such as Flint was perceived as a very convincing argument by 64% of respondents and a somewhat convincing argument by an additional 25% of respondents.

In respect to the perceptions about the current condition of the nation's water infrastructure 10% believed it to be in very good condition, with an additional 49% who believed it

to be in somewhat good condition. 34% believed it to be in somewhat to very bad condition. When asked about their community's water infrastructure 42% believed it to be in very good condition, and an additional 44% believed it to be in somewhat good condition. 13% believed local water infrastructure to be in somewhat to very bad condition.

In a follow-up question after participants were queried into their assessment of the nation's and local water infrastructure, 71% believed it to be very important to improve and modernize the water infrastructure system and an additional 24% believed it to be somewhat important.

In an earlier question, respondents were asked their willingness to pay more on their water bill to ensure reliable water service. Once respondents had answered questions pertaining to conditions of water infrastructure and importance of updating water infrastructure they were asked again what their willingness to pay more on their water bill would be to ensure safe and reliable water and wastewater service. Those willing to pay more rose from 47% to 60%. When prompted with percentage increases in their water bill (e.g. 5%, 10%, 15%) participants willing to pay more rose more so with 44% willing to pay 5% more, 26% willing to pay 10%, 6% willing to pay 15% more, and the remainder willing to pay 20% or more. Younger adults, minorities, and those with lower incomes were more willing to pay over 10% more.

Participants were also asked to rank their level of concern for the capacity of their local community to treat wastewater in a safe and environmentally responsible way. 56% were very concerned about treating wastewater in a safe and environmentally responsible way with an additional 28% being somewhat concerned.

In a series of statements regarding messages about the importance of water and the need to invest in our water systems three primary themes emerged for the majority of Americans. 64% believed we are all dependent on strong and reliable water infrastructure. Secondly, 64% believed we need to avoid public health tragedies. Thirdly, 53% believed water infrastructure is aging.

What the results from this poll indicate is that the more information and awareness respondents are provided with, the more willing they are to pay more.

Drinking Water and Water Sources

58% of respondents were very concerned about being able to drink water straight from the tap and an additional 17% were somewhat concerned. 48% were very concerned about their community's capacity to have enough water to sustain them through a drought with an additional 27% being somewhat concerned.

Recreation

45% of respondents were very concerned about lakes and rivers being safe for swimming, fishing, and other recreation with an additional 33% being somewhat concerned.

Relevance to Great Lakes Public Opinion Polls

In all three of the Great Lakes polls climate change did not show up as a top concern for threats to water quality whereas in the RBC polls climate change was a top mentioned threat to fresh water

resources. However, when prompted about impacts of climate change in the IJC polls, respondents felt it would have a negative impact. However, in the latest IJC 2018 poll climate change was only emerging as a top concern with 3% of respondents identifying it as the most significant problem facing the Great Lakes and 2% identifying it as a significant problem facing the Great Lakes when given the option to provide three responses. This may speak to the need to better educate the public about the impacts of climate change that are already happening in the basin.

The RBC polls also show that respondents support stronger regulations imposed on industry. Industry was also one of the top threats in the GLPRN 2013 poll and Ontario and Quebec residents showed similar levels of support as the national average to impose stronger regulations on industry. It may be useful to include a question about regulations for industry pollution and water consumption in future IJC polls.

Questions pertaining to pharmaceuticals, ingredients in personal care products, and microplastics were more prominent in the RBC polls than any of the other polls studied. The IJC could consider including questions more specific to the awareness, perceived threat, and actions willing to be taken by respondents in respect to dealing with these emerging contaminants in the Great Lakes.

Additionally, questions pertaining specifically to bottled water were asked in the RBC polls. This could also be a new data point in the IJC polls as it relates to rising concerns of the impacts of bottled water in the Great Lakes.

Heavy rainstorms, climate change, and flooding were all perceived that they will have negative impacts on water supplies across all polls when respondents were prompted to provide a ranked level of impact. It may be useful to include in future IJC polls a list of options of possible actions that respondents would support that could be taken to mitigate and adapt to these growing concerns.

The RBC polls also included a question which asked for level of concern regarding First Nation's water issues. The IJC could ask a similar question in future polls to gauge the non-Indigenous concern and support to act on these issues.

Across all RBC polls 2015-2017 as well as the U.S. Value of Water poll 2016, there was a strong emphasis on the public's perceptions, awareness, and attitudes towards critical water infrastructure including drinking water, stormwater, and wastewater management. This is lacking in the IJC polls and a new section should be included which looks at this. This can help to understand what kind of education and information the general public lacks and what kind of support they are willing to offer through various actions and behavioural changes in order to maintain and upgrade critical water infrastructure throughout the basin. This information can be useful to the IJC for helping to provide information and guidance to decision-makers (e.g. federal, provincial, and municipal decision-makers).

Comparative Analysis of Great Lakes Public Opinion Polls 2013-2018

During the years of 2013-2018 three basin-wide polls were conducted for the Great Lakes region to gauge the public's perceptions, awareness, attitudes, and opinions on various issues which affect the Great Lakes. The Great Lakes Policy Research Network conducted one poll in 2013, *Environmental Policy*

in the Great Lakes Region: Current Issues and Public Opinion and the IJC's Great Lakes Water Quality Board conducted two *Binational Great Lakes Basin Polls* in 2015 and 2018. Each poll used a telephone survey to collect data from residents living in the Great Lakes basin. The purpose of the GLPRN 2013 poll was to gauge public opinion on the value, current health, and success of a number of environmental policy issues impacting the Great Lakes basin. The purpose of the IJC 2015 survey was to establish baseline data for public awareness and attitudes on issues related to perceived threats to the Great Lakes, the importance of watershed and Great Lakes protection, and awareness of the IJC and cross-border water protection efforts. The IJC 2018 survey was a follow-up to the 2015 poll and also established some new data points with its questions.

The 2013 GLPRN poll included a study sample size of 1,247 interviews. The questions used in the survey instrument differed from the questions used in the IJC 2015/2018 polls but enough similarities between thematic categories such as policies and regulations were present for the 2013 poll to provide meaningful and valuable comparison to the IJC polls. The 2015 IJC survey included a study sample size of 3,950 interviews and the 2018 IJC survey included a study sample size of 4,250 interviews. Sample quotas for each poll were set for each state and province that comprise the Great Lakes basin and its approximate population of 33 million residents to ensure results were representative of the population across the basin. The 2018 poll also set quotas for Indigenous (Canada-First Nations, US-Native Americans or Tribes, Métis) respondents across the basin to introduce additional insight from these demographic cohorts of the population. This is of importance given that these cohorts of the Great Lakes population represent unique nations within the basin. The 2018 IJC poll included some revisions and new data points for survey questions but most of the original baseline indicators were retained (41 questions were asked in the 2015 poll and 18 new questions/data points were asked in the 2018 poll).

The subsections provided here represent the thematic categories used. These categories were used because they comprehensively encapsulate the range of questions and issues covered by each poll. Each subsection will provide a discussion of findings found in the comparative analysis across polls and will highlight where similarities and differences occur. Observed notable changes between the IJC basin-wide polls are also highlighted.

Binational Awareness/IJC Awareness and Support for Collaborative Efforts

Awareness

Both the 2015 and 2018 IJC polls asked participants questions to gauge their level of awareness for cross-border actions to protect the Great Lakes as well as their awareness of the IJC. 68% in 2015 and 70% in 2018 of respondents did not have any awareness of collaborative or cross-border actions happening between the U.S. and Canada. 14% in 2015 and 15% in 2018 indicated they were aware of cross-border actions and 18% in 2015 and 15% in 2018 indicated they were not sure. 72% of respondents in 2015 and 70% in 2018 had not heard of the IJC. 20% in 2015 and 21% in 2018 indicated they had heard of the IJC. Of those that had heard of the IJC 37% in 2015 and 36% in 2018 believed the role of the IJC is to protect the Great Lakes; 23% in 2015 and 30% in 2018 believed the IJC helps Canada and the U.S. to cooperate in lake protection. Other responses included assisting in cleaning up the waters, ensuring legislation is in place for protection, and unsure. Very few respondents had heard of or seen anything in the media about the IJC with only 6% in 2015 and 7% in 2018. 15% of respondents had heard of the Great Lakes Water Quality Agreement and 79% had not heard of the agreement. Overall,

there is low awareness for binational efforts in the Great Lakes and low awareness of the IJC. Indigenous respondents showed slightly less awareness of cross border actions (8% compared to 15.6% for non-Indigenous).

Support for binational collaborative efforts

Participants in the GLPRN 2013 were asked to respond how effective they felt Canada and the U.S. are in working together to care for the Great Lakes. Only 12% of respondents believed the two countries are 'very effective' in protecting the Great Lakes. The majority of respondents (64%) believed the two countries to be 'somewhat effective'. 12% of respondents felt the two countries are 'not very effective' and 3% believed they are 'not effective at all' on working to protect the Great Lakes. U.S. respondents were slightly more inclined to believe the two countries are 'very effective' at working together on the Great Lakes with 14% of respondents compared to 7% of respondents for Canada. U.S. respondents were also slightly more inclined to believe that the two countries were 'some effective' with 68% of respondents compared to 61% of respondents for Canadians. Both countries overall have a majority who believes the two countries are only 'somewhat effective' at working together to care for the Great Lakes.

Participants were then asked if they would support increasing coordination between states and provinces even if it meant giving up some of their state's/province's decision-making power. Here there was a majority response of support for this action ranging from 'somewhat' to 'strongly' support. 29% of respondents said they would 'strongly support' and 41% of respondents said they would 'somewhat support' this. 14% of respondents said they 'somewhat disagree' with this statement and 8% stated they 'strongly disagree'. This shows there is a majority support to increase and strengthen collaborative binational efforts in order to protect the health of the Great Lakes.

For the Great Lakes 2015 and 2018 polls participants were asked to rate the level of importance they assigned to the U.S. and Canada working together on dealing with Great Lakes issues as well as the importance for having an organization like the IJC and providing adequate funding to the IJC. 77% of respondents in 2015 and 76% of respondents in 2018 indicated it was 'important' to 'very important' for Canada and the U.S. to work together on protecting the Great Lakes. 10% of respondents in 2015 and 7% of respondents in 2018 indicated it was 'not important' or 'not at all important'. The remainder of respondents were unsure or neutral. 74% of respondents in 2015 and 78% of respondents in 2018 felt that the IJC is an important organization to have for protecting the Great Lakes. Only 7% in 2015 and 6% in 2018 did not feel it was important. 65% of respondents in 2015 and 70% of respondents in 2018 also felt that it was important that the IJC is adequately funded to fulfill its objectives. Only 5% of respondents in both years felt it was not important. Liberals⁵ were more likely to respond that it is important for Canada and the U.S. to work together on dealing with Great Lakes issues. Both Indigenous and non-Indigenous respondents felt it was important for the two countries to work together, that the IJC was an important organization, and it is important to adequately fund the IJC. However, Indigenous respondents were more likely to feel this way across all three questions.

⁵ The use of the word Liberals indicates respondents who identified in the polls as having politically liberal viewpoints and does not indicate a specific political party identification.

Currently, there is also low awareness of the binational efforts and low awareness of the IJC as an organization. Both countries overall have a majority who believe the two countries are only ‘somewhat effective’ at working together to care for the Great Lakes. Overall, across the two IJC polls, respondents feel Canada and the U.S. working together is important, the IJC is important, and funding the IJC is important. This raises the questions that with a majority of respondents supporting increasing coordination between states and provinces even if it meant giving up some of the state’s or province’s decision-making power, how can this information be used to communicate to the Parties the need for more collaborative efforts and support for the IJC as an organization?

Participants were asked a follow up question to gauge what the public considers to be the most important role of the IJC. A significant percentage of respondents were unsure (45% in 2015 and 34% in 2018), though the decrease in this number in 2018 indicates a growing awareness of issues affecting the Great Lakes. Thirty-four percent of respondents in both years stated protecting the water quality of the Great Lakes. Protecting the lakes from invasive species rose from 4% in 2015 to 7% in 2018. Reducing industrial and agricultural pollution also slightly rose from 4% in 2015 to 6% in 2018. Other responses which accounted for 4% or less of responses included education, promoting U.S./Canadian cooperation on water issues, punishing polluters, enforcing regulations, ensuring fish and other species are protected, ensuring safe drinking water, and monitoring water levels.

Figure 12. Summary of Finding Related to Binational Awareness

Poll	Awareness of cross-border actions	Awareness of IJC	Awareness of GLWQA
GLPRN 2013	n/a	n/a	n/a
IJC 2015	14% aware; 68% unaware	20% aware; 72% unaware	n/a
IJC 2018	15% aware; 70% unaware	21% aware; 70% unaware	15% aware; 79% unaware

Figure 13. Summary of Findings Related to Binational Support

Poll	Effectiveness of US/CAN working together	Increasing coordination between states and provinces	IJC is important to have	Important to fund IJC
GLPRN 2013	12% 'very effective'; 64% 'somewhat effective'; 12% 'not very effective'; 3% 'not effective at all'	29% 'strongly support'; 41% 'somewhat support'; 14% 'somewhat disagree'; 8% 'strongly disagree'	n/a	n/a
IJC 2015	n/a	n/a	74% yes; 7% no; 19% neutral or do not know	65% important; 5% unimportant;
IJC 2018	n/a	n/a	78% yes; 6 % no; 16% neutral or do not know	70% important; 5% unimportant;

Responsibility to Protect Great Lakes Water Resources

The importance of protecting the Great Lakes is strong among residents of the Great Lakes with 85% of respondents agreeing it is important in the 2015 IJC poll and 88% in 2018 IJC poll. The number of those who viewed it as unimportant also slightly decreased from 8% in 2015 to 6% in 2018. A follow up question asking who residents feel is *currently* responsible for protecting the Great Lakes, shows significant belief that 'everyone' has a role to play (42% in 2015 and 39% in 2018). These numbers are followed by support for the federal governments (18% in 2015 and 23% in 2018), and support for the state/province (17% in 2015 and 18% in 2018). The numbers slightly differ when asked who *should be* responsible for protecting the Great Lakes. 35% of respondents in 2015 and 32% in 2018 answered 'everyone'. Compared to the number of respondents who believe the federal government is currently responsible for protecting the Great Lakes there was marked increased in those who believe they should be responsible with 23% in 2015 and 28% in 2018. Those who believe the state/province should be responsible also slightly rose with 20% in 2015 and 21% in 2018. Respondents overall believe that individual residents, local governments, and industry have less responsible for protecting the Great Lakes (6% or less respectively). Liberals are slightly more inclined to believe the federal government should be responsible for protecting the Great Lake (35%) than moderates (25%) and Conservatives

(25%). Ontarian respondents also are more inclined to believe the federal government should be responsible for protecting the Great Lakes in both the 2015 and 2018 polls. Minnesotan respondents showed a significant increase from 2015 to 2018 in the belief that the federal government should be responsible for protecting the Great Lakes rising from 19% in 2015 to 34% in 2018. Indigenous respondents were also more inclined to believe the federal government should be responsible (42.8%) in contrast to non-Indigenous respondents (27%).

In a similar question in the GLPRN 2013 poll respondents were asked to answer how much responsibility each actor (a list of actors was provided) *should have* for taking actions to protect the Great Lakes. Under the category 'A Great Deal' of responsibility, 78% of respondents felt this applied to businesses and industries, 76% felt it applied to the federal government, 70% felt it applied to the state/province, 56% felt it applied to individual citizens, and 49% felt it applied to local government. For the same category of 'A Great Deal' of responsibility, Ontarian respondents gave slightly more importance to the role of businesses and industry with 81% compared to 76% for U.S. respondents. Significant more responsibility was given by Ontarian respondents to the federal government's responsibility with 87% compared to 72% for the U.S. respondents. Ontarians also assigned 'A Great Deal' of responsibility more so than the U.S. respondents for all remaining categories including: state/province (Ontario 78%) compared to U.S. 65%; local government (Ontario 59%) compared to U.S. 44%; individuals (Ontario 62%) compared to U.S. 54%. The U.S. respondents were more inclined to assign 'Some' responsibility to each actor provided to them in the list of possible answers.

Although divergences were present across the GLPRN and IJC polls, trends were also shown. This can be attributed to differences in methodology for these questions. For example, industry and businesses are given a significant increase in responsibility by respondents in the GLPRN 2013 poll than in the IJC 2015 and 2018 polls with industry only accounting for 1% of respondents in both IJC polls, however 78% of respondents felt that industry and businesses had 'A Great Deal' of responsibility in the GLPRN 2013 poll. This response accounted for the highest assigned responsibility among all actors provided in the GLPRN 2013 poll. The IJC polls on contrast showed the role of 'everyone' to be assigned the most responsibility by respondents for protecting the health of the Great Lakes. Reasons for these discrepancies can partially be attributed to the methodology for the way in which respondents could answer the questions. In the IJC polls, respondents were not provided with a list of possible answers and were asked to provide one unaided response. Respondents were only provided with a list of possible options if they answered 'Do not know'. This list included city/local government, state/provincial government, federal government, industry, residents/individuals, everyone/all. In the GLPRN 2013 poll respondents were provided with a list of various actors and asked to provide an assigned degree of responsibility to each one. However, despite these divergences a clear trend for the importance of the role of the federal government, followed by state/province was present across all polls with the federal government falling into the second ranking and the state/province falling into the third ranking for each poll. The role of local government and individual citizens were each given some importance by respondents for each poll but much less so than the other actors provided and named.

The role of the individual specifically, was addressed in all three polls. The IJC polls asked how important the role of the individual was and the GLPRN provided a statement for agreement/disagree *What I do in my life does not impact the health of the Great Lakes*. For the GLPRN poll 60% of respondents somewhat to strongly disagreed that what they do in their life does not have an impact on

the health of the Great Lakes highlighting that a significant percentage believes they play a role as an individual for protecting the Great Lakes. 37% somewhat to strongly agreed that what they do in their life does not have an impact. For the IJC polls 78% in 2015 and 80% in 2018 of respondents stated that the role of the individual was important. Only 10% of respondents in 2015 and 9% in 2018 felt that the role of the individual was unimportant. All respondents feeling that the role of the individual is important, however Indigenous respondents were even more likely to state this (97%) compared to non-Indigenous respondents (79%). Across all three polls it is observable that respondents do believe they have a role to play in protecting the health of the Great Lakes.

Figure 14. Summary of Findings Related to Responsibility to Protect the Great Lakes

Poll	Importance of Protecting the Great Lakes	Who should be responsible for protecting the Great Lakes?	How much responsibility should each actor have - 'A Great Deal'	Role of individual
GLPRN 2013	n/a	n/a	78% businesses and industries; 76% federal government; 70% state/province; 56% individual citizens; 49% local government	60% yes, their actions impact the Great Lakes
IJC 2015	85% important; 8% unimportant	35% 'everyone'; 23% federal government; 20% state/province; 6% or less respectively - individual residents, local governments, and industry	n/a	78% individual role is important
IJC 2018	88% important; 6% unimportant	32% 'everyone'; 28% federal government; 21% state/province; 6% or less respectively - individual residents, local governments, and industry	n/a	80% individual role is important

General Water Attitudes

Across the polls respondents show a trend in their perceptions about the current condition of the health of the Great Lakes. The GLPRN 2013 poll shows that 18% of respondents strongly disagree that the health of the Great Lakes has improved over the last 20 years and 12% who strongly agree that it has improved. 32% somewhat disagree that the health of the Great Lakes has improved and 27% somewhat agree that it has improved. Thus, 50% of respondents to some degree do not feel the health has improved and 39% believe it has. Roughly 11% of respondents were unsure. In a similar question for the IJC polls, 2015 shows 18% of respondents who believe conditions are improving and this number

decreases to 16% in 2018. A significant increase of respondents believes the health is deteriorating in 2018 at 33% compared to 26% in 2015. Roughly a third of respondents believe conditions are remaining the same for both polls. The GLRPN 2013 poll also shows a significant number of respondents who believe the current conditions to be poor (9%) to fair (43%). In contrast, 38% believed the Lakes at the time were in good condition and 5% believed the Lakes to be in excellent condition. In the 2015 IJC poll females, younger respondents (18-44), Liberal respondents, residents of Ontario, Minnesota, and Michigan were significantly more likely to say things are deteriorating. The same demographics were present in the 2018 poll as well as Indigenous and Pennsylvania respondents who were also more likely to perceive the health of the Great Lakes to be deteriorating. The trend across the polls is that there is an increasing number of respondents who feel the conditions of the lakes are deteriorating compared to those who believe the health of the lakes is improving.

Both IJC polls also asked participants to rate their agreement with statements regarding general water attitudes. The top value statements are that the Great Lakes should be protected for the benefit of the fish and wildlife who depend on the lakes with 76% of respondents in 2015 and 79% in 2018 stating this as well as the concern that the economy will suffer if the Great Lakes are not healthy with 76% of respondents in 2015 and 78% in 2018 in agreement with this statement. 74% of respondents in 2016 and 76% in 2018 were most concerned with the lake closest to them. 72% in 2015 and 74% in 2018 believe the health of the residents of the Great Lakes will suffer without the health of the Great Lakes. 68% in 2015 and 72% in 2018 believe the Great Lakes should be protected for the benefit of the people living in the basin. 60% in 2015 and 65% in 2018 agree it is important to protect the Great Lakes for the personal benefits that they receive.

Lastly, 53% in 2015 and 60% in 2018 are concerned about the Great Lakes as a whole. Comparable to the increase from 2015 to 2018 in the previous question that the Great Lakes condition is deteriorating, those concerned about the Great Lakes as a whole also increased. In the 2018 poll Indigenous respondents are more likely to strongly agree it is important to protect the Great Lakes for personal benefits they receive (93%) vs 49% non-Indigenous respondents; strongly agree Great Lakes Water Quality should be protected for benefit of people living in basin (97.5%) vs 53% non-Indigenous; strongly agree Great Lakes Water Quality should be protected for the benefit of fish and wildlife who depend on the lakes (99%) vs 64.3% non-Indigenous; believe economy of region will suffer if lakes are not healthy (94%) vs 76.4% non-Indigenous; believe health of residents will suffer if Great Lakes are not healthy (97.5%) vs 72.6% non-Indigenous; concerned about health of the Great Lakes as a whole (93.3%) vs 57% non-Indigenous; and agree they are most concerned about health of lake that is closest to them (98%) vs 74% non-Indigenous.

Figure 15. Summary of Findings Related to General Water Attitudes

Poll	Condition of the lakes	Why protect the lakes	Concern for lakes
GLPRN 2013	9% poor; 43% fair; 38% good; 5% excellent	n/a	n/a
IJC 2015	18% improving; 26% deteriorating; 30% staying same; 24% do not know	76% fish/wildlife; 76% for economy; 72% health of residents; 68% benefit of people; 60% personal benefits;	74% most concerned for lake closest to them; 53% concerned about all lakes
IJC 2018	16% improving; 33% deteriorating; 29% staying same; 22% do not know	79% fish/wildlife; 78% for economy; 74% health of residents; 72% benefit of people; 65% personal benefits	76% most concerned for lake closest to them; 60% concerned about all lakes

Consumer Actions and Behaviour

Both IJC Polls asked participants which actions they think they could be doing and which actions they would be willing to take to protect the Great Lakes basin. The top action that respondents indicated they would be *willing* to take was conserving water (14% in 2015 and 18% in 2018). Actions which showed an increase in respondent’s willingness to take included properly disposing of waste (9% in 2015 to 15% in 2018) and taking political action (9% in 2015 to 20% in 2018). New responses in 2018 included voting for a political candidate who supports Great Lakes protections/the environment (11%); volunteering time and money (6%); fighting or protesting harmful development projects (3%); not using bottled water (1%); and pollute less/waste less (5%). Other responses from the polls included ‘anything I can’ (10% in 2015 and 9% in 2018); be informed (6% in 2015 and 7% in 2018); take care of the environment (2% in 2015 and 3% in 2018); and blow the whistle on polluters (1% in both years). Indigenous respondents were more likely to indicate they would be willing to take political action (16%) vs. 10.9% for non-Indigenous and fight against development (31.7%) vs 0.7% non-Indigenous. These numbers speak highly to the discrepancy in issues being faced by indigenous peoples on the ground such as development projects in comparison to non-Indigenous residents. Non-Indigenous respondents were more likely to be unsure which actions they would be willing to take (20%) vs Indigenous respondents (2%).

A new data point was added in 2018 which asked which actions respondents would be *likely* to take. Respondents answers included: attend a public meeting organized by government or an NGO 29%; engage in an online forum or group 37%; contact a local elected representative or government official 32%; conserve water at home by using less installing water efficient fixture 74%; be more careful of disposing items down drain 83%. Liberals, respondents from Pennsylvania, and younger respondents

were more likely to engage in an online forum or group; Liberals, respondents from Pennsylvania, those with a university education, and those aged 55-64 were more likely to contact an elected representative; and Liberals, younger respondents, and respondents from Pennsylvania were more likely to attend a public meeting. Indigenous respondents were more likely to: attend a public meeting organized by the government or an NGO (70%) vs 26.5% non-Indigenous; engage in online forum or group (70.7%) vs 34.3% non-Indigenous; and contact a local elected representative or government official (64.3%) vs 30.1% non-Indigenous.

Water Sources and Wastewater

Participants were asked in both IJC 2015 and 2018 polls questions to gauge their knowledge of and perceptions about water sources and waste water. The majority of respondents indicated their drinking water came from a groundwater source (34% in 2015 and 33% in 2018). 20% in 2015 and 21% in 2018 indicated their drinking water came from a local lake. A large percentage of respondents had no idea where their water came from (23% in 2015 and 19% in 2018). 7% of respondents in both polls indicated Lake Michigan, 5% of respondents in 2015 and 6% in 2018 indicated Lake Ontario, and 4% of respondents indicated Lake Erie for both polls. Other responses (2% or less) included Lake Superior, local rivers, municipal treatment plant, Lake Huron, the Great Lakes, and Georgian Bay. Illinois (38%), Wisconsin (39%), Pennsylvania (36%), and Indiana were more likely to respond with groundwater sources; Ontario was more likely to respond with Lake Ontario, and Ohio was more likely to respond with Lake Erie.

In respect to waste water, 31% of respondents in 2015 and 28% in 2018 did not know where their wastewater went after it left their home. Some 17% in 2015 and 16% in 2018 said a septic system; 12% in 2015 and 11% in 2018 said a sewage plant; 11% in 2015 and 12% in 2018 said a wastewater treatment facility; 8% in both 2015 and 2018 said sewers; 8% in 2015 and 2018 said local lake and rivers. Other mentions of 4% or less each included into the ground/groundwater; specific lakes; run off to farms/field beds; or a reservoir. Overall, a significant number of people are unaware of what happens to their wastewater once it has left their home.

Figure 16. Summary of Findings Related to Water Sources and Wastewater

Poll	Where does your drinking water come from?	Where does your wastewater go?
IJC 2015	34% groundwater; 20% local lake; 23% no idea; 7% Lake Michigan; 5% Lake Ontario; 4% Lake Erie 2%/<2% Lake Superior/other	31% no idea; 17% septic system; 12% sewage plant; 11% wastewater treatment facility 8% sewers; 8% local lake/river; 4%/<4% other
IJC 2018	33% groundwater; 21% local lake; 19% no idea; 7% Lake Michigan;	28% no idea; 16% septic system; 11% sewage plant;

	6% Lake Ontario; 4% Lake Erie; 2%/<2% Lake Superior/other	12% wastewater treatment facility 8% sewers; 8% local lake/river; 4%/<4% other
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Water Quality and Threats

The GLPRN 2013 poll found that pollution and contamination in general were of highest perceived concern of threats currently facing the Great Lakes with 55% mentioning it as the top concern and 74% mentioning it as one of the top three concerns. Asian Carp were the second most mentioned top threat by 8% of respondents and mentioned by 21% of respondents as one of the top three threats. Water levels, invasive species, water quality, industrial/business waste, the fishing industry, and sewage/waste were also among some of the issues that showed up on respondent's radar for issues affecting the Great Lakes during the time of the study, albeit these issues accounted for a small percentage for respondents who see these issues as a top concern (between 2-5% of mentions respectively) or one of the top three concerns (between 6-16% of mentions respectively). Top threats which were mentioned by some respondents but only accounted for 1% or less respectively were chemicals, water diversion, toxic/nuclear waste, runoff/farm waste, algae, climate change, beach issues, and pharmaceuticals. US respondents (23%) were slightly more concerned than Ontarian respondents (16%) about Asian Carp and the Ontarian respondents (25%) were slightly more concerned about water levels than the US respondents (12%).

The IJC 2015 and 2018 polls had similar questions that showed different results in respect to percentage of respondent answers; however they showed similar trends of what respondents believe to be top threats facing the Great Lakes. Pollution was the most mentioned top concern in both polls with 20% in 2015 and 19% in 2018. Invasive species ranked the second most mentioned top concern at 16% in 2015 and 17% in 2018. Waste being dumped into lakes accounted for 6% of the most mentioned top concern for both years. Water level fluctuation, oil spills, runoff/drainage, algae, agricultural pollution, endangered species/fish depletion, and fracking accounted for a small percentage in both years (between 1-4% respectively). Algae had a slight increase in importance from 2% in 2015 to 4% in 2018. Issues which had not been mentioned in 2015 as a top concern such as pipelines, endangered species, and climate change/extreme weather showed up as emerging top concerns in 2018, though they accounted for 3% respectively or less of respondent's answers. Indigenous respondents show a slightly higher concern for climate change, algae, fracking, and the oil industry/pipelines but are much more concerned about endangered species/fishing (21.2%) vs 1.6% non-Indigenous.

For top three ranked mentions of threats from 2015 to 2018 invasive species (e.g. zebra mussels, Asian carp) raised in importance from 23% to 26%, climate change showed up as a new concern at 2%, and algae rose in importance from 2% to 5%. Pollution, industrial waste, and garbage waste accounted for 6% to 13% respectively of total top three ranked mentions in both years. Other less mentioned top three concerns included population growth/urban sprawl, wasteful use of water, chemical pollution, pipelines, agricultural pollution, water levels, fracking, traffic on water, overfishing, mercury, water removals, road salts, tourism, and commercial vessels. Notably the number of residents who cannot name any threat facing the Great Lakes decreased between the polls (24% in 2015 and 17% in 2018).

A new data point in the 2018 survey found that a majority of respondents believe that climate change, flooding, nuclear waste, loss of wetlands, manure or animal waste, municipal wastewater runoff, impact of heavy rainstorms, algae blooms, invasive species (E.g. Asian carp, zebra and quagga mussels), the petroleum industry, pipelines, drilling, and fracking, will all have a high to extreme negative impact on the health and water quality of the Great Lakes (ranging across issues between 66-80% of respondents in agreement with this statement). The issues with the highest perceived negative impact to the Great Lakes are heavy rainstorms (72%), fracking (73%), climate change (73%), municipal wastewater runoff (74%), algae blooms (76%), and invasive species (80%). Despite these issues appearing as less of a top concern in questions regarding top threats facing the Lakes, respondents clearly feel they will have a significant detrimental impact when they are prompted to rank the degree of threat posed by these issues. Younger respondents and the more Liberal are more likely to believe each issue will have an extreme negative impact. Conservatives respondents are more likely to believe there will be low to no impact caused by each issue. Females also show a higher concern of extreme negative impact for each issue than males. Indigenous respondents more likely to believe all of the above issues will have a high to extreme negative impact.

Reasons for protecting the Great Lakes were highlighted in both IJC polls. With multiple answers accepted the top two reasons included drinking/household water (20% in 2015 and 19% in 2018) and that they are a valuable resource (19% in 2015 and 18% in 2018). Less mentioned reasons (8% or less) included sources for fresh water, for the fish/fishing, our health, for the wildlife, recreational purposes, good for the economy, important for what the environment, important for the future, the right things to do, and commercial activity/shipping. In the 2018 poll Indigenous respondents are more likely to feel the lakes need to be protected for: fish/fishing 24.7% vs 5.9% non-Indigenous; for the ecosystem/environment 14% vs. 4.8% non-Indigenous; from development (commercial, residential, pipelines, etc.) 9.1% vs 1% non-Indigenous; and for future generations/children/grandchildren 10.4% vs. 1.2% non-Indigenous. Non-Indigenous people are more likely to feel the lakes need to be protected for: drinking water (19.7%) vs 11% for Indigenous; because they are a valuable resource (19.1%) vs 3.7% for Indigenous; and more likely to not know (18.1%) vs 2.7% for Indigenous. When respondents were prompted to rate their agreement in another question pertaining to reasons why the Great Lakes should be protected (reasons were provided in a list), for the fish and wildlife, for the health of the residents, and for recreational use were ranked with high importance. This shows that when respondents are prompted to think on these issues, they are also attributed high value.

Figure 17. Summary of Key Findings Related to Water Quality and Threats

Poll	Top threats (total mentions)	Top three threats (total mentions)	Impact of threats (list provided) (Top 6 – high to extreme negative impact)
GLPRN 2013	55% pollution/contamination; 8% Asian Carp; 2-5% water levels, invasive species, water quality, industrial/business waste, the fishing industry, and sewage/waste	74% pollution/contamination; 21% Asian Carp; 6-16% water levels, invasive species, water quality, industrial/business waste, the fishing industry, and sewage/waste	80% invasive species; 76% algal blooms; 74% municipal wastewater runoff; 73% climate change; 73% fracking; 72% heavy rainstorms
IJC 2015	20% pollution; 16% invasive species; 6% waste dumped into lakes; 1-4% water level fluctuation, oil spills, runoff/drainage, algae, agricultural pollution, endangered species/fish depletion, and fracking	23% invasive species; 12% pollution; 7% industrial pollution; 9% garbage/waste; 3% algae;	N/A
IJC 2018	19% pollution; 17% invasive species; 6% waste dumped into lakes; 1-4% water level fluctuation, oil spills, runoff/drainage, algae, agricultural pollution, endangered species/fish depletion, and fracking	26% invasive species; 13% pollution; 7% industrial pollution; 6% garbage/waste; 5% algae	N/A

Recreation and Activities

Across the GLPRN 2013 poll and the IJC 2015 and 2018 polls participants were given questions to gauge their connection to the Great Lakes through their recreational use of the waters. In the GLPRN

2013 poll 22% of respondents had visited all 5 lakes at least once during their lifetime, 15% had visited 4 lakes, 23% had visited 3 lakes, 21% had visited 2 lakes, and 18% had visited at least 1 lake during their lifetime. Only 2% indicated they had never visited any of the Great Lakes in their lifetime. When asked which activities they had engaged in in the last twelve months, 54% had gone for a beach visit, 54% had eaten fish from one or more of the Lakes, 40% had gone swimming, 40% had gone boating, 29% had gone fishing, and 11% had gone hunting.

In the 2015 and 2018 IJC polls participants were asked if they or any of members of their household use the Great Lakes for leisure or recreational purposes. 42% of respondents in 2015 indicated yes, with 44% indicating yes in 2018. For the 2018 poll the highest usage was among Indigenous or Métis respondents (60%), participants aged 45-54 (50%), 35-44 (47%) and 18-34 (46%) and larger households of five or more (54%), four (48%) and three (49%). 70% of respondents in 2015 and 73% in 2018 had used or visited a Great Lake in the last six months. Participants were also asked which activities they had engaged in in the last six months. 38% of respondents in 2015 and 35% in 2018 had gone swimming or to the beach, 28% in 2015 and 27% in 2018 had gone boating, 19% in 2015 and 20% in 2018 had gone fishing, and 10% in 2015 and 11% in 2018 had gone canoeing, kayaking, paddle boarding, or windsurfing. Other responses (5% or less) included skating, skiing, snowshoeing, and leisurely/scenic reasons. Indigenous respondents were more likely to use the Great Lakes for recreational purposes (61%) vs. 42.4% for non-Indigenous. Indigenous respondents were also more likely to have engaged in fishing/ice fishing (31%) vs 18.5% for non-Indigenous. Non-indigenous were more likely to engage in beach visits and swimming (37.6%) vs 12.8% Indigenous.

The IJC polls also asked participants how important it is that the Great Lakes are available for their recreational and leisurely use. 86% of respondents in 2015 and 89% in 2018 indicated that it is important to them. Only 7% in 2015 and 5% in 2018 indicated that it is not important for them. In a new question in 2018 participants were then asked how concerned they were about the health of their local lake or waterways being used for recreational purposes. Almost half of respondents (49%) indicated they were unconcerned and 24% indicated they were concerned. The remainder were neutral or did not know. Concern was highest in Michigan (35%), followed by Ohio (30%), Illinois (29%), New York (27%) and Pennsylvania (27%), while lower in Wisconsin (20%), Indiana (18%), Minnesota (16%) and Ontario (12%). Both Indigenous and non-Indigenous feel it is important to have the Great Lakes available for recreational purposes however Indigenous slightly more inclined to feel this way (95%) vs. non-Indigenous (80%).

Across all three polls visits to the beach/swimming, fishing, and boating, were one of the top recreational activities among respondents. The GLPRN 2013 poll provided participants with a list of six statements about the activities they engaged in in the Great Lakes. The IJC polls asked the question as an open question [unaided] and allowed for multiple responses. This accounts for some of the differences apparent between the 2013 poll and the 2015/2018 polls. Despite these differences in methodology for the questions, each question shows a trend of what the most popular activities are in the Great Lakes. Across polls there is also a trend that a significant number of respondents had used the Great Lakes for recreational purposes within the last six to twelve months. These trends can have implications for how outreach efforts and messages are targeted and the need to speak to the value of what is at risk of losing for recreation if we do not act.

Figure 18. Summary of Findings Related to Recreation and Activities

Poll	Have you visited/used the Great Lakes for leisure/recreation?	Which activities have you engaged in?	How important are the Great Lakes for recreational/leisure purposes?	Concern about local lake/waterbody available for recreation
GLPRN 2013	22% yes, all 5 lakes; 15% yes, 4/5 lakes; 23% yes, 3/5 lakes; 21% yes, 2/5 lakes; 18% yes, 1/5 lakes	54% beach visit; 54% eaten fish from a lake; 40% swimming; 40% boating; 29% fishing; 11% hunting	n/a	n/a
IJC 2015	42% yes	38% swimming/beach; 28% boating; 19% fishing; 10% canoeing, kayaking, paddle boarding, or windsurfing; 5%/<5% skating, skiing, snowshoeing, and leisurely/scenic reasons	86% important; 7% not important	n/a
IJC 2018	44% yes	35% swimming/beach; 27% boating; 20% fishing; 11% canoeing, kayaking, paddle boarding, or windsurfing; 5%/<5% skating, skiing, snowshoeing, and leisurely/scenic reasons	89% important; 5% not important	49% unconcerned; 24% concerned

Government Actions, Policies, and Regulations

Awareness

The IJC polls both asked participants if they were aware of any policies or regulations to protect the Great Lakes, and if so which ones. A majority of respondents were unaware (71% in 2015 and 73% in 2018). Roughly 10% of respondents in both polls indicated they were aware of policies or regulations. Of those who had heard of policies the most cited was the Clean Water Act (17% in both years) and legislation to remove foreign species (16% in 2015 and 14% in 2018). Overall, there is low awareness by respondents in the basin of what actions, policies, and regulations are in place to protect the Great Lakes.

Attitudes and Support

Respondents in the IJC polls were asked if they felt there are too few, too many, or the right amount of policies and regulations in place. Those who believe there are too few rose from 46% in 2015 to 53% in 2018. Those who felt there are too many slightly declined from 7% in 2015 to 5% in 2018. In 2015, 15% of respondents believed there is the right amount in 2018, 16% of respondents responded that there is the right amount. Younger respondents, Liberals, and Minnesotans showed greater support for more policies and regulations to be put in place. Indigenous respondents are more likely to feel there are too few policies and regulations to help protect the Great Lakes (95%) vs 50% non-Indigenous. Non-Indigenous respondents are more likely to feel there are the right amount (16%) vs 2.5% for Indigenous.

A new data point was added in 2018 which asked if respondents would be willing to have greater protections to the Great Lakes even if they would need to pay more for certain consumer products. Over half of respondents (55%) agreed they would and 18% disagreed. Younger respondents and females were more likely to be willing to pay more for products. Indigenous respondents were also more likely to pay more (91.2%) vs. 52.7% non-Indigenous.

Another new data point asked the impact increased regulations and their enforcement would have on the economy. 23% felt there would be a positive impact, 27% felt there would be a negative impact, and 30% felt there would be no impact. The remaining respondents did not know. People who expressed Liberal political viewpoints were most inclined to say there would be a positive impact (64%), conservatives were more likely to express a negative impact (82%), and moderates were more likely to believe there would be no impact (52%). Females were more likely to believe there would be a positive impact (28%) than males (18%). Indigenous (53%) and 18-34-year-olds (32%) had the highest numbers of responses indicating a positive impact, while participants 65+ years had the highest number of responses indicating a negative impact (33%). Geographically, Minnesota residents were most likely to indicate a positive impact (37%) and Wisconsin respondents were more likely to indicate a negative impact (34%).

In another question 76% of people in 2015 and 78% in 2018 felt the economy would suffer if the Great Lakes weren't healthy (Sec. 7, Q. 5). There was also an increase from 2015 to 2018 in another

question from 26% to 33% who believed the Great Lakes to be deteriorating (Sec. 1, Q. 3). Additionally, 53% in 2015 and 60% in 2018 were concerned about the Great Lakes as a whole (Sec. 7, Q. 7).

53% of respondents indicating they felt there would be no impact or a positive impact to the economy due to regulations can potentially have implications for the acceptability to increase regulations and enforcement to protect the Great Lakes on specific issues that require more urgent, proactive and timely action. However, almost a third of respondents do believe there would be a negative impact. **Whether or not these respondents would support increased regulations in order to protect the Great Lakes despite a perceived negative impact that this could have on the economy is important to understand. Future polls could incorporate a new data point to obtain this information from respondents.**

In the GLPRN 2013 poll participants were asked to state their agreement for a list of various policies which they would support in the Great Lakes basin. These responses all provide insight into support for regulations or policies which could have an impact on the cost of products and the economy. Respondent's statements for 'somewhat support' to 'strongly support' were as follows: strengthen regulations to reduce the release of pharmaceuticals and other contaminants entering the Great Lakes, even if the cost of drugs increase, 83%; rebuild sewers to improve Great Lakes water quality, even if it requires an increase in your property taxes, 84%; increase efforts to improve Great Lakes water quality, even if it requires higher taxes, 76%; reduce runoff from farm and the agricultural sectors even if it increases the cost of food, 77%; phase out coal-fired power plants to reduce mercury emissions in the Great Lakes Region, even if the cost of electricity increases, 66%; prevent new construction on wetlands, even if limits economic development, 73%; reduce the rate at which farmland or other natural areas are being paved over, even if it limits local economic development, 69%; close the shipping channel near Chicago that may allow Asian carp to enter Lake Michigan, even if this harms the local economy, 53%; increase the cost of water for households and businesses to encourage consumers to use less water, 52%; and enforce laws to reduce water diversion from the Great Lakes, even if it means citizens outside the Great Lakes face water shortages, 49%.

For all statements of support (with the exception of support to close the shipping canal near Chicago), Ontario respondents were more likely to indicate they 'strongly support' the policy, action, or regulation than U.S. respondents. For the closure of the shipping canal near Chicago, both U.S. and Canadian respondents show the same degree of support with one quarter of all respondents saying they would 'strongly support' this action. The most significant binational differences in responses occurred on the topic of phasing out coal (Ontario 48%, U.S. 24%) and reducing the rate of paved over lands (Ontario, 34%, U.S. 7%). Overall across the statements, there was a strong degree of support to increase protections even if it means paying more as a consumer or causing negative impacts to the economy. It would be useful to be able to find out similar information from respondents in future IJC polls.

The GLPRN 2013 poll also asked for participant's degree of support for energy policy options in the Great Lakes basin. Respondent's statements for 'somewhat support' to 'strongly support' were as follows: increase the use of renewable electricity in the Great Lakes Region, 86%; increase the use of wind power on land in the Great Lakes Region, 84%; increase the use of wind power off the shores of the Great Lakes, 80%; increase the use of hydroelectric power through dams in the Great Lakes Region, 71%; increase the use of nuclear power in the Great Lakes Region, 32%; allow more offshore oil and gas drilling in the Great Lakes, 29%; and increase drilling for natural gas and oil through hydraulic fracturing,

also known as “fracking,” in the Great Lakes Region, 33%. The US is slightly more in support of fracking and offshore drilling, but slightly less supportive of nuclear. Overall, both countries favour renewables, hydroelectric, onshore wind and offshore wind, more so than they favour fracking, offshore drilling, and nuclear energy options.

Figure 19. Summary of Findings Related to Government Actions, Policies, and Regulations – Awareness/Support/Attitudes IJC Polls

Poll	Awareness of policies/regulations to protect Great Lakes	Too few/too many/right amount of regulations	Willingness to pay more for products to protect Great Lakes	Impact on economy of increased protections
IJC 2015	71% unaware; 10% aware; 19% do not know	46% too few; 7% too many; 15% right amount	n/a	n/a
IJC 2018	73% unaware; 9% aware; 18% do not know	53% too few; 5% too many; 16% right amount	55% yes; 18% no	30% no impact; 27% negative impact; 23% positive impact; 20% not sure

Figure 20. Summary of Findings Related to Government Actions, Policies, and Regulations – Support (somewhat to strongly) GLPRN Poll

Action	Support
Rebuild sewers to improve Great Lakes water quality, even if it requires an increase in your property taxes	84%
Strengthen regulations to reduce the release of pharmaceuticals and other contaminants entering the Great Lakes, even if the cost of drugs increase	83%
Reduce runoff from farm and the agricultural sectors even if it increases the cost of food	77%
Increase efforts to improve Great Lakes water quality, even if it requires higher taxes	76%
Prevent new construction on wetlands, even if limits economic development	73%
Reduce the rate at which farmland or other natural areas are being paved over, even if it limits local economic development	69%
Phase out coal-fired power plants to reduce mercury emissions in the Great Lakes Region, even if the cost of electricity increases	66%
Close the shipping channel near Chicago that may allow Asian carp to enter Lake Michigan, even if this harms the local economy	53%

Increase the cost of water for households and businesses to encourage consumers to use less water	52%
Enforce laws to reduce water diversion from the Great Lakes, even if it means citizens outside the Great Lakes face water shortages	49%

Information Sources and Communications

Both polls asked participants questions pertaining to communications and information sources for issues related to the Great Lakes. Participants whom had indicated earlier in the surveys that they were aware of the IJC were also asked where they had heard of the IJC which changed from 36% in 2015 to 29% in 2018 whom indicated they had heard of the IJC from the television. 24% in 2015 and 21% in 2018 had heard of the IJC through the radio. 17% in 2015 and 15% in 2018 had heard of the IJC through the internet or websites. 14% in 2015 and 29% in 2018 had heard through online or print news sources. Other mentions (5% or less) said word of mouth, social media, or the IJC website. There was a slight decline in TV (7%) and radio (3%) sources and an increase in online and print news sources (15%) between 2015 and 2018. In 2015, respondents 55-64 were slightly more likely to get info from TV (50%) and younger generation slightly more likely to get information from the internet (28%) and the only respondents to mention social media (7%). In 2018, although social media only rose slightly from 2% to 5%, an increase was seen among all respondents aged 54 and under. This differs from only those aged 18-34 mentioning social media in 2015. This suggests the growing importance of understanding the effective use of social media for disseminating messages and information to the public which could help aid in the number of respondents who are aware of who the IJC is.

Participants were also asked a new question in 2018 in respect to their recreational use of the Great Lakes where they currently obtain local information about water, beach, and fishing safety, including warnings or pollutant advisories. 37% named news or media releases, 27% websites (including government), 9% social media, 8% through word of mouth and 3% public notices (at site). There were 11% that said they do not obtain information and 5% answered do not know. Older respondents were more likely to have heard information from news and media advisories, whereas younger respondents were more likely to hear from a government websites or social media.

When asked how interested they were in receiving news and information about issues relating to the Great Lakes, 50% of respondents in 2015 indicated they were interested, 24% indicated uninterested, 18% indicated neutral, and 8% did not know. In 2018, six in ten or 60% expressed interest up 10% from 2015. 18% indicated they were uninterested, 15% were neutral and 7% answered do not know. In both years those with Liberal view points as well as younger respondents were more likely express interest. Respondents from Ontario, Minnesota, Indiana, and Michigan were also more likely to express interest in receiving news/information. Indigenous respondents were more likely to be interested in receiving news about issues related to the Great Lakes (95%) vs 57% for non-Indigenous.

Lastly, participants were asked where they *currently* get information from and where they would *prefer* to get information from in respect to issues related to the Great Lakes. For *current* sources of information, roughly a quarter of respondents in both years mentioned online or hard copy newspapers, as well as a quarter who mentioned internet sources. Television followed with 22% in 2015 and 16% in 2018, then social media with 5% in 2015 and 14% in 2018. Radio accounted for roughly 10%

of respondents in both years, followed by word of mouth which accounted for 7% in 2015 and 5% in 2018. Lesser named mentions included magazines (1%), environmental organizations (1%) and water bills or through utilities (<1%), while 6% were unsure or could not recall (7% in 2015). In both years the older the resident, the more likely they are to use newspapers (online and print) to receive information. 18-34 shows the least number of respondents receiving information this way compared to those aged 65+. Younger residents are more likely to get information from the internet in general and social media compared to residents over the age of 34. As age increases, social media use decreases (e.g. in 2018, those aged 18-34 accounted for 29% of respondents and those aged 45 and older accounted for less than 6% of respondents respectively).

In the follow-up question which asked *preferred* sources, for the 2015 poll, 25% indicated the internet, 22% indicated the television, 20% indicated newspapers, 9% indicated social media, and 8% indicated radio. In the 2018 poll 29% indicated the internet, 19% indicated the newspaper, 16% indicated social media, 16% indicated television, 7% indicated the radio, and 2% indicated email. Other mentions (4% or less respectively) included word of mouth, ENGOs, mail, or not sure. Older respondents preferred newspapers in both years while millennials had the highest response of social media in both years with this increasing from 19% in 2015 to 34% in 2018. Millennials also more likely to mention the internet in both years with this number increasing from 29% in 2015 to 34% in 2018. Indigenous respondents are more likely to prefer newspapers online or print (26.7%) vs 18.8% non-Indigenous and social media (31.6%) vs 14.8% non-Indigenous. Non-Indigenous are more likely to prefer TV (17%) than Indigenous 0%. A third of both groups prefer the internet in general.

Figure 21. Summary of Findings Related to Communication and Information Sources

Poll	Where did you hear of the IJC?	Where do you get information about local water, beach, and fishing safety?	Interest in receiving news about the Great Lakes
IJC 2015	36% TV; 24% radio; 17% internet; 14% online/print news sources; 5%/<5% word of mouth, social media, IJC website	n/a	50% interested; 24% uninterested; 18% neutral; 8% do not know
IJC 2018	29% TV; 24% radio; 15% internet; 29% online/print news sources; 5%/<5% word of mouth, social media, IJC website	37% news/media; 27% websites; 11% no where; 9% social media; 8% word of mouth; 5% do not know; 3% public beach notices	60% interested; 18% uninterested; 15% neutral; 7% do not know

Figure 22. Summary of Findings Related to Current and Preferred Sources of Information

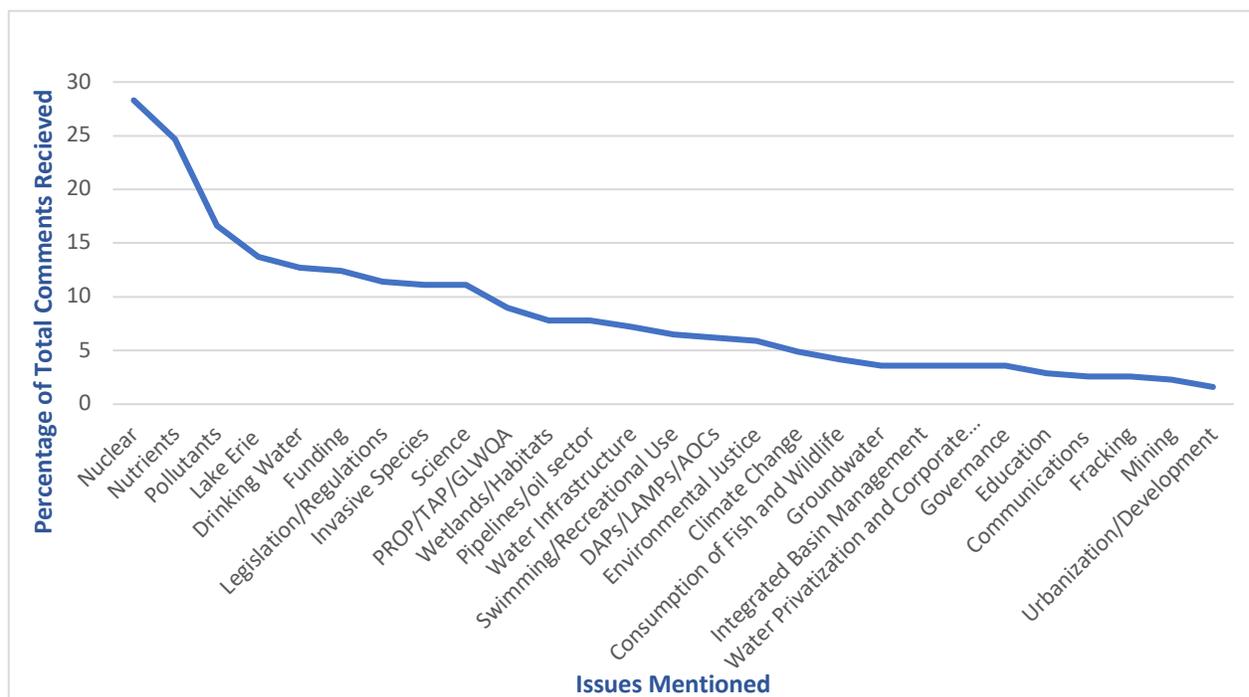
Poll	Where do you currently get information related to the Great Lakes?	Where do you prefer to get information related to the Great Lakes?
IJC 2015	26% online/print news sources; 22% internet; 22% TV; 10% radio; 7% word of mouth; 7% unsure; 5% social media; 1%/<1% magazines, ENGOs, water bills or through utilities	25% internet; 22% television; 20% newspapers; 9% social media; 8% radio; 4%/<4% word of mouth, ENGOs, mail, or not sure
IJC 2018	24% online/print news sources; 24% internet; 16% TV; 14% social media; 9% radio; 6% unsure; 5% word of mouth; 1%/<1% magazines, ENGOs, water bills or through utilities	29% internet; 19% newspaper; 16% social media; 16% television; 7% radio; 2% email; 4%/<4% word of mouth, ENGOs, mail, or not sure

Analysis of Qualitative Data from IJC Public Forums and Channels

This section will discuss issues which were brought up in the public forums/meetings which the IJC conducted during the fall of 2016 and March 2017 as well as the online public input received via Participate IJC (emails, letters) during this time period.

The following figure illustrates the number of times an issue was mentioned by a participant as a percentage of total comments made. 307 total comments were received. Some comments made mention of more than one issue and the numbers represented here are total mentions of each issue as a percentage of total comments received from participants.

Figure 23. Percentage of total comments received on each issue



Drinking Water

(i) be a source of safe, high-quality drinking water;

Drinking water accounted for 39 total mentions out of 307 comments (12.7%) received during the public input forums. Common mentions included the need to update drinking water infrastructure; the need to focus more on social science indicators and equitable and affordable access to safe drinking water; and the potential risks to drinking water from nuclear and pipelines (e.g. the deep geological

repository near Lake Huron and Line 5); concerns over bottled water companies; and the need to increase source water protections.

“People across the region are at risk of contaminated drinking water and the benefits of the Great Lakes are not shared equitably. I fear that there is general lack of urgency in addressing some of these critical threats to the Great Lakes and the people that call them home.” – Great Lakes Public Forum

Swimming and Recreational Use

(ii) allow for swimming and other recreational use, unrestricted by environmental quality concerns;

Swimming and recreational use accounted for 20 total mentions out of 307 comments (6.5%) received during the public input forums. Common mentions included the need for more information for beach closures, the need for criteria for beach closures to be clearly communicated, concerns about recreational based diseases and human health, and the need for more progress on human health indicators such as swimming, drinking, and fishing.

“We need consistent rules in the basin for why and how we close beaches.” – Oregon Public Meeting

“We need more indicators for recreation impacts beyond beach closings, such as CSOs and HABs.” – Buffalo Public Meeting

Consumption of Fish and Wildlife

(iii) allow for human consumption of fish and wildlife unrestricted by concerns due to harmful pollutants;

(Comments related to fish stocks were categorized under habitat. Comments pertaining to pollutants which could cause harm to fish in general, but not pertaining directly to fishing and fish consumption were put under the pollutant category.)

Fish and wildlife consumption accounted for 13 total mentions out of 307 comments (4.2%) received during the public input forums. Common mentions included concerns over impact of pollution on fish, the need more focus on swimmable, drinkable, fishable waters, and we need to focus and understand better which communities are facing greater issues (e.g. concern over moves to delist fish advisories in the area given high levels of mercury and PCBs in anglers around Detroit and Flint).

“Fishing isn’t like it was a century ago anywhere in the lakes, which reflects sickness in the water... Subsistence fishing is essential for our people, we’ve changed which parts we feed to our children to protect from contaminants, and we’re trying to get the message out to more of our community about which fish are safe to eat. The size of fish have declined dramatically, which is a huge economic impact for the Native fishing industry.” – Sault Ste. Marie Public Meeting, First Nations and Tribes evening session.

Pollutants

(iv) be free from pollutants in quantities or concentrations that could be harmful to human health, wildlife, or aquatic organisms, through direct exposure or indirect exposure through the food chain.

Pollutants accounted for 51 total mentions of 307 comments (16.6%) received during the public input forums. Common mentions included concerns over pharmaceuticals, plastics, microplastics, chemical pollution, nonpoint source pollution, air pollution, and calls to reinstitute the Binational Toxics Strategy.

“Pollutants such as pharmaceuticals and plastics among emerging pollutants are concerning. PBDEs are concerning and persistent organic pollutants. This is a public health concern.” – Email/letter

“Some form of the Binational Toxics Strategy be reinstated by the US EPA and Environment Canada under the 2012 GLWQA.” – Great Lakes Public Forum Meeting

Wetlands and Other Habitats

(v) support healthy and productive wetlands and other habitats to sustain resilient populations of native species;

Wetlands and habitats accounted for 24 total mentions out of 307 (7.8%) comments received during the public input forums. Common mentions included the need to protect and restore wetlands and stop development over wetland; the need to look at forest degradation and focus on reforestation and dendro- and phyto- remediation; and the need to focus on fish stocks.

“The Great Lakes needs to protect and restore its wetlands and add more. We need stronger policies to protect wetlands and policies that require compensation or offsetting where wetland impacts are unavoidable. We need investments by governments and others in wetland management. Wetlands and other natural systems should be considered critical infrastructure and be allocated infrastructure funding. we need a complete up-to-date wetland inventory. We need more investment in measuring ecological goods and services. We also need to expand on our body of science regarding wetlands. And we need more investment on wetland restoration on the ground.” – Great Lakes Public Forum Meeting

Nutrients

(vi) be free from nutrients that directly or indirectly enter the water as a result of human activity, in amounts that promote growth of algae and cyanobacteria that interfere with aquatic ecosystem health, or human use of the ecosystem;

Nutrients accounted for 76 total mentions out of 307 comments (24.8%) received during the public input forums. Common mentions included the need to be specific how we will meet phosphorus reductions; concerns about voluntary measures; support for voluntary measures from the farming community; the need for an enforceable plan for Total Maximum Daily Loads in Lake Erie; concerns over CAFOs and the need for regulations; concerns about sewage overflows; and concerns about algal blooms/harmful algal blooms.

“Help train us farmers in how to pollute less. Universities are telling us how much to apply while fertilizer companies are pushing more on us. Research needs to tell us what to do. We don't want to pollute, just train us with encouragement.” – Oregon Public Meeting

‘We need incentives, legal or financial to reduce excess nutrient run off from stormwater and agriculture. Lake Ontario is receiving a lot of pollution from Lake Michigan and Lake Erie. HABs and botulism outbreaks are an issue.’ – Email/letter

Invasive Species

(vii) be free from the introduction and spread of aquatic invasive species and free from the introduction and spread of terrestrial invasive species that adversely impact the quality of the Waters of the Great Lakes

Invasive species accounted for 34 total mentions out of 307 comments (11.1%) received during the public input forums. Common mentions included Asian Carp, quagga mussels, phragmites, concerns about the Vessel Incidence Act; and the need to strengthen ballast water regulations.

“Current ballast water regulations should be strengthened for ocean vessels and Great Lakes vessels. We are opposed to the US Commercial Vessel Incidental Discharge Act. The region needs a plan with assurance that actions will be taken for Asian carp and current contingency plan does not offer full range of options nor this assurance.” – Email/letter

Groundwater

(viii) be free from the harmful impact of contaminated groundwater

Groundwater accounted for 11 total mentions out of 307 comments (3.6%) received during the public input forums. Common mentions included concerns about ground water depletion due to bottle water companies such as Nestle; concerns about impacts of nuclear on groundwater; and the need to focus on groundwater and surface water equally.

“The Great Lakes needs to focus on surface and groundwater equally.” – Sault Ste. Marie Public Meeting

Other Materials, Substances, and Conditions

(ix) be free from other substances, materials or conditions that may negatively impact the chemical, physical or biological integrity of the Waters of the Great Lakes

The top mentions out of 35 comments in this section (11.4% of 307 comments received during public input forums) were climate change and urbanization/development. Climate change accounted for 15 total mentions forums and urbanization/development accounted for 5 total mentions. Common comments were the need for a basin-wide climate strategy; concerns over ice cover reduction affecting lake levels and fisheries habitats; extreme weather; the need for TAP to recognize climate change better; concerns over water diversions as the basin warms; concerns over shoreline development; and concerns over the impacts of urbanization on water quality. Other comments included concerns of Fermi 2 nuclear plant and lack of thermal regulations for water being put back into Lake Erie and concerns over water diversions from the basin in general.

“More research on climate change adaptation actions is needed.” – Email/letter

“TAP needs to recognize climate change better. Stakeholders all need to acknowledge and adapt to climate change.” – Oregon Public Meeting

“Climate change must be taken seriously.” – Email/letter

“Fermi 2 nuclear reaction takes millions of gallons of water from Lake Erie and has no thermal limits for water they dump back in the lake. The water temperature is 19 degrees higher than anywhere else in Lake Erie. This invites invasive species and algal blooms.” – Email/letter

Other issues highlighted**

This section includes issues which were highlighted during the public input periods which were not covered by a general objective per say or showed a high level of concern among participants.

Mining and Energy Sector (Nuclear, Pipelines, Fracking, and Mining)

Nuclear

Nuclear accounted for 87 total mentions out of 307 comments (28.3%) received during the public input forums. Common mentions included concerns over radionuclides and calls to add them to

“I am concerned about the burial of radioactive nuclear waste and the DGR leaking. I am concerned about protecting the groundwater of Lake Huron. I am concerned about radionuclides. Stop the DGR plan. Put radionuclides on the list of Chemicals of Mutual Concern.” – Great Lakes Public Forum

** Includes issues not covered by General Objectives and/or accounted for frequent mentions during the forums.

Annex 3; concerns over nuclear waste being transported through the basin; concerns over nuclear waste being stored in the deep geological repository; concerns over groundwater and drinking water being contaminated; and the need to undertake an independent study of the impacts of nuclear on the basin.

Pipelines/oil sector

Pipelines and the oil sector accounted for 24 total mentions out of 307 comments (7.8%) received during the public input forums. Common mentions included concerns over Enbridge Line 5 and the impacts of a leak or spill on Lake Huron and Lake Michigan; calls to decommission Enbridge Line 5; and the need to undertake a study about the impacts and risks of crude oil transport through the basin.

*“We are concerned about small leaks already occurring with Enbridge Line 5.” –
Sault Ste. Marie Public Meeting*

“Do something about Enbridge Line 5.” – Sault Ste. Marie Public Meeting

Fracking

Fracking accounted for 8 total mentions out of 307 comments (2.6%) received during the public input forums. Common comments included the need to better understand the impacts of fracking on the water and concerns over public health.

*“I am concerned about fracking and fracking waste in Michigan.” – Detroit Public
Meeting*

Mining

Mining accounted for 7 total mentions out of 307 comments (2.3%) received during the public input forums. Common mentions included concerns over heavy metals and cyanide pollution. One commentator mentioned that they are on a boiling water advisory as a result of mines in the Michigan Upper Peninsula.

*“We are receiving effluent from mines in the Michigan upper peninsula. We are on boil
water restrictions as a result. Governments keep passing the ball.” – Sault Ste. Marie,
First Nations and Tribes Evening Session*

Integrated Basin Management

Integrated basin management accounted for 11 total mentions out of 307 comments (3.6%) received during the public input forums. Common mentions included the need to take a headwaters down stream approach; the need to find a better balance between the lakes and their watersheds and the thousands of tributaries which contribute 48% of annual inflow to the lakes; and a need for greater collaboration between government and stakeholders.

“More integration between Annexes would be helpful for on-the-ground practitioners. More data sharing and management is needed for making links on topics such as algal blooms and eutrophication.” – Detroit Public Meeting

Domestic Action Plans, Lakewide Management Plans, Areas of Concern

DAPs, LAMPs, and AOCs accounted for 19 total mentions out of 307 comments (6.2%) received during the public input forums. Common comments included the need to be specific with how we will achieve phosphorus reductions for DAPs; the need for citizen forums for LAMPs to increase participation; the need for more effective engagement with LAMPs with Indigenous peoples, minorities, NGOs and other constituencies; and the need for government funding to address binational AOCs.

“We need citizen forums for LaMPS; without them there is not enough participation from grassroots organizations.” – Sault Ste. Marie

Lake Erie

Lake Erie accounted for 42 total mentions out of 307 comments (13.7%) received during the public input forums. Common comments included Lake Erie needs to be declared impaired to force those responsible for the problem to act; the need for an enforceable plan for the Lake Erie DAP and nutrient reduction targets; concerns over CAFOs; the need to regulate CAFOs; and concerns over Fermi 2 taking water from Lake Erie and dumping it back in without any thermal limits.

“Urge Commission to explicitly recommend state and provincial regulation of phosphorus application from agricultural lands. This includes actions such as banning application of fertilizer and animal waste on frozen, snow covered or saturated lands, and putting a moratorium of CAFOs in the Lake Erie watershed.” – Great Lakes Public Forum

“We have to regulate the use of animal waste around the basin. CAFOs shouldn't be allowed in Ohio, we don't have the proper regulations for them.” – Oregon Public Meeting

Water Privatization and Corporate Interests

Water privatization and corporate interests accounted for 11 total mentions out of 307 comments (3.6%) received during the public input forums. Common mentions included concerns over corporation plundering groundwater supply; concerns over privatization of water; concerns about Nestle; and calls for the governance of water to remain in the public domain; and a need for a deeper shared understanding of the science.

“Governance of water needs to remain in the public domain and public control so that clean water is affordable. Water should not be weaponized on the people of Detroit and Flint.” – Detroit Public Meeting

Science

Science accounted for 34 total mentions out of 307 comments (11.1%) received during the public input forums. Common comments included a need for increasing tracking of pollution; a need to implement additional water quality sampling sites throughout the basin; the need for research to be publicly available; a need for data to be more openly available; and a need to increase citizen science.

“We need more science-based decision making. Research needs to be made publicly accessible.” – Detroit Public Meeting

“We need to work more closely with academics on science and monitoring.” – Email/letter

Funding

Funding accounted for 38 total mentions out of 307 comments (12.4%) received during the public input forums. Common comments included concerns over cuts to GLRI funding and concerns over funding for drinking water.

“GLRI funding is imperative.” – Email/letter

Education

Education accounted for 9 total mentions out of 307 comments (2.9%) received during the public input forums. Common comments included the need to enhance environmental literacy; the need for full implementation of outreach and education subcommittees for the LAMPs; and the need to provide sufficient funding for education and research.

“We need to provide sufficient funding for education and research.” – Buffalo Public Meeting

“There needs to be full implementation of the outreach and education subcommittees for the LaMPs.” – Buffalo Public Meeting

“In addition to increased public engagement of vulnerable communities and indigenous communities, increased public education and outreach is crucial for public support for restoration projects. This will also help shift the public's behaviour to align with the goals of clean water.” – Email/letter

PROP, draft TAP^{††}, and GLWQA

PROP, TAP, and the GLWQA accounted for 29 total mentions out of 307 comments (9.4%) received during the public input forums. Common comments included the IJC recommend to Parties a transparent prioritization process that explains why some actions can be taken immediately and others cannot in respect to Objectives of the GLWQA; the need to include environmental justice in the PROP assessment; TAP needs a section about environmental justice; data in TAP needs to be translated so that it can be more easily digested by the public; the need to communicate how the IJC decides on its priorities in TAP; TAP needs more links to human health; and Annex 6 and Annex 7 committees should be recognized for their work and collaborative processes and these can serve as a model for other GLWQA objective or annex working groups.

“How does the IJC identify and decide on its priorities? We need to know this in the report.” – Oregon Public Meeting

“TAP needs to include a portion about environmental justice, affordability, public health.” – Detroit Public Meeting

^{††}Comments provided in respect to TAP were made on the draft TAP that was made available for public comment. These comments are not reflective of comments provided on the final TAP that was submitted to governments.

Water Infrastructure

Water infrastructure accounted for 22 total mentions out of 307 comments (7.2%) received during the public input forums. Common mentions included the need to implement and fund green infrastructure; the need to maintain and upgrade out critical water infrastructure; and concerns over stormwater infrastructure and CSOs.

“IJC expand draft TAP report to include recommendations to the Parties to support programs - including funding - designed to maintain and upgrade critical water infrastructure.” – Great Lakes Public Forum

“The quality and state of water treatment and supply infrastructure is a critical element of government programs to achieve general objectives of the agreement. We need to integrate efforts for waste, storm, and drinking water infrastructure. We need to upgrade drinking water infrastructure and explore various challenges to doing so and offer recommendations.” – Email/letter

Legislation and Regulations

Legislation and regulations accounted for 35 total mentions out of 307 comments (11.4%) received during the public input forums. Common comments included the need to develop an enforceable plan with mandatory regulations to meet nutrient management targets in Lake Erie; the need for stronger legislation for grey water and bilge water; the need to maintain and strengthen ballast water regulations; concerns about the Commercial Vessel Incidental Discharge Act; the need to regulate CAFOs; and the need for greater sewage discharge regulations.

“We need to put regulations on farms, livestock and agricultural. Farms are being given too much slack. Evidence has shown us that farms, especially factory farms will not take up voluntary measures.” – Email/letter

“Develop an enforceable plan for both governments for total maximum daily loads (TDMLs) for Lake Erie.” – Great Lakes Public Forum

“We are concerned about efforts in the US Congress to undermine the CWA protections through legislation such as the Vessel Incidental Discharge Act.” – Great Lakes Public Forum

Communications

Communications accounted for 8 total mentions out of 307 comments (2.6%) received during the public input forums. Common comments included IJC having more direct communication with major cities and municipalities where local regulation isn't pre-empted by larger governments; TAP needs to be communicated better and made more visually appealing for the public; fund media projects to get word out to the public about what the IJC is doing; use interactive maps for readers to explore areas where we are struggling or succeeding; TAP provides opportunity to provide non-scientific community explanations of why policy decisions cannot always be made in a way that reflect the public's preferences or popular beliefs.

"Please fund media projects to get word out to public about what you're doing. How can you communicate your message and what can we do to get the report out in a digestible form?" – Buffalo Public Meeting

"The TAP report could have been communicated better and been more visually attractive; there are no pictures in it. TAP is useful but it should be communicated in different media formats." – Buffalo Public Meeting

"The IJC should incorporate GIS mapping and data into its TAP reports." – Detroit Public Meeting

"Create interactive map for readers to explore areas where we are struggling or succeeding with general objectives." – Email/letter

Governance

Governance accounted for 11 total mentions out of 307 comments (3.6%) received during the public input forums. Common comments included recognizing the rights of First Nations across the basin and their role in governance matters; a need to understand water governance structures better; a need to pay more attention to urban centres; a need for a systems approach that links science and governance strategies; and a call for water governance to remain in the public domain.

"We need to understand water governance structures better. Urban centres are key." – Detroit Public Meeting

IJC encourages enhancing science modelling however we need a systems approach that links science and governance strategies. This should involve good process design to build trust and buy in from all sectors." – Buffalo Public Meeting

Environmental Justice

Environmental justice accounted for 18 total mentions out of 307 comments (5.9%) received during the public input forums. Common comments included the need for more equitable access to safe drinking water across the basin; the need to include environmental justice in TAP; the need for a social science team to determine social science indicators that could be linked to the Annexes; the need to pay more attention to Flint; and a call for The Parties to adopt an environmental justice policy applying to the Agreement as a whole.

“IJC needs to include environmental justice in its PROP assessment. IJC needs to improve its process of engagement with environmental justice communities.” – Great Lakes Public Forum

Environmental justice should have its own section in the TAP report. A working group to advise on social science indicators and environmental justice is a good idea.” – Detroit Public Meeting

“IJC should continue adding experts on social science, environmental justice, and economics to its boards and research committees. You can't just focus on scientific aspects of clean water. We need to focus on how to improve access to clean water.” – Detroit Public Meeting

Public Engagement, Citizen Engagement, and Indigenous Engagement

Public engagement and citizen engagement accounted for 35 out of 307 total comments (11.4%) received during the public input forums. Common comments included the need to better engage low-income and minority communities; the need to better engage beyond overwhelmingly government people, academics, scientists, and policy-makers; the need for citizen scientists, activists, and volunteers; the need for citizen forums for the LAMPS; the need for outreach and public engagement for AOC plans; the need for public engagement for the Annexes such as Annex 3.

“We need more citizens here, on the ground citizens, to be engaged in the Water Quality Agreement process. We need to communicate with those who want to be engaged about how they can act.” – Great Lakes Public Forum

Indigenous engagement accounted for 12 out of 307 comments (3.9%) during the public input forums. Common comments included the need for public engagement sponsors such as the IJC to come to First Nations communities to carry out public engagement meetings and not just the other way around of them coming to 'us'; the need for the IJC to recognize jurisdiction, sovereignty, and inherent treaty rights of First Nations in all governance matters affecting First Nations across the Great Lakes; the need to encourage more Indigenous subcommittee participation; the need to strengthen engagement with Indigenous communities and learn more from their perspective.

“We need to address that there are more than two nations in the Great Lakes. We need to acknowledge First Nations and their sovereignty in the Great Lakes, as well as their role in making the lakes swimmable, fishable, and drinkable.” – Great Lakes Public Forum

Recommendations

General Awareness of Water and Great Lakes

- 1) An area for future research includes looking into further strengthening current communications strategies beyond conventional mediums and methods. There is a need to work on communications strategies to increase the general public's awareness of the IJC and the work that it does which will also help increase awareness of binational efforts such as the GLWQA. This is important to gain buy-in for cross-border actions as well as the necessary uptake/action required by all stakeholders of the public. These strategies can include utilizing the vast network of ENGOs throughout the basin dealing with issues related to Great Lakes protections to help inform their followers, supporters, and networks of the work the IJC does as well as inform them of the GLWQA. This can also include further developing an online presence with strategic content that can appeal to identified audiences. This can be incorporated into social media accounts such as Twitter and Instagram. This requires the adequate funding, attention, and resources to effectively implement.
- 2) There is a need to educate those who do not know where their drinking water comes from or their wastewater goes. Governments, NGOs, and water utility companies need to help educate the public in order to increase the public's understanding, awareness, and value they place on having these critical water services which require upgraded and maintained infrastructure across the basin.
- 3) There is a need to educate the public on the process and costs of providing safe drinking water and managing and treating wastewater.
- 4) The IJC and government should examine which issues are currently low on the public's awareness as top threats in the polls and forums and how these align with what the science and evidence is telling us about the urgency of these issues (e.g. runoff/farm waste, algae, climate change, chemicals of concern, pharmaceuticals, microplastics). Which issues require more awareness on behalf of the general public than what is reflected by respondent's answers in the polls?

Awareness of Great Lakes Policies, Regulations and Actions

- 1) There is low awareness of policies and regulations to protect the Great Lakes. A public database was created by the GLPRN in 2014 which compiled all major policies and regulations in place across the basin. This could be made public by the GLPRN and the IJC could update annually.
- 2) Consider commissioning a study which looks at all major policies and regulations in place across the Great Lakes to compare for synergies, overlaps, conflicts, and gaps. This could help increase all stakeholder's understandings of where we are lacking and where we are doing well in respect to protections. This is important given the number of people who think there needs to be more regulations. (However, this could be quite large of a scope to take on for a project and may be difficult to commission).

Priority Public Concerns In the Basin By Rank According To the Polls and Public Input Forums

- 1) As pollution is a top concern across polls and in public input forums, hone in on what types of pollution people are aware of/concerned about. There is a need to educate the public more specifically on what sources of pollution are impacting the lakes and which sources are top concerns.
- 2) Ensure that an independent study by the IJC is commissioned to provide an up-to-date investigation into effects of nuclear on the basin so that concerns and perceptions can be addressed.
- 3) Fish and wildlife are a top concern across polls and in public input forums; invest adequate resources into science, studies, and on the ground initiatives for protecting fish and wildlife to reflect the prominence of this concern across the polls and during the public input forums.
- 4) Invest proper studies and attention into fish stocking issues, perhaps in cooperation with the Great Lakes Fisheries Commission.
- 5) Ensure continued funding and resources are put towards Asian Carp solutions. Strategize public outreach and education initiatives.
- 6) As invasive species are a top concern across the polls and in the public input forums; continue to ensure proper outreach and education initiatives are funded.
- 7) Engage more with subsistence anglers and communities which are disproportionately affected by fish advisories across the basin.

Engagement and Communication with Appropriate Actors

The findings indicate there is a need to effectively communicate to appropriate actors (e.g. commissioners, various government leaders of the respective parties) that:

- i) There is strong support to increase and strengthen collaborative binational efforts in order to protect the Great Lakes
- ii) There is strong support and agreement for having the IJC lead binational cooperation and decision-making.
- iii) There is strong support and agreement for providing adequate funding to the IJC to fulfil its objectives.

- iv) Ensure adequate funding and resources are continued to be allocated towards public engagement efforts as a significant percentage of respondents in the polls indicate they are likely to take part in attending a public meeting or engaging in an online forum
- v) There is a significant degree of concern for invasive species. Ensure that adequate and robust policies are put in place and that existing policies are either maintained or strengthened.
- vi) There is significant support from the public to increase protections and restoration for wetlands in the polls and public input forums.
- vii) There is a need to communicate to the Parties the concerns raised in respect to the Lake Erie basin (e.g. agriculture, Fermi 2, CAFOs, proposals for a declaration of impairment, and proposals for stronger regulations).
- viii) There is a need to pay attention to the attitudes and support from the public that is present in the polls and the public input forums regarding implementing regulations and policies. Continue to monitor this data point across future polls. Pay attention to what is being said during public input forums in respect to what regulations and actions various participants support or do not support. Pay attention to what the majority of respondents are saying across polls and during public input forums.

Strategic Engagement with Target Groups, Water Users and Key Publics

Youth

- 1) Millennials generally show a high degree of value placed upon protecting the environment and the Great Lakes in comparison to older generations according to the polls. Thus, there is a need to more effectively engage millennials and the youth in general (e.g. social media use and internet use is higher among youth and this should be tapped into to engage this demographic).

Indigenous Communities

- 2) Need to continue to work on how to effectively engage and collaborate with Indigenous communities (e.g. how to effectively tap into existing Indigenous transboundary networks across the basin, work on cultural and competency education and training for non-Indigenous water managers for a better understanding of Indigenous traditions, governance, and laws)
- 3) Social media and internet use is higher among Indigenous respondents in the polls than non-Indigenous and this should be tapped into to engage this demographic.
- 4) Emphasize and make use of Indigenous ethics and values towards water when crafting engagement and outreach messages and efforts in the basin.
- 5) Consult with Indigenous engagement working group on how to effectively organize public meetings with Indigenous residents (recall high willingness of Indigenous respondents in the 2018 poll to use this forum)
- 6) Consult with Indigenous engagement working group on how to effectively design and use online forums for Indigenous engagement (recall high willingness of Indigenous respondents in the 2018 poll to use this forum)

- 7) Indigenous are most likely to support more protections and regulations for the Great Lakes. Speak to Indigenous communities to understand which kinds of regulations and protections they would like to see that are currently are not in place.
- 8) Include more Indigenous subcommittee participation.
- 9) Sponsor Indigenous engagement throughout the basin by traveling to more Indigenous communities. Utilize Indigenous working group network and knowledge.

Local Governments, Authorities and NGOs

- 10) Respondents are most concerned about the lake closest to them. Leverage local concern by increasing collaboration, coordination, and engagement between binational governance agencies and municipal governance agencies – e.g. leveraging municipal governments and local ENGOs capacity to carry out engagement efforts for the lake and waterbody closest to them. **
- 11) Need media in local areas such as municipalities to create and send out outreach messages to increase education and awareness of the lake closest to them and the role each actor can play to better protect the water body closest to them. Also need to increase the general public's understanding of local lakes/waterbodies/tributaries and their connection to the Great Lakes basin as a whole.

Connections between Water and Health

- 1) Pay attention to connections between those who feel a healthy Great Lakes basin is important to the economy, those who feel the condition of the lakes is deteriorating, and those who would support increased regulations to protect the Great Lakes if the waters were in poor condition. E.g. how can this be tied to urgent issues/threats impacting the Great Lakes which may require further regulations?
- 2) Include more of a focus on public health in future TAPs as well as consideration of a public health annex and additional public health indicators that are not currently being used.
- 3) Link public health to environmental justice to address communities who are disproportionately facing concerns across the basin.
- 4) Findings across polls and public comments indicate a need for further studies in criteria for beach closures so that a standard set of indicators can be used across the basin and communicate this information to the public so that they are aware of the criteria/standards.
- 5) Strengthen engagement and public consultation processes with communities impacted by proposal development projects where there is a high concern for environmental harm and public health.
- 6) Trends for recreational use of the Great Lakes (e.g. the majority of respondents having either swam, visited a beach, went fishing, or went boating) can have implication for how outreach efforts and messages are targeted (E.g. the need to speak to the value of what is at risk of losing for recreation in face of current and emerging threats).

Recommendations for Future IJC Polls

- 1) Consider including questions in future polls which ask respondents what they think are the top causes and contributors of specific forms of pollution. Consider a follow-up question that asks

respondents what actions they believe could address these and/or what actions they would support to address specific pollution issues.

- 2) Include new question to gauge respondent's support and concern over various energy options.
- 3) Include new question that asks respondents where they *prefer* to get information regarding local information about water quality and safety (as a follow-up question of where respondents currently get their information from).
- 4) Continue using polls and public engagement forums (online and in-person meetings) as complementary mediums for obtaining public opinion and input as these reflect different cohorts of the public (e.g. the typically less engaged general public in the polls and the more engaged public during the organized public input forums).
- 5) Include poll questions that are more specific to climate change/extreme weather (e.g. *What negative impacts do you think climate change and extreme weather could have on the environment in the Great Lakes basin?*). There is also a need to focus more on educating residents about climate change and extreme weather in the basin (e.g. predictions, impacts, adaptation, mitigation) as a general low awareness of climate change and extreme weather was demonstrated in the Great Lakes basin polls.
- 6) Include new question(s) which gauge support for various actions that can help to mitigate the threats and impacts caused by climate change and extreme weather.
- 7) Consider including 'local waterbodies/waterways' in question pertaining to resident's use of the Great Lakes for recreation/leisure. (E.g. have you visited/used a Great Lakes or local waterbody/waterway within your community or region?) This helps to emphasize the connection residents have to water within the basin beyond use of the Great Lakes.
- 8) Incorporate new question(s) that gauge support to increase protections for the Great Lakes in face of current and emerging threats, even if the economy would be impacted. (Recall questions about attitudes towards the importance of the Great Lakes to the economy and the rise in respondents who believe the condition of the Great Lakes to be deteriorating.) This question could be modelled off of a similar question in the GLPRN poll which provides potential actions/regulations to implement and the reasons for doing so (e.g. what issue specifically will each action/policy address), followed by what the potential costs are (e.g. limiting local economic development).
- 9) Include questions that are specific to perceptions of issues such as heavy rainstorms, climate change, wastewater runoff, algal blooms. Include question which gauges what respondents believe to be top contributors of these issues, what issues they believe exacerbate these threats, and potential solutions and ways to mitigate these threats.
- 10) Include a follow-up question that gauges degree of support for various policies, regulations, and government actions which will help mitigate the impact of these threats.
- 11) Communicate in future polls the facts about Line 5 (e.g. age, potential risks) to gauge public opinion on Line 5. Communicate to the Parties the high degree of concern over Line 5 during the public input forums, particularly among Indigenous participants.
- 12) Consider including questions regarding support for renewable energy options in the basin.
- 13) Consider using questions from the GLPRN poll regarding support for various actions to address current and emerging threats (E.g. rebuilding sewers, reducing agricultural runoff, preventing new construction on wetlands) in future IJC polls. There is a need to understand more

specifically which policies, regulations, and actions the public would support and is aware of that can help to mitigate current and increasing threats to water resources.

- 14) The RBC 2017 poll asked a question to respondents of how much more urgent they felt issues would be in ten years that related to issues such as sewage infrastructure, water treatment costs, increasing consumption of water supplies, loss of water permeable surfaces, stormwater management systems, and preparedness for floods. IJC polls could include a question similar to this before asking respondents what kind of support they would offer to the solutions for mitigating and adapting to these impacts.
- 15) The RBC 2016 poll also asked consumer behaviour related questions to gauge people's behaviour towards products containing microbeads, expired/unused medications, and using products which are more environmentally friendly. IJC polls could include a similar question in a section that gauges awareness and lifestyle choices that impact microplastics and pharmaceuticals entering the Great Lakes and their tributaries.
- 16) IJC polls can consider modeling questions about extreme weather from the RBC polls to apply them to the Great Lakes context (e.g. preparedness for extreme weather events).
- 17) IJC polls should include questions pertaining to water infrastructure (e.g. awareness of current state, awareness of costs to upgrade and maintain, support for upgrading and maintaining, willingness to pay).
- 18) Include in future IJC polls questions pertaining more specifically to pharmaceuticals, ingredients in personal care products, and microplastics (similar to those asked in the RBC polls).
- 19) Include a question which gauges level of concern for Indigenous water issues.

Other

- 1) Based on comments on the draft TAP, examine and incorporate recommendations from public input forums regarding how to more effectively communicate future TAPs to the public.
 - E.g. notable comments made:
 - "Data in TAP needs to be translated so that it can be more easily digested by the public";
 - "There is a need to communicate how the IJC decides on its priorities in TAP";
 - "TAP needs to be communicated better and made more visually appealing for the public";
 - "use interactive maps for readers to explore areas where we are struggling or succeeding";
 - "TAP provides opportunity to provide non-scientific community explanations of why policy decisions cannot always be made in a way that reflect the public's preferences or popular beliefs"
- 2) Based off of comments received during public input, the IJC can consider in future/upcoming initiatives to commission a working group with a background in environmental social sciences to study environmental justice issues affecting communities across the basin. This working group could offer insights for priority issues in this area of environmental decision-making and help provide possible solutions for addressing environmental justice concerns and issues.

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Appendix

Coding index

Comments from the public input received by the IJC (in person meetings and emails/letters) were coded and categorized by issue or topic. These comments were used for the analysis of qualitative data from IJC public forums and channels.

Category	Issues/Topics Included in Search Criteria
Drinking Water	Drinking water; source water protection
Swimming and Recreational Use	Swimming; recreation; tourism
Consumption of Fish and Wildlife	Fishing
Pollutants	Pollutants; industry pollution; toxics; pharmaceuticals; plastics; chemicals of mutual concern (excluding nuclear related which has its own category); nonpoint source pollution; air pollution
Wetlands and Other Habitats	Habitat; forest degradation; wetlands; natural heritage systems
Nutrients	Nutrients; agricultural pollution; CAFOs; 4Rs; algal blooms; wastewater; sewage; bilge and grey water
Invasive Species	Invasive species; AIS; ballast water; discharge from vessels
Groundwater	Groundwater
Other Materials, Substances, and Conditions	Climate change; disaster management; urbanization; development; aquafarming; water levels; dredging; water diversions; water temperature
Mining and Energy Sector	Nuclear; DGR; radionuclides; energy transport; pipelines; Line 5; oil transport; fracking; mining
Integrated Basin Management	Integrated basin management; collaboration
Domestic Action Plans, Lakewide Management Plans, Areas of Concern	DAPs; LAMPs; AOCs
Lake Erie	Lake Erie
Water Privatization and Corporate Interests	Water privatization; corporate interests
Science	Science; data
Funding	Funding
PROP, TAP, and GLWQA	PROP; TAP; GLWQA
Water Infrastructure	Water infrastructure
Legislation and Regulations	Legislation; regulations
Communications	Communications
Governance	Governance; social science
Environmental Justice	Environmental justice; social science
Public Engagement and Citizen Engagement	Public engagement; citizen engagement; minority communities
Indigenous engagement	First Nations; indigenous engagement