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Providing Improved Livelihoods for Muskoka's Stakeholders in the Time of Two Global Crises

Andrew Court '22

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Prepared for: Stakeholders of the Muskoka Region

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Abstract

Climate change and the coronavirus pandemic have drastically impacted the livelihoods of Muskoka's stakeholders. Climate change has led to altered weather patterns and environments in Muskoka, which have negatively impacted stakeholders' (defined as permanent residents, seasonal residents and tourists) built infrastructure, mental and physical health, and these effects are only expected to worsen in the coming decades. Similarly, the coronavirus pandemic has caused many physical and mental health problems for Muskoka's stakeholders and has also led to tensions and anxieties regarding opinions about whether or not every stakeholder should be able to access the region during the pandemic. Although coronavirus cases are lower than prior months, the effects of the virus on stakeholders' livelihoods merits closer attention and analysis. I, Andrew Court, am a stakeholder in the Muskoka, Ontario region who greatly cares about the health of the environment and the livelihoods of stakeholders. This summer, I had the privilege of living in Muskoka and studying the effects of these two global crises to provide stakeholders with a framework for adapting to climate change and managing tensions around the coronavirus. I love Muskoka and its citizens, and I hope they find these suggestions helpful in improving their livelihoods.

Report Number: 1

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SECTION #1: AN EXECUTIVE SUMMARY FOCUSING ON HELPING STAKEHOLDERS ADAPT TO CLIMATE CHANGE AND MANAGE OPINIONS AROUND THE CORONAVIRUS PANDEMIC

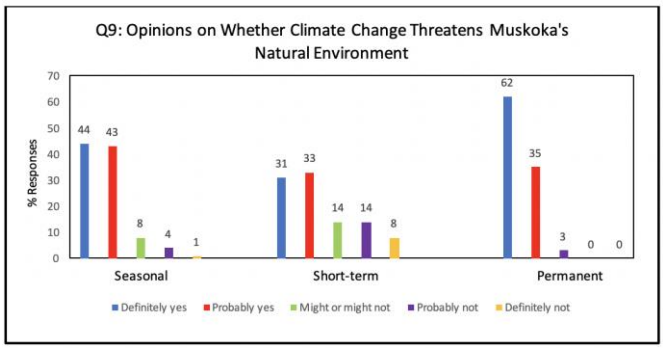
Introduction

Climate change and the coronavirus pandemic are two extremely strong forces which greatly impact the livelihoods of Muskoka's stakeholders. These twin crises have caused many disruptions to Muskoka's public health and economy. Climate change is predicted to cause much more intense storms which can destroy infrastructure and create other unfavourable environmental conditions, such as an increase in the presence of harmful algae blooms (HAB), tick-borne illnesses and variable temperatures, leading to an increase in heat/cold related deaths and sicknesses. These effects are also going to be exacerbated moving towards mid-century, especially if Muskoka's stakeholders (defined as permanent residents, seasonal residents and short-term visitors or tourists) do not adequately plan for and adapt to these predicted effects. Unfortunately, the coronavirus pandemic started affecting Muskoka's public health and economy around March, 2020, and stakeholders are now dealing with the harsh effects of both crises. The coronavirus pandemic has caused many mental and physical health problems in Canada and has also led to a hurting economy, as visitation was discouraged and Muskoka's economic base relies heavily on outside sources for revenue (mainly from seasonal residents and short-term visitors or tourists). Despite the fact that vaccines are rolling out quickly, tensions between stakeholders regarding opinions around this virus must be understood in order to improve their livelihoods. According to the data, the effects of climate change and the coronavirus pandemic, when piled together, are the worst effects Muskoka's stakeholders have ever faced. This means Muskoka's stakeholders livelihoods are currently degraded and may continue to be given the harsh predicted impacts of climate change by mid-century. However, if Muskoka's stakeholders understand what they need to do to plan for climate change and understand the differing values and opinions between stakeholders around the coronavirus, then they may be able to improve upon their current livelihoods. The effects of climate change and the coronavirus are global, but each region must adapt to and manage these crises differently to suite its unique circumstance. Fortunately, the Muskoka region has a strong natural buffer to the effects of climate change, allowing it to be more resistant to its effects than many other regions, especially if stakeholders know how to adequately adapt. As for the coronavirus, there are already less cases in Muskoka (GOC, 2021), and more visitation in the summer months is spurring the economy, presenting a better economic situation and if all stakeholders understand this, then tensions around this virus can be mitigated. Despite the extensive effects of these twin crises, there is much hope for the livelihoods of Muskoka's stakeholders, especially if they act now. My name is Andrew Court, an environmental studies Major at Hamilton College and a long-term stakeholder in the Muskoka region who is hoping to improve the livelihoods of stakeholders. In this executive summary, I have provided information and suggestions on how stakeholders can adapt to climate change (*Helping Stakeholders Adapt to Climate Change*) and understand values and opinions around the coronavirus pandemic *(Helping Stakeholders Manage the Impacts and Opinions around the Coronavirus*) in an attempt to elevate the livelihoods of all who frequent the region. It is important to keep in mind that in Section #2 (starting on page #10), I have provided a more detailed analysis of the underlying data supporting my claims made in Section #1A and 1B below, which are the two sections of this executive summary.

HELPING STAKEHOLDERS ADAPT TO CLIMATE CHANGE

Keep in mind that this information is here to prepare you, not scare you. Humans are highly adaptable, and I believe Muskoka's stakeholders can access a better livelihood if they consider the information, adaptations, and suggestions below.

First, on your right is a bar graph from a summer 2020 research project**,** which outlines stakeholders' opinions on whether climate change threatens Muskoka's natural environment (Court, 2020). Judging from the graph, only 9% of stakeholders selected "definitely not," suggesting that a large majority of stakeholders believe climate change threatens Muskoka's natural environment. Keep in mind that stakeholders live within this natural environment, which suggests they believe in climate change and that it may threaten their livelihoods (Court, 2020). Despite the fact that many stakeholers believe in climate change, its effects are only getting worse, and stakeholders need to start to adapt to these effects. Source for bar graph: (Court, 2020).



Second, climate change is expected to cause an increase in stochastic weather events, such as storms and extreme heat/cold events. Below is a table of the type of stochastic events, their predicted effects on stakeholder's public health and/or economy, and the best adaptation method(s) for stakeholders and local municipal governments of Muskoka.

Type of Storm and Predicted Effect(s)	Adaptation Method
Stochastic Event: Rainstorms **Predicted Effects:** ⇒ Muskoka's flood plain map, storm-water drainage system, and damming system are outdated and not equipped to deal with current or mid-century floods, indicating floods will have increasingly harsh effects on stakeholder livelihoods. ⇒ Effects include but are not limited to: destroyed or flooded homes, disruptions to traffic, and flooded docks.	**Stakeholders:** ⇒ Access the local flood plain map. Floods are increasing in severity, and if you are in (or close to) Muskoka's flood zone, I would strongly recommend you buy flood insurance. ⇒ If you own a dock, make sure nothing of importance is on it, especially during extreme rainfall events, ice-outs and snow pack melts. You can also raise your dock to avoid water levels exceeding it. **Local Government:** ⇒ Continually update flood map with new climate change models (err on the side of caution and use an RCP 4.5 or 8.5 scenario). ⇒ Build a new damming system and storm-water drainage system to manage peak discharge. ⇒ Develop new retention basins.
Stochastic Event: Windstorms **Predicted Effects:** ⇒ Fallen trees resulting in power outages and damages to infrastructure. ⇒ Wind can sometimes become so strong in Muskoka that it can break windows. ⇒ General disruptions to traffic, including an increase in collisions	**Stakeholders:** ⇒ Consider hiring a tree expert once every few years to monitor tree health around your cottage. Consider cutting down the trees that are at risk of severely damaging your infrastructure (large trees in poor health and leaning towards your cottage). DO NOT cut down trees that are not a significant threat to falling on your infrastructure. ⇒ Install hurricane-resistant windows to avoid them being destroyed by intense winds from hurricanes or intense wind/ice storms. ⇒ Make sure to monitor intense weather conditions to avoid driving or boating during a storm. **Local Government:** ⇒ Aid in the availability of tree experts and hurricane-resistant windows for Muskoka's stakeholders. ⇒ Make sure to notify the public of when an intense windstorm is coming. ⇒ Make sure to adapt old/build new infrastructure to be storm/hurricane-resistant.
Stochastic Event: Snow/Ice storms **Predicted Effects:** ⇒ Intense cold leading to broken windows. ⇒ Intense snow events leading to disrupted traffic. ⇒ General disruptions to traffic, including an increase in collisions.	**Stakeholders:** ⇒ Once again, consider buying hurricane-resilient windows. These are thick windows that will prevent against extreme cold and wind. ⇒ Buy snow tires for your car. ⇒ Have adequate snow materials (shovels, salt for walkway, car cleaner, etc.) **Local Government:** ⇒ Have an abundance of snow plows (and drivers) to manage extreme snow/ice. ⇒ Make sure to notify the public of when an intense snow/ice storm is occurring.
Stochastic Event: Extreme heat/cold days. **Predicted Effect:** ⇒ Intense cold/heat causing mortality, sickness, or uncomfortable living conditions.	**Stakeholders:** ⇒ Install adequate cooling (air condition) and heating systems in your households. ⇒ Have adequate snow gear, including a warm winter jacket, hat, gloves, boots, and snow-pants. **Local Government:** ⇒ Have heating and air conditioning in all government and public facilities. ⇒ Warn stakeholders when extreme heat/cold events are coming.

***Keep in mind that these effects of climate change are mainly storm related. Effects of temperatures on seasonality, water quality and the change in availability of pests still needs to be addressed.

Third, climate change is expected to cause seasonal changes in temperatures and precipitation, impacting recreation, tourism and recreational businesses. Specifically, there is supposed to be less snow/ice and a greater presence of warm/hot days, which impacts tourism and the economy associated with it. Below is a table listing the estimated impact of climate change on seasonal temperatures and precipitation, what the predicted effect of this impact on recreation is, and how recreational business owners and recreationists within Muskoka can adapt to these changes.

Estimated Impact of Climate Change and its Predicted Effect	Adaptation Method

Estimated Impact: Less snow/ice during winter months, on average. **Predicted effects:** ⇒ Less overall winter recreation ⇒ Less revenue for winter recreational businesses. ⇒ Fewer opportunities for stakeholders to engage in winter recreation, such as ice fishing, snowmobiling, and skiing. ⇒ Less tourism in the region during winter months, hurting Muskoka's economy.	**Business Owners** ⇒ Offer a variety of winter recreational activities in case one relies on a fixed state of the environment (a ton of snow, for example) which is not being offered that season. ⇒ Offer both summer and winter recreation (summer recreational opportunities may increase). ⇒ Expect a decline in snow/ice, on average, and potentially transition businesses to allow for more revenue opportunities outside winter recreation (maybe join with a summer recreational business to gain year-round profits). **Recreationalists** ⇒ Expect less ice/snow and the recreational opportunities that come with it. ⇒ Pick up summer recreational activity, as you will most likely be able to engage in that more frequently due to warmer temperatures and longer summers. ⇒ Go elsewhere to engage in activities which may not be prevalent in Muskoka, such as skiing. However, still make sure to support local winter recreational facilities, as they may struggle in the coming decades.
Estimated Impact: Longer summers and higher temperatures, on average. **Predicted effects:** ⇒ More overall summer recreation ⇒ More revenue for summer recreational businesses. ⇒ Increased opportunities for stakeholders to engage in summer recreation, such as wake-surfing, kayaking, and hiking. ⇒ More tourism in the region during summer months, aiding Muskoka's economy.	**Business Owners** ⇒ Continue functioning as usual and expect more recreational visitors. ⇒ Expand the recreational opportunities your business offers. ⇒ Aid winter recreational business owners through either joining with them or buying them out. **Recreationalists** ⇒ Expect more days to recreate during warmer months (these months/ days are increasing due to climate change). ⇒ Enjoy many recreational opportunities and feel free to find new ones.

*** As you may see, there is an expected decrease in winter recreation and an increase in summer recreation. Although the predicted impacts of climate change may leave total revenue within the region from tourism relatively the same (the increase in summer recreation is expected to offset the decrease in winter recreation) (Muskoka Watershed Council, 2016), stakeholders who own a winter recreational business or like recreating in the winter may suffer, especially if they do not consider the above suggestions. It is also important to note that there will be significant changes in seasonal patterns of temperature and precipitation, which may greatly impact Muskoka's farmers, especially those focused on cultivating maple syrup. If you are a farmer, refer to either source one or two (or both), as they will help you and your farm adapt to climate change.

Fourth, the changes in weather patterns, temperature, and precipitation as a result of climate change discussed above also result in effects on Muskoka's water quality, availability of insects/diseases, impacting public health and recreation. Below is a table that states what these effects are and how they occur, how they impact stakeholders' health and recreation, and what stakeholders can do to adapt to these effects.

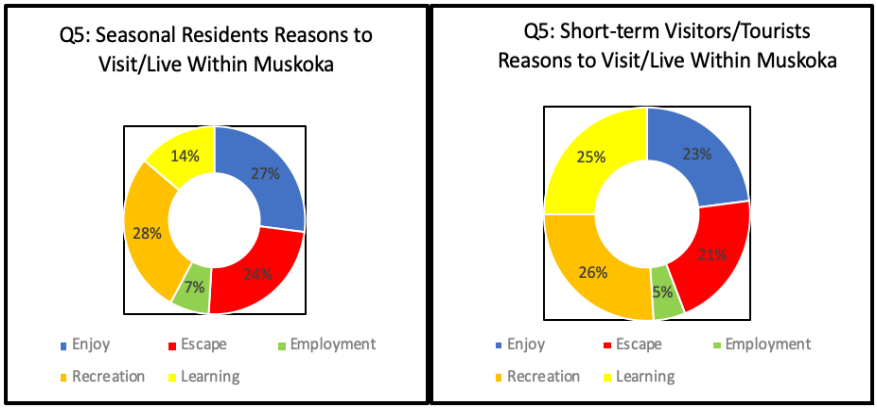
Effect of Climate Change and how it Occurs	**Adaptation Method**
Effect: Increased presence of Harmful Algal Blooms (HAB): **How it occurs:** A HAB is an excessive growth of algae on or near the water surface and results from an oversupply of organic pollution (such as fertilizers). HAB's threaten public health when present. For more information on HAB's, click this link.	**Recreation** ⇒ Fisherman should expect less fish, especially in areas with a high abundance of HAB's. To address this, fishers should monitor fish stocks and HAB abundance in the lake they wish to fish in. DO NOT overfish. ⇒ Worse water quality leading to less overall on-water recreation. To address this, the municipal government and non-profits in the area should engage in mitigation strategies. ⇒ All stakeholders should do what they can to limit non-point source runoff of nutrients, such as fertilizers from entering nearby streams or water bodies. **Health** ⇒ People can be exposed to HAB toxins by swallowing or swimming in affected waters, eating poisoned fish or shellfish (even when food is cooked, algal toxins remain), or inhaling airborne droplets of affected water (NRDC, 2021). ⇒ To avoid exposure to HAB's, make sure to check that water is clean before swimming. DO NOT drink unfiltered lake water.
Effect: Increased presence of pests such as ticks and mosquitoes: **How it occurs:** Warmer and wetter temperatures lead to a higher abundance of mosquitoes and ticks, which can carry harmful illnesses (such as Lyme disease) to stakeholders.	**Recreation** ⇒ Less eco-tourism and visitation during months of peak misquotes (spring months). ⇒ Less eco-tourism due to fear of contracting virus's or illnesses from ticks or other pests. Less eco-tourism due to a decline in large mammal populations (ticks kill off large mammals, such as moose). ⇒ To still enjoy eco-tourism in the region, change what species you are looking for and be open to new ways of enjoying Muskoka's beautiful environment. There are also many destinations and activities you can enjoy and visit in Muskoka which will be minimally affected by climate change. **Health** ⇒ Illness and in severe cases, death. ⇒ Degradation of mental health due to inability to go outside without being swarmed by pests. ⇒ To avoid risk of illness and being swarmed, install a screened in porch area. ⇒ If it is safe to do so, light an outdoor fire. Pests, such as mosquitoes, do not like smoke and will tend to leave you alone.

***There are more effects that were not listed in detail here. Please read Section #2A if you want to find out more.

Fifth, Muskoka's stakeholders must adequately plan for climate change given the predicted impacts on Muskoka's economy and public health. These effects impact stakeholder livelihoods in different ways given their values, interests, relative income, and where they live or frequent within Muskoka. Although the effects of climate change will be exacerbated in the future, if stakeholders take the necessary precautions to adapt to these predicted effects, they can maintain or improve their current livelihoods. Please start to plan for climate change now. Be as proactive as possible and realize that we are all in this together.

HELPING STAKEHOLDERS MANAGE OPINIONS AROUND THE CORONAVIRUS PANDEMIC

Keep in mind that this information is here to alleviate tensions between stakeholders on topics regarding the COVID-19 pandemic. If stakeholders can understand each other's opinions, they can undoubtedly alleviate tensions.



First, here are two pie charts from a summer 2020 summer search initiative detailing seasonal residents' and short-term visitors' or tourists' reasons to visit/live within the Muskoka region (Court, 2020). As you can see, most seasonal residents (79%) and short-term visitors or tourists (70%) visit/live within the region to escape from busy urban lifestyles and recreate and/or enjoy the natural environment. These reasons are important to understand, especially for permanent residents, as they tend to be the ones discouraging outside visitation due to an expected increase in coronavirus cases. However, if permanent residents better understand why it is necessary for other stakeholders to enter the region, even during a pandemic, then there may be alleviated tensions between stakeholder groups. Source for pie charts: (Court, 2020).

Second, there are three primary arguments around whether or not outside stakeholders (seasonal residents and short-term visitors or tourists) should be able to enter and access the Muskoka Region given the expected increase in cases that would occur. Below is a table that lists the argument and the reason for it:

Argument #	Reason for Argument
#1: Permanent residents deserve access to low coronavirus cases (safe conditions)	In this argument, you predominately have permanent residents arguing that seasonal residents and short-term visitors or tourists should not be coming to visit Muskoka because they already have a home and should stay there. This argument has some good points to back it. For one, there is a large population of Muskoka that are older (defined as 50+) (Stats, 2021), and older people are more likely to die or have health-related issues if they contract the Virus (CDC, 2021). Secondly, there are finite health resources in Muskoka, and if cases increased like expected, hospitals and ICU beds could be overrun (Paikin, 2020). The third and final argument that the results show is that visitors of Muskoka, on average, visit for pleasure, and this pleasure can wait until the coronavirus is at manageable levels or vaccines have been widely distributed (Goldfinger, 2020). This argument as a whole suggests that many permanent residents may want to keep Muskoka's environment and economy to themselves in order to prevent a rapid increase in COVID-19 cases at the expense of other stakeholders (seasonal residents and short-term visitors or tourists) not having the privilege of accessing the region. Below is a summary of what this argument is and what it may mean for Muskoka and its stakeholder's: ⇒ FAVORS LOW VISITATION = MAINTAINS PUBLIC HEALTH = LOWER ECONOMIC PROSPERITY (Court, 2020).
#2: Non-permanent resident's deserve access to Muskoka, especially during a pandemic	In this argument, you predominately have seasonal residents and tourists arguing that they deserve access to Muskoka. This argument has some good points to back it. For one, many seasonal residents own a cottage and feel they deserve access to enjoy it, especially if they are not receiving a property tax rebate (which they are not currently) (Goldfinger, 2020). Short-term visitors or tourists and seasonal residents argue that they deserve access to quiet and naturally beautiful environments, especially if they come from busy city life that currently consists of lockdowns, high coronavirus cases, and low livelihoods for most compared to before the pandemic (Teitel, 2021). This argument as a whole suggests that many seasonal residents and short-term visitors or tourists want to access Muskoka and enjoy its natural beauty despite the potential effects of their visitation on public health. Below is a summary of what this argument is and what it may mean for Muskoka and its stakeholder's: ⇒ FAVORS HIGH VISISTATION = INCREASE CASES = THRIVING ECONOMY (Court, 2020).
#3: permanent residents want visitors coming up to maintain their economy	As stated in the introduction, many permanent residents rely on seasonal residents and short-term visitors or tourists as a significant source of their revenue (TNS Canadian Facts, 2007). In this argument, you have permanent residents arguing for seasonal residents and short-term visitors or tourists to be allowed to come up to Muskoka whenever they want (Paikin, 2020). This argument has some good points. For one, Muskoka's economy derives around half of its profits from seasonal residents and short-term visitors and tourist's annual consumption, and because economic prosperity is such a significant determinate of an excellent citizenry livelihood (Robbins, 2020), all should be allowed in Muskoka to consume even despite the increase in COVID-19 cases that is expected (Paikin, 2020). Secondly, this argument allows for the most significant number of stakeholders to be happy, as it would align with the values of some permanent residents and virtually almost every seasonal resident and short-term visitor or tourist (Paikin, 2020). This argument as a whole suggests that permanent residents want seasonal residents and short-term visitors or tourists to continue their travel plans up north to Stimulate Muskoka's economy, producing a better economic livelihood for those who live in and visit the region at the expense of potential determinantal effects on public health. Below is a summary of what this argument is and what it may mean for Muskoka and its stakeholder's: ⇒ FAVORS HIGH VISITATION = INCREASE CASES = THRIVING ECONOMY (Court, 2020).

***Keep in mind that these arguments were based off of last year's research findings and recent online data.

Third, to further understand which argument may be the most prominent and best for all stakeholders, on average, I conducted eight interviews with local experts and permanent residents to understand why there are tensions between stakeholders regarding the virus and how to alleviate them. It is important to note that all of these arguments are valid and significant. I am by no means trying to tell stakeholders how they should feel, but instead helping stakeholders understand how others feel to alleviate tensions and what argument may ultimately be best for their livelihoods. As a whole, seasonal residents and short-term visitors or tourists tended to have similar values towards coming up to and visiting the region during the pandemic. This makes sense, as, of course, seasonal residents and short-term visitors or tourists want access to the region they love and enjoy, especially during a high-stress pandemic. Therefore, seasonal residents' and short-term visitors' or tourists' values and opinions around the virus tend to align with argument #2 or #3. However, permanent resident's (especially those who do not rely on outside visitation for revenue) values and opinions around the virus tend to align with argument #1. Despite this, I will show a table below which includes six questions asked to local experts and permanent residents about these arguments and general tensions around the coronavirus, and a summary of what they said:

Question #	Summary of Answer(s)
#1: Would you agree that it is best for all stakeholders (including seasonal residents and tourists) to have access to stay in the region during the coronavirus pandemic? If so, how do we convince permanent residents of this?	On average, experts agreed that it was best for all stakeholders to be able to visit the region. However, some push-back from certain experts warned that there would be an increase in cases. Despite this, experts mentioned that if stakeholders were vaccinated, they would have minimal issues with them visiting or living in the Muskoka Region, even during the pandemic.
#2: Do you see the coronavirus as a long-lasting threat to Muskoka's public health and/or economy?	On average, experts thought that the coronavirus will have long-lasting effects on the economy but not public health. However, experts, similar to question #1, believed that if everyone were vaccinated in the region, there would be minimal impacts on public health, and the economy would recover.
#3: Is there a divide between stakeholders regarding opinions around the coronavirus?	On average, experts believed that there are tensions between stakeholder groups regarding opinions around the coronavirus pandemic. experts said that there have always been tensions in the region, but the virus's effects have exacerbated them. These tensions are especially present between city dwellers (mainly seasonal residents and short-term visitors or tourists) who live in dense urban areas and coronavirus hot spots like Toronto or Mississauga. However, all experts who answered this question believed that these tensions could be mitigated through increased understanding.
#4: Do you think the tensions between stakeholders will last beyond the virus?	On average, experts believed that tensions between stakeholders will last beyond the virus. experts said that these tensions were present before the virus, but were definitely exacerbated by its effects. These tensions are mainly between permanent residents and seasonal residents/short-term visitors or tourists because permanent residents tend not to like it when outside stakeholders come to the region and alter its social components. However, experts believed permanent residents are not as mad or frustrated with other stakeholders as many think and that many of these tensions (especially regarding the virus) can be mitigated through increased understanding and higher vaccine rates.
#5: Do you think the combination of effects that the coronavirus and climate change have on Muskoka's stakeholders are the worst they have ever seen or experienced in history?	On average, experts believed that the combination of effects that the coronavirus and climate change have on Muskoka stakeholders are the worst they have seen in history. experts said that despite the historic lumber and tannery regimes in Muskoka's past which heavily degraded Muskoka's natural environment, these effects were not even close to as harsh on stakeholder's livelihoods as the current impacts of the coronavirus and future predicted impacts of climate change. experts also said there is much anxiety around climate changes predicted effects moving forward, worsening stakeholders' general livelihoods. Climate change related anxieties and impacts are further discussion in Section #2A.
#6: How can I best help provide an understanding to permanent residents on why other stakeholders should be able to access the Muskoka region, event during a pandemic?	On average, experts believed that permanent residents prefer low visitation from other stakeholders. However, experts said that if permanent residents understand better how much permanent residents (whether they own a business or not) rely on other stakeholders for economic revenue, they may be more inclined to want them to frequent the region, regardless of Covid. Also, experts said that every stakeholder should have access to the region for the sake of their livelihoods, especially during a pandemic, and if permanent residents understand this, they may be more understanding of the different values behind stakeholders wanting to visit the Muskoka region.

***Keep in mind that there is a differing number of answers per questions based on the expert's speciality and applicability to that question.

Fourth, judging from the summary of the answers in the above table, it is likely that argument #3, which is that permanent residents want visitors coming up to maintain their economy, is the best option for the majority of stakeholders. Specifically, arguments #2 and #3 align because they both argue for high visitation from seasonal residents and short-term visitors or tourists. Although these arguments clash with the values underlying argument #1, information in the above table suggests that many permanent residents can be swayed to understand that high visitation from outside stakeholders is vital for Muskoka's overall economy and the livelihoods of themselves, seasonal residents and short-term visitors or tourists. However, if you are a seasonal resident or short-term visitor or tourist, please get vaccinated (if you do not have an exemption or underlying health condition) to provide safer conditions for permanent residences and all stakeholders. Permanent residences, please understand that seasonal residents and short-term visitors or tourists just want to access the region to improve their general livelihoods. Seasonal residents and short-term visitors or tourists care about permanent residences and are not trying to take the region from permanent residents but rather share it. All of Muskoka's stakeholders must understand that people just want access to a strong livelihood and the pristine environment of Muskoka tends to really help people relax, be happy and mitigate the effects of the coronavirus on their physical and mental health. Please consider the above information and suggestions and allow for all stakeholders to enjoy the wonderful environment and region of Muskoka.

OVERARCHING CONCLUSION FOR EXECUTIVE SUMMARY

The current effects of climate change on Muskoka are harsh and the predicted impacts are even harsher, and many stakeholders just realized this. Upon this realization, the coronavirus started to affect stakeholders' physical and mental health significantly. These impacts, especially when compiled, are challenging to manage and are the worst Muskoka's stakeholders have ever seen. However, there are many ways to adapt to climate change given one's specific stake in the region. There are also many ways stakeholders can better understand each other's opinions and needs regarding the coronavirus pandemic. Many of these methods for adapting to climate change and managing opinions and arguments around the coronavirus are in this section (Section #1). However, if you want the full report, which has more details on Muskoka's environment, climate adaptation strategies, and suggestions on how to mitigate tension's around the coronavirus, please read the proceeding sections. I hope you find these suggestions and information helpful in improving your own and peers' livelihoods. Muskoka is so very special, and so are its stakeholders

2020 SUMMER RECAP AND 2021 SUMMER PLAN

In the summer of 2020, I had the privilege of studying humans' historical and current impacts on Muskoka's natural environment. Specifically, I wanted to understand the different values of stakeholders (defines as permanent residents, seasonal residents, and short-term visitors or tourists) within the region and assess how each of these groups can cause environmental degradation, and provide suggestions on how they can mitigate these impacts. In order to achieve this desired analysis, I created three small reports and combined them into one proposal titled *Proposing a Sustainable Future for the Muskoka Region*. The first report had the primary goal of outlining Muskoka's natural environment's current and historical state to understand the main threats to its sustainability and what demographic(s) have significant impacts on the surrounding natural environment by analyzing content from expert interviews online data. The findings of this report showed that the most significant local threat to Muskoka's natural environment is new development, and even though the current state of Muskoka's economy is in better condition than it was historically, short-term residents or tourist values are quickly leading to new forms of environmental degradation in the region (Court, 2020). The second report aimed to understand the general values each stakeholder group has towards Muskoka's natural environment to gauge what demographics may be the most significant cause of environmental degradation in the Muskoka Region by surveying Muskoka stakeholders. The findings of this report concluded that as a person's stake increases within the region, their relative impact on the natural environment (on average) decreases, all stakeholder groups wanted Muskoka's economy and general lifestyle to remain the same, and many stakeholders believe that climate change threatens Muskoka's natural environment (Court, 2020). Report three compiled the evidence of the first two reports, proposing and plan towards a sustainable future for all who inhabit the Muskoka Region through education and other unique suggestions tailored to each stakeholder group on what they can do to mitigate their personal and collective impact on Muskoka's natural environment (Court, 2020). If you want to find out more about these suggestions or the proposal in general, simply click this link.

It is important to note that I created this proposal and provided the above suggestions because I care about and value Muskoka's natural environment intrinsically. However, in creating and providing these reports, my main goal was to improve the livelihoods of residents and visitors in the region. I am a seasonal resident of Muskoka, and its pristine environment is vital to sustain to maintain the livelihoods of my friends, peers, and others who inhabit and frequent the region. Although in my last paper I did aid in the understanding of local threats to Muskoka's natural

environment, helping improve the livelihoods of Muskoka's residents and visitors, I have not yet assessed external threats that affect Muskoka's natural environment and the livelihoods of residents and visitors. Undoubtedly, the most current and problematic external threat to Muskoka's natural environment is climate change, and the most current and problematic threat to stakeholders' livelihoods within the region is the Coronavirus pandemic (Arsalides, 2021). Climate change is the most significant threat to natural environments worldwide (Introcasto, 2018), and despite Muskoka's currently resilient and healthy environment, it is not exempt from this. On October 29th, 2020, the District of Muskoka declared a climate emergency, deepening the district's commitment to protecting Muskoka's ecosystems, communities, and economy from the various impacts associated with climate change (Muskoka, 2020). Unfortunately, around six months later, Muskoka COVID-19 infection rates hit record levels (Arsalides, 2021). The climate crisis and coronavirus pandemic have apparent effects on Muskoka, such as declining environmental and citizens health and creating tensions between stakeholder groups (Court, 2020). The effects of and tensions around these two global crises within Muskoka merit closer attention and analysis and will be the main focus of this report.

I truly and wholeheartedly enjoyed helping stakeholders cope with and understand the different impacts and opinions around development and recreation last summer and hope to do this again this year through once again providing information that can help in improving the livelihoods of stakeholders by aiding them in understanding the different impacts and opinions around the Climate Crisis and Coronavirus pandemic. To achieve this, I have created a second and third section of this report: outlining the current state and effects of climate change (*Section #2: Understanding Climate Change*) and providing an understanding to stakeholders of the differing and impactful opinions around the Coronavirus (*Section #3: Understanding Opinions around the Coronavirus*). These sections include data from online sources and expert interviews, which help stakeholders understand these two global crises, how they impact their livelihoods and what they can do about it. In doing this, I hope to elevate the livelihoods of all who visit or inhabit the Muskoka region while also creating the framework for other alike regions to do the same. Muskoka is a beautiful region with many wonderful citizens who deserve access to adequate preparatory information and mitigation strategies for the impacts associated with arguably the two most significant crises of our time.

SECTION #2: UNDERSTANDING CLIMATE CHANGE

Introduction

Muskoka's environment is rapidly changing. This rapid change is a result of new development (Court, 2020). However, the observed change in Muskoka's natural environment and biota increasingly results from climate change, which is estimated to drastically alter Muskoka's weather patterns, ecosystems, and built infrastructure (Muskoka, 2021). As of 2018, the District Municipality of Muskoka had a permanent population of around 61,000, a seasonal population of 26,000, and short-term visitors or tourist population of around 3.2 million annually (Canadian Government, 2018). This is a considerable number of stakeholders, and they all deserve access to information on how climate change has and will affect their own health and the health of Muskoka's natural environment. Currently, there is only one report titled *Planning for Climate Change in Muskoka* that does an adequate job explaining how climate change will affect our lakes, waterways, forests, built infrastructure, communities, and stakeholders' way of life by 2050 (Muskoka Watershed Council, 2016). However, even though this report is helpful to stakeholders in gauging the effects of climate change, there is still more that can be explained, especially regarding stakeholder opinions on this crisis. This report is also now five years old and the science of climate change is rapidly changing. Therefore, this section seeks to sum up the most significant points in this 2016 report while adding many new points from online peer reviewed articles, other online empirical sources, and local opinions. Ultimately, this section will provide easily readable and understandable information on phenomena related to climate change in Muskoka, which will help the stakeholders and policymakers within the region be more equipped to deal with and mitigate the impacts and potential tensions associated with this crisis.

Methods for Section #1 and 2

To effectively provide information on phenomena related to climate change in Muskoka, I started by researching and providing summaries from online empirical evidence and data to show the changes in weather patterns, watershed and forest composition, and what this means for stakeholder’s public health and general livelihoods. Specifically, I used the Muskoka's Watersheds council's 2016 report, peer reviewed articles and many other scientific papers and news articles that provided me information on the state of and impacts around climate change in

the Muskoka region. This information was then recorded into the "*Results #1: Online Empirical Analysis"* and discussed in the *"Discussion #1: Online Empirical Analysis"* portion of this section. These reports and papers aided in the analysis but did not complete it, which required me to include an original analysis of factors related to impacts around and stakeholder opinions of climate change by engaging in six expert interviews. These local experts were had a ton of information on climate change and related environmental phenomena in Muskoka (Table 1.0). I already had the contact information of many local experts from last summer's research, and for the ones that I did not, I searched for their contact information on google. These interviews were conducted from Monday, June 28th to Friday, July 9th, 2021. All interviews were conducted remotely via zoom and followed an interview protocol approved by the Hamilton College Institutional Review Board. Interviewees were asked anywhere from three to six questions on climate change-related phenomena (Table 2.0).

I then recorded the interviews with the interviewees' consent. It is important to note that I did not record every recorded result in this section, as I only posited the ones that I found to be most pertinent. To achieve this, I listed each of the six questions (Table 2.0) on Climate Change and the most detailed and important answer for each, although sometimes I may have included multiple answers because they were too significant to leave out. I also recorded the interviewee(s) that made the claim. These answers were then recorded *into "Results #2: Opinions of Local Experts"* and discussed in the *"Discussion #2: Opinions of Local Experts"* portions of this section. It is important to note that the results are discussed under the projection of an RCP 8.5 scenario. It is also important to note that the climate I am describing is the projections for mid-century (from around 2040-2060), as this time frame incorporates effects on existing and new generations.

Additionally, to create the executive summary, I used the information from this section on climate change (Section #2) and the proceeding section on opinions around the coronavirus pandemic (Section #3) to help stakeholders adapt to climate change and manage the opinions around the coronavirus. For the information regarding adaptations to climate change, I summed up the results from this section and some of the data from a summer 2020 research project titled *Proposing A Sustainable Future for The Muskoka Region*. For the information regarding understanding opinions around the coronavirus pandemic, I summed up the results from section #3 and some of the data from a summer 2020 research project and recorded it into the executive

summary. I then provided an overarching conclusion section to sum up the findings which include adaptations to climate change and suggestions to stakeholders on how to alleviate impacts and tensions around the COVID-19 pandemic. All of this information was provided in a succinct manner in the executive summary above *("Section #1: An Executive Summary Focusing on Helping Stakeholders Adapt to Climate Change and Manage Opinions around the Coronavirus Pandemic"*).

Results #1: Online Empirical Analysis of Climate Change

The results from various online platforms and the Muskoka Watershed reports show that Muskoka's climate is changing faster than at any time in history (Muskoka Watershed Council, 2016). This statistic indicates that even despite the previous and large-scale development and resource extraction Muskoka experienced historically (Court, 2020), the effects of climate change may unfold to have a much more widespread and intensive impact on the natural environment and built infrastructure in Muskoka. Climate change in Muskoka will change general weather patterns, impacting watersheds, aquatic and terrestrial environments, public health, and stakeholders' current lifestyles.

Weather Patterns: Summer and Winter Temperatures

Although climate models cannot provide precise predictions on future weather forecasts, they can estimate general decadal trends in weather events. Climate change results from an increase in anthropogenic emissions such as carbon dioxide, which leads to an increase in the trapping of heat in our atmosphere, causing a rise in average global temperatures. According to the Ontario Centre for Climate Impact and Adaptation Resources, under an RCP 8.5 scenario, Muskoka's climate at mid-century will be warmer and wetter than the present, and precipitation may be less frequent but more intense when it occurs (OCCAR, 2017). This projected increase in precipitation intensity is primarily expected to occur from November to May (Canada, 2011). There is also a projected increase in the number and intensity of storm events such as windstorms, hailstorms, and ice storms by mid-century (Canada, 2011). While there will still be warmer and colder and wetter and drier years, the climate that is expected in Muskoka by mid-century, on average, will be warmer and wetter, having longer summers and shorter winters (Muskoka Watershed Council, 2016). Average summer temperatures are expected to increase by

3-5.2°C (Muskoka Watershed Council, 2016). These higher temperatures mean Muskoka's stakeholders will experience many more days above 30°C (Muskoka Watershed Council, 2016). Currently, there are three to four days a month where average temperatures in the summer exceed 30°C (WWO, 2020). However, by mid-century, Muskoka will experience around an entire month of days above 30°C (WWO, 2020). Total precipitation is also expected to increase by around 17% (Muskoka Watershed Council, 2016), increasing water levels. However, the higher air temperatures exacerbate evapotranspiration and evaporation, causing drier soils than present, which may maintain water levels around their current levels (Muskoka Watershed Council, 2016).

Regarding winter months, maximum daily temperatures above freezing are expected to double as there will be a change in frequency of around 16 days to 30 days (Council, 2010). This means more intense and sooner snowpack melts, on average (Council, 2010), and these trends are also reflected in nighttime temperatures, where the expected days above freezing in the wintertime and above 30°C in the summertime are both expected to double (Muskoka Watershed Council, 2016). As a whole, a warmer, wetter, and sometimes drier Muskoka are the predicted effects of our changing climate, presenting more variable conditions that many environments, habitats, and stakeholders will need to cope with.

Watersheds: Lakes, Rivers, Streams, Wetlands and their Aquatic Ecosystems

Muskoka's watershed plays a vital role in maintaining the health of the region's environment. Around 24% of Muskoka's entire area is part of its watershed and is home to many animals and a place of recreation for many stakeholders (Doppler Online, 2018). While water sources come from groundwater and water within the soils, the primary water source that feeds Muskoka's watershed is rainfall (WaterWeb, 2019). The results from the Muskoka's Watersheds council's 2016 report show that lakes, rivers, streams, and wetlands all are on average increasing in temperatures, especially during the summer (Muskoka Watershed Council, 2016). These changes are due to increases in atmospheric temperatures as a result of climate change. Specifically, in a study done on Harp Lake (an average-sized lake within Muskoka), lake stratification was more prevalent, leading to increased temperatures in nearby rivers and streams than a decade ago (Harrings, 2019). These changes, under RCP 8.5, are expected to be amplified (Muskoka Watershed Council, 2016), meaning warmer lakes, rivers, streams, and wetlands by

mid-century, affecting water quality and the aquatic ecosystems that rely on these water sources (Ho and Eager Et al., 2018).

Many species are vulnerable to changes in Muskoka's watersheds as a result of climate change. With increased temperatures, species types such as zooplankton and fish will diminish in population size (Muskoka Watershed Council, 2016). For example, a type of zooplankton called *Daphnia* will not be equipped to tolerate higher water temperatures than currently and is expected to severely diminish in population by the mid-century (Carter and Schindler Et al., 2017). All types of fish will also struggle to maintain their current populations as there will be an increase in HAB's (harmful algal blooms) resulting from increased temperatures, which means less available oxygen and the potential for dead zones (Chung & Allen, 2017). Certain types of insects, such as misquotes, who inhabit Muskoka's watershed will have highly variable population sizes, with some springs having an abundance of them while others having minimal amounts (Muskoka Watershed Council, 2016). This change in insect populations results from a predicted increase in the variability of Muskoka's snowpack melt (Muskoka Watershed Council, 2016). Other animals, such as birds (MWR, 2020), may also struggle to maintain their current population size due to a potential decline in food availability (Rosenberg, 2013). Like freshwater clams or bottom-dwelling invertebrates, species in a fixed place will be more at risk than mobile species like birds or fish (Council, 2010). However, even small invertebrates play an integral role as prey for larger animals, so a decline in their numbers is not insignificant (Council, 2010). Therefore, as a whole, Muskoka's average temperatures are increasing, which puts stress on aquatic ecosystems, causing a potential decline in aquatic (and overall) biodiversity within Muskoka and this decline can also be seen in the region's forests.

Forests: Trees and their Terrestrial Ecosystems

According to the results, the effects of climate change on Muskoka's forests have already started to occur and are only getting worse in the foreseeable future (Council, 2010). Just as in aquatic environments, changes in annual patterns of temperatures and precipitation are leading factors for the change in the composition of Muskoka's forests (Council, 2010). The results above show that the warmer climate we expect in the coming years will lead to greater evapotranspiration, which leads to drier soils that are more prone to drought. These negative changes have effects on tree growth. There was a study done on how climate change will impact

the White Pine (*Pinus strobus),* Sugar Maple (*Acer saccharum),* and White Spruce (*Picea glauca)* by mid-century (these trees are some of the most popular types within Muskoka) (Canada, 2021). This study explained that the White Pine will decrease in distribution and population while the abundance of Sugar Maple may remain unchanged, and the abundance of White Spruce will decrease (Canada, 2021). Specifically, white pine is a broadly distributed tree in Muskoka, but as temperatures rise, the great lakes region (including Muskoka) will only have a marginal climate for this tree, causing a decline in its population (Muskoka Watershed Council, 2016). The sugar maple is also a broadly distributed tree common in Muskoka, but as our climate starts to warm, it is expected that this tree species will move substantially northward (Muskoka Watershed Council, 2016). Since Muskoka is located around the mid-northern latitudes of Canada, scientists are uncertain whether or not the sugar maples population will remain or decrease due to climate change-related factors (Council, Muskoka's Biodiversity, 2012). However, maple syrup generation from these trees is excepted significantly decrease by mid-century in Muskoka due to changes in seasonal temperatures, affecting maple syrup farmers in the region (Levington, 2019). Finally, suitable climates for the White Spruce within Muskoka are expected to increase as temperatures warm (Muskoka Watershed Council, 2016) as the white spruce thrives in hotter climates (Sky, 2011). The study that concludes these findings were made off of the assumptions that the frequency of hotter temperatures, storms, dry and wet days would increase, which aligns with the results posited in the "weather patterns" portions of this section. Warmer and drier soils also increase the likelihood of wildfires, which can be devastating to tree and animal populations (Ontario, 2020). Ultimately, all tree species respond to climate change differently, and the type of tree species and their relative abundance may significantly change by mid-century in the Muskoka District (Pare and Xiajing Et al. 2013).

Climate change is expected to impact the abundance of existing terrestrial species while also introducing new ones. For example, the Mountain Pine Beetle (*Dendroctonus ponderosae)* has long been limited to south-western British Columbia. However, because temperatures are now warming, they will soon be able to inhabit the Muskoka Region, damaging or killing surrounding trees (Bogland, 2010). Other invasive insects, such as the Emerald Ash Borer (*Agrilus planipennis), can* harm or kill Muskoka's trees and are expected to increase in population size as our climate warms (Bogland, 2010). Trees are not the only terrestrial species impacted by climate change, as birds that are adapted to a particular type of habitat and food source, such as

the Pleated Woodpecker (*Dryocopus pileatus),* are likely to experience significant decline as a result of changing temperatures and overall climates (Council, 2010). Even large mammals such as the Gray Wolf (Canis lupus) are currently and will continue to struggle to find adequate food supply due to climate stress (Beattie, 2016). The Canada Moose (Alces alces) population in Muskoka is also suffering from increasing tick-borne illnesses because more ticks can survive winters and are spawning earlier, more frequently, and for longer durations than historically (Busters, 2017). Similar to the results for aquatic ecosystems, species who are more mobile, such as the Gray Wolf, despite their lack of food supply, have a greater chance of survival because they can migrate outside of Muskoka much quicker when compared to tree species or even slower animals such as the turtles, where all six species who currently inhabit Muskoka are at risk (Hartill, 2018). As a whole, climate change is expected to alter the current terrestrial ecosystem significantly in Muskoka in the form of tree loss, insect invasion, and potential implications to Muskoka's food chain, which can impact even the largest animals in the region (Council, Muskoka's Biodiversity, 2012). These impacts come with the potential for a loss in terrestrial ecosystems biodiversity, even despite the new species being introduced due to increasing temperatures. The effects of climate change impact aquatic and terrestrial ecosystems and threaten the public health and general livelihoods of stakeholders who live in and frequent the region.

Humans: Public health, Infrastructure and Current Ways of Life

The projected changes in weather patterns, watershed and forest compositions resulting from climate change are substantial to any other time in human history and will impact public health, infrastructure, and stakeholders' current ways of life (Levison and Butler Et al., 2018). The results show that there are potential positive and negative impacts associated with the projected change in climate, and although there are certainly more negatives, the positives should not be unaddressed. First, climate change is expected to increase the opportunity for on-water recreation, as the season will be extended due to early ice-outs in the spring and later ice formation in the fall (Levington, 2019). This increase in water recreation resulting from longer ice-free seasons may spur the economy for seasonal homes in Muskoka (Levington, 2019), stimulating the economy (Muskokas Economic Strategy, 2020). Also, these new predicted climate conditions within Muskoka offer amateur gardeners new plant varieties and higher

vegetable yields due to increasingly being able to produce before the first frosts, making it a much simpler process than in the past (Muskoka Watershed Council, 2016). Although these benefits lead to the potential of more opportunities to recreate on the water, garden and generate revenue, the negative impacts of climate change on Muskoka's stakeholders cannot be ignored.

To effectively display the results that discuss the negative impacts of climate change, I will describe the effects on humans that result from the changes in weather, water quality, and forest composition that were posited previously. Since summers will be longer, Muskoka's seasons for skiing, snowmobiling, and other winter recreational activities will diminish (Scott and Mills Et al., 2018) along with the economy and businesses for those activities (Muskoka, 2020). For example, outdoor skating rinks and ice fishing may become a distant memory (Scott and Mcboyle Et al., 2018), as the ice may not be thick enough to support these activities by mid-century, impacting winter recreation and general travel across ice roads, especially for construction purposes (Scott and Mills Et al. 2018). The increase in variable and intense weather events creates new road and boat transportation challenges and the greater the risk of floods, droughts, and storms (Muskoka Watershed Council, 2016). These climate fears may dissuade potential stakeholders from buying or building in the area and may offset the expected increase in seasonal home buyers posited previously, as floods can destroy docks and droughts (along with other stochastic events) can lead to natural phenomena such as wildfires, which can destroy homes and surrounding forests (Flooding and Flood Plain Mapping, 2020). These droughts will also cause a lack of water in the late summer, impacting the value of Muskoka's iconic waterfalls, as some may run dry (Muskoka Watershed Council, 2016).

Although Muskoka's summers will be hotter, providing for the potential of more on water recreation, this type of increase in on-water recreation may be overweighed by the negative impacts of climate change, as heat stroke and sickness from insect or tick-borne illness and HAB's are expected to increase rapidly (Dickens, 2020). For example, both Lyme Disease and West Nile cases are expected to double by mid-century (Prevention, 2007). Also, due to this expected increase in HAB, there will be fewer opportunities for pristine fishing and swimming conditions in the Muskoka region (Muskoka Watershed Council, 2016). HAB can also lead to sickness, deteriorating public health in the area if undetected, and due to the number of residents who reside around and recreate in Muskoka's lakes, this is likely to occur (CDC, 2019). Other diseases that may appear in the future as our climate warms include malaria and dengue fever, as

both of these have been detected in Muskoka since 2017 (Muskoka Watershed Council, 2016). The direct effect of warmer weather on human health will come as heat stress and deteriorating air quality from smog events which can cause increases in respiratory diseases such as asthma (Muskoka Watershed Council, 2016). The increase in variable and intense weather events will mean more misquotes in some years and less in others, creating anxiety when the next "bug" season will come (Muskoka Watershed Council, 2016)

Regarding Muskoka's farmers, they will likely have less suitable conditions to farm, especially in late summers when there is expected to be a shortage of water (Muskoka Watershed Council, 2016). Maple syrup farmers are expected to diminish in population by mid-century, as the region may no longer be suitable for large-scale extraction this crop (Levington, 2019). On average, Muskoka's farmers will experience increasing struggles as the climate warms (Muskoka Watershed Council, 2016).

Unfortunately, the results show effects on public health, recreation, and Muskoka's built infrastructure. Muskoka's built environment consists of roads, bridges, dams and other river control systems, drainage ditches, lagoons, canals, storm-water and domestic sewer systems, and commercial, residential, and industrial buildings (Muskoka Watershed Council, 2016). However, much of this infrastructure, including dams, ditches, river control systems, and residential housing is outdated and inadequate to deal with stochastic events such as flooding (especially 100-year floods) (Muskoka Watershed Council, 2016). The projected climate by mid-century will also significantly strain Muskoka's current road and drainage systems, as 100-year floods events now how frequencies of around every 6-10 years (Macgregor, 2019). The changes in temperatures also make ice road maintenance more difficult , causing Muskoka's municipal government to at least double its allocations to ice road maintenance (Muskokas Economic Strategy, 2020). The expected increase in ice on normal roads will also cause damages, and spring repairs due to frost will become more prevalent (Muskokas Economic Strategy, 2020). These icier conditions mean more salt will have to be used on roads, increasing expenses to the district and causes environmental challenges to roadside plant and animal species (Muskokas Economic Strategy, 2020). The expected increase in floods can overrun Muskoka's current storm-water drainage system, as it was never designed to manage floods, especially the expected discharges of one coming by Muskoka's mid-century (Heatlie, 2020). Muskoka's current flood plain map is also outdated, which may significantly impact the value of old and newly purchased

residential, commercial and industrial infrastructure (Heatlie, 2020). Although floods will be common, so will droughts. These droughts will decline tourism as rivers, streams, and waterfalls run dry, affecting economic activity in the region (Muskoka Watershed Council, 2016). The decline in biodiversity may also cause a decline in seasonal visitors (Climate Change in Muskoka, 2018). These factors as a whole lead to increased maintenance prices when dealing with climate change-related phenomena and an overall decline in eco-tourism (Climate Change in Muskoka, 2018).

The local government and stakeholders of Muskoka have some serious planning to do if they want to maintain or improve upon their current ways of life. The effects of climate change, on average, are harmful and have the potential to drastically impact public health and infrastructure which impacts Muskoka's economy and stakeholder's way of life (Kirton & Gubert, 2011). The warmer and wetter conditions bring flood risk, intense storm events, and insect or tick-borne illness. The warmer and dryer conditions bring the risk of wildfires and health conditions such as heat stroke. The colder and more variable conditions bring the risk of property damage and accidents due to ice formation. On average, the results show that Muskoka's climate will be more challenging to deal with and will require more planning and allocation of money and resources by municipal governments and stakeholders to maintain their current ways of life (Kirton & Gubert, 2011). These results are an excellent start to understanding the impacts of climate change on the Muskoka Region but require local expertise to get the complete picture of effects and potential individual and regional solutions.

Discussion #1: Online Empirical Analysis of Climate Change

The above results indicate that climate change has significantly affected stakeholders' livelihoods in Muskoka. There has been and will continue to be a change in Muskoka's climate, affecting weather conditions in the region. These weather conditions, on average, will be hotter, more variable, and sometimes colder, and these changes will drastically impact Muskoka's aquatic and terrestrial environments. Despite the potential increase in on water recreation predicted as Muskoka's climate warms, overall recreation and, therefore, utilization of the region by stakeholders may decline as Muskoka's climate becomes less pristine. For example, Muskoka's watershed is expected to be degraded via an increase in HAB, and Muskoka's forests are expected to be degraded due to predicted changes such as an increase in pests, wildfires, and

stochastic events. There is also an expected increase in waterfalls running dry and other natural attractions diminishing in tourism value due to climatic changes. The expected increase in stochastic events means more floods destroying docks, an increase in wildfires burning homes, and the risk of other infrastructure being damaged or destroyed by wind, ice, and rainstorms. The most current flood plain map of Muskoka is outdated, and the current dam system is not fit to deal with large-scale floods. These changes can have severe impacts on the public health and economy of Muskoka. Therefore, given the available results, it is clear the climate change in Muskoka may drastically impact the livelihoods of stakeholders in the region. Despite this fact, the results do not conclude details on the biggest concerns of stakeholders regarding climate change, the most significant current and future threat of climate change to stakeholders, and how to address these threats moving forward. In the introduction, I stated that this report's primary goal is to improve Muskoka's stakeholders' livelihoods by aiding them in understanding the different impacts and opinions around the Climate Crisis and Coronavirus pandemic. To achieve this, I now need to find out the answers to the three above topics and others by talking with local experts who may hold the key helping stakeholders cope with the effects of these two global crises. These findings are in the *"Results #2A: Opinions from Local Experts*" portion below.

Results #2: Opinions of Local Experts on Climate Change

The expert interviews on the climate crisis show many similarities and few differences with the findings posited in the results #1 and discussion #1 portion of this section. Below are the answers to the questions, along with a discussion section that explains the significance of these answers:

Question #1: What natural disaster do you currently worry about most currently when it comes to potential effects on the built infrastructure of Muskoka? Is this natural disaster the same for the predicted effects of climate change on infrastructure by mid-century?

The two interviewees with the most information and qualifications to answer this question were Experts #2 and #3. Expert interviewee #2 specializes in watershed management, and it was no surprise that Expert #2 announced that flooding is the natural disaster that may affect the built infrastructure of Muskoka the most. Expert #2 said that floods have already caused many damages to infrastructure, especially housing, in the past decade and will only

worsen with climate change. Expert #2 also said that just this past weekend (around July 9th), an intense rainfall event led to flooded boathouses, homes, and even some commercial areas in the Muskoka District. Expert #2 finished our conversation with the statement that flooding is undoubtedly one of (if not the most) worrisome natural disasters regarding Muskoka by mid-century, as floods are expected to have a high frequency and intensity. Expert #3, however, is a local climate scientist and believes that the natural disaster that is the most significant threat to Muskoka's environment is intense storms, including severe wind storms, ice storms, hailstorms, and rainstorms. Expert #3 also stated that storms, such as intense windstorms, will increase in intensity and severity, impacting Muskoka's built infrastructure. For example, Expert #3 mentioned that there has been at least one severe windstorm every year for the past decade, which has caused many power outages, trees falling on cottages and other homes, and other wind-related damages to the built infrastructure. Expert #3 also mentioned that this threat is the most significant one by mid-century in Muskoka, given the current climatic predictions. Therefore, Expert #2 and #3 both said that they worry most about stochastic events, such as storms, when considering the natural disaster they worry about most currently (and in the future) regarding the built infrastructure in the region.

Question #2: What natural disaster or climate situation do you worry about most regarding public health in Muskoka? Is this natural disaster the same when thinking by mid-century?

For this Question #2, two Experts were the most qualified to answer this question based on their specialized knowledge and confidence when being interviewed. These interviewees were Experts #3 and #5. Expert #3, as stated above, is a local climate scientist and was knowledgeable on the effects of anthropogenic emissions on the Muskoka Region. Expert #3 is currently worried most about weather-related natural hazards, such as damages to infrastructure from storms, impacting the social, occupational, and mental stress that comes with those damages, ultimately degrading stakeholder's public health. However, when thinking about the climate in mid-century Muskoka, Expert #3 was explicitly worried most about temperature-related morbidity or mortality from intense cold and heat events. Although these events could come from storms, Expert #3 was not explicit in saying this. Expert #3 was also worried about the potential effects of vector-borne and zoonotic diseases, especially ones carried by mosquitoes

and ticks. Expert #3 finished our interview off with the fact that the effects of climate change on public health will increase by mid-century, especially from extreme heat/cold events and diseases from pests. In support of Expert #3's statement that natural disasters may be a worry for public health in Muskoka by Mid-century, Expert #5, who is a local biologist that specialized in aquatic and terrestrial biodiversity, also thinks that intense weather events, such as storms will significantly impact public health in Muskoka by mid-century. However, Expert #5 thought that the most significant threat to public health in Muskoka by mid-century is water-borne illnesses. Expert #5 stated that stakeholders in the area have already been suffering from health issues regarding water quality, especially when HAB's are present, and these harmful effects on public health are only going to be exacerbated moving into mid-century Muskoka. Expert #5 also briefly mentioned the potential effects of vector-borne and zoonotic diseases on public health but did not state that these effects would be the most significant to stakeholder's public health in the region currently or by mid-century.

Question #3: Do you see the effects of climate change drastically impacting recreation (eco-tourism, water, and land recreation)? Do you think total tourism will increase or decrease in Muskoka?

The Experts that answered this question most precisely were Experts #1 and #6. Expert #1 is an Employee of a local conservancy foundation who has lived in and recreated within Muskoka their whole life. Expert #1 also owns a summer recreational business which I did not know until the interview. Expert #1 said that they do see the effects of climate change drastically impacting recreation in Muskoka. Specifically, Expert #1 stated that winter recreation will severely decline by mid-century, but summer recreation may increase. Expert #1 said that although there will be some years of more snow, the average year will have less snow and ice, which means fewer opportunities for winter recreation, causing the closure of some existing winter recreational businesses. Expert #2 said that summer recreation might become more widespread and popular due to warmer temperatures. Expert #1 stated that the effects of climate change are widespread throughout Canada, but Muskoka's natural environment is more pristine and naturally buffers the effects of anthropogenic emissions better than other environments, implying that summer recreation may increase. Expert #1 did not know whether total tourism would increase or decrease due to the expected increase in summer recreation and decrease in

winter recreation. Expert #6, a Local librarian focused on Muskoka's history, thinks that the effects of climate change on Muskoka's environment are similar to the degradations that occurred historically. Specifically, Expert #6 stated that historic logging and tannery regimes significantly degraded and altered Muskoka's natural environment. Since then, Muskoka environment was recovering, but due to the massive influx of anthropogenic emissions, Muskoka's environment is being degraded again, which will drastically impact tourism—Expert #6 stated that summer recreation might not increase as much as people and scientists say and winter recreation will most definitely decline, implying a net loss in total tourism.

Question #4: How drastic will the impact of climate change be on Muskoka's economy?

There was only one Expert interviewee that fully addresses this question, and it was Expert #1. Expert #1, as stated, is an employee of a local conservancy foundation who understands the predicted impacts of climate change on Muskoka's economy. Expert #1 states that the impact of climate change on Muskoka's economy will be moderate to severe, depending on the region's climate adaptation and mitigation strategies. Specifically, Expert #1 stated that the effects of climate change will have impacts on public health and infrastructure, but if we plan for these impacts, the impact of climate change on Muskoka's economy may be less drastic than anticipated. Expert #1 stated that if recreational businesses, government officials, and citizens plan for the expected change in climate, then Muskoka's economy will be in great shape. Expert #1 mentioned that recreational businesses might have to change the type of recreation they offer to accommodate changing weather and temperature patterns due to climate change. Expert #1 also mentioned that government officials must build resilient infrastructure and help citizens plan for climate change-related effects. Lastly, Expert #1 mentioned that if citizens do things like have adequate air conditioning and warming systems and acquire proper knowledge on limiting exposure to climate change-related phenomena, then Muskoka's economy (and public health) will be able to deal with the impacts of climate change. Therefore, Expert #1 thinks that if stakeholders in the region adequately prepare for, adapt to, and mitigate the effects of climate change, then its effects may not be as drastic as many anticipate.

Question #5: Given the predicted effects of climate change, how do you think Muskoka's stakeholders can maintain or even improve upon their current livelihoods and ways of life?

The Expert that best answers this question was Expert #4 and Expert #2. Expert #4 is an owner of a non-profit focused on Muskoka's sustainability and has lived in Muskoka for their entire life. Expert #4 said that understanding the current and predicted future impacts is vital for Muskoka's stakeholders to maintain or improve their livelihoods. For example, Expert #4 said that if we do things like update our current flood maps, then citizens who are now within the flood plain map (there is an increase in the area of the flood plain map) can build resilient infrastructure in order to adapt to the effects of increased floods. Expert #4 also said that this increased understanding must be on the individual and municipal level because if stakeholders and governments understand there will be more floods, they can build new and resilient infrastructure such as a raising their homes or building a new damming or storm-water drainage system to mitigate flood damage. Expert #4 also mentioned that the municipal government of Muskoka could set a mandate that all new homes and buildings have hurricane-resilient infrastructure, such as hurricane windows. Therefore, Expert #4 thinks that the biggest problems for stakeholders regarding climate change are floods and storms, and if we better understand (on an individual and municipal level) how these will impact stakeholders, they may be able to maintain our current livelihoods. Expert #4, however, said it would be tough to improved stakeholder's current livelihoods given these predicted effects of climate change. Expert #2, however, is a local scientist specializing in watershed health and management and thinks that there is a potential to improve the livelihoods of Muskoka's stakeholders if we improve the current storm-water drainage system. Expert #2, a local scientist specializing in watershed health and management, is an expert on the current flood map and storm-water drainage system and argues that there is barely one. Expert #2 said that climate change might make conditions more pleasant in Muskoka, such as increased warm days, and if stakeholders better manage the disasters associated with climate change, such as flood damage, then they can maintain or maybe improve their livelihoods. Although Expert #2 did not specifically reference Muskoka stakeholder's need to plan for other natural disasters, such as hurricanes, it was implied in the conversation. As a whole, these two Experts believe that if stakeholders better understand how they will be impacted by climate change, they may maintain or even improve upon their current livelihoods and ways of life.

Question #6: How do we best plan for climate change moving forward?

Same as question #4, only one Expert interviewee fully addressed this question, and it was Expert #1. Expert #1 said that if stakeholders in Muskoka adequately plan for climate change, then Muskoka's economy may not be drastically affected. Expert #1 said that the health of Muskoka's economy is closely (if not directly) related to the relative level of livelihoods for stakeholders in Muskoka. Therefore, Expert #1 thinks that the best way to plan for climate change is to adjust the built infrastructure and stakeholders' current ways of life to promote a thriving economy and adequate living conditions. Expert #1 also said that these adjustments must also consider stakeholder's mental and physical health, as climate change will impact this. As a whole, Expert #1 suggested that I should compile these findings from all Experts into a succinct section of this report which gives suggestions to specific groups stakeholders in the region on how to plan for and deal with climate change. Expert #1 also mentioned that I should try to provide these suggestions to local government officials and recreational business owners on what they can do to help stakeholders maintain or improve their livelihoods.

Discussion #2: Opinions of Local Experts on Climate Change

Many of the secondary results (results #2) from the expert interviews align with the findings of the preliminary results (results #1). However, some results of the findings from the secondary results challenged the original findings from the preliminary results section. To effectively show these results, I will sum up the expert's answers to the six questions (Table 2.0) in the Results #2 section and posit how these results align with and differ from the preliminary results section. In doing so, I will now understand how climate change affects Muskoka's stakeholders' livelihoods currently and how it is predicted to by mid-century.

The results from question #1 align with the preliminary findings. Both Expert #2 and #3 believe that stochastic events will be the biggest threat to Muskoka's infrastructure and although this was not explicitly stated in the results #1 portion, the results suggest it. For example, results #1A indicate that stochastic events are predicted to increase by mid-century and are already a significant current issue to stakeholder's infrastructure. A stochastic event in this situation is an unpredictable weather event that can affect Muskoka's stakeholders' livelihoods. These events can be considered storms, such as windstorms, rainstorms, and ice storms, and as posited in both results sections, these storms can significantly affect stakeholders' livelihoods due to potential damages done to infrastructure. Within these stochastic events, Expert #2 pointed towards the

fact that rainstorms, leading to floods, may be the worst types of storms when thinking about effects on stakeholder livelihoods. As posited in both results #1 and #2, the District of Muskoka has an outdated storm-water drainage system, damming system, and flood plain map, and when compounded together, these forces can exacerbate the effects of floods on stakeholders built environments, such as their homes. Expert #3, however, believed that windstorms might be the most significant threat to Muskoka's stakeholders. Both of these thoughts are not wrong, as there has been an increase in windstorms and rainstorms in Muskoka, which have led to many damages to infrastructure and disruptions to public health (Muskoka Watershed Council, 2016)—this was found in results #1 portion. There was also just a rainstorm on Monday, July 5th (which occurred while I was writing this section) (Weather, 2021), which flooded homes and further shows the fact that stochastic events, such as floods, may be the most significant threat currently and by mid-century Muskoka. As a whole, results #1 and #2 align in the fact that stochastic events, whether they be rainstorms, windstorms, or other types of storms, are currently the most significant threat to Muskoka's infrastructure. Also, results #1 and #2 show that stochastic events resulting from climate change are only expected to increase and, therefore, will also be the most significant threat to stakeholders-built infrastructure mid-century.

The results from question #2 align with the preliminary findings. Expert #3 believes that the most impactful natural disaster to public health is storms, such as wind and rainstorms, damaging infrastructure and causing general dangers associated with storms. These results align with the preliminary findings because many online sources point towards the fact that public health can be negatively impacted by storms events, such as rainstorms and windstorms. However, by mid-century, Expert #3 believes that heat/cold-related deaths and diseases from pests may be the most significant threat to public health. These results also align with the preliminary findings because many online sources point towards increased heat/cold-related deaths and diseases from pests. Expert #5 also believes that storms may be the biggest threat to public health currently. However, Expert #5 thinks that by mid-century, water quality may be the biggest issue in Muskoka, as the total area of HAB is expected to increase within Muskoka rapidly. Therefore, Expert #5 and #3 both agree that storms may be the most significant threat to public health in Muskoka and that illnesses from pests may also be an issue for public health but differ on their opinions around whether temperature or water quality-related issues may be more threatening to stakeholder's public health by mid-century. Despite Expert #3 and #5 differences in opinions

around what natural disaster or climate situation they worry about most when it comes to the public health in Muskoka and by mid-century, they both are correct in the fact that there are effects on public health from storms, heat/cold related weather events and illnesses from pests or HAB and these effects will be further exacerbated by climate change moving into the mid-century (Canada, 2021).

Many of the results from question #3 align with the preliminary findings, although not all of them. Expert #1 believes that winter recreation will decrease and summer recreation will increase. Expert #2 was unsure whether total tourism would increase or decrease due to this change in recreation because they were unsure how they may offset or balance each other. These results align with the preliminary findings, as online sources say winter recreation may decrease and summer recreation may increase due to climate change-related factors in Muskoka. Expert #2 ideas also align with the findings in the sense that they believe Muskoka's environment has a strong natural buffer to climate change and may not be as drastically impacted as other areas in Canada because this idea was confirmed previously (Court, 2020). Expert #6, however, believes that total tourism may decrease because they believe that summer recreation may not increase as much as people and scientists say and winter recreation is expected to decline in the coming decades—Expert #6 opinion differs from Expert #1 in the fact that they believe that the stark decline in winter recreation will offset the less substantial increases in summer recreation while Expert #1 is unsure. Expert #6 has a great understanding of Muskoka's historic resource extraction and compares the impact of that era to the impact of climate change in the sense that Muskoka's environment is not as pristine as it could be and is being rapidly degraded, causing the potential for less tourism and recreation. This new idea was not found in the preliminary results section and offers a unique idea that we cannot be entirely sure whether recreation (or total tourism) will increase or decrease in the Muskoka region due to the varying effects of climate change on seasonal weather patterns. Expert #6, #1, and others all had different opinions on this question, implying that no one can fully answer this question with absolute certainty. As a whole, the results for question #3 align with the preliminary results in a sense that we cannot be sure whether recreation (or total tourism) will increase or decrease because one cannot understand all of the climatic, political, and social factors which tie into whether recreation and total tourism may increase, decrease or remain relatively the same.

The results from question #4 align with the preliminary findings. Expert #1 stated that the effects of climate change on Muskoka's economy will be moderate to severe, depending on the stakeholder's (and local government's) ability to adapt to climate change. Expert #1 worried about the effects of storms on public health and infrastructure. Expert #1 also worried about the impacts associated with extreme heat and cold. These findings align with the preliminary results, as climate change is expected to cause an increase in storms and hot/cold days, impacting public health and infrastructure. Expert #1 also mentioned that recreational businesses might lose customers due to changes in the average climate off Muskoka, which aligns with the preliminary results. However, Expert #1 mentioned that if the local government and stakeholders in Muskoka plan for these changes in weather patterns and temperatures, such as building resilient infrastructure and installing heating/cooling in homes, then Muskoka's stakeholders will become better able to manage the effects of climate change to maintain or improve upon their livelihoods. As a whole, Expert #1 believes that the effects of climate change on Muskoka's economy will be moderate to severe, and this severity is determined by how Muskoka's government officials, recreational business owners, and general public plan for and adapt to climate change.

The results from question #5 primarily align with the preliminary results section. Expert #4 worries about the effects of storms, such as floods, on stakeholders' infrastructures. Expert #4 also worries about the impacts of these events on Muskoka's economy. Given these effects, Expert #4 does not believe that stakeholders can improve upon their current livelihoods, even if they do everything possible to adapt to climate change, such as installing hurricane windows or building a new storm-water drainage system. These results align with the preliminary findings because they are the exact effects that were posited. Also, even though Expert #4 believes that stakeholders will not be able to improve their livelihoods, they still believe that climate change will impact stakeholders, which aligns with the preliminary findings. Expert #2, however, thinks that if we can manage the anticipated destruction from flood events, then Muskoka's stakeholders may be able to experience improved livelihoods. Expert #2 put a ton of emphasis on creating a new storm-water drainage system and said that if the municipal government of Muskoka does this, then stakeholders will be able to experience warmer days on average without the downfall of extreme flood damage. Expert #2's opinion and emphasis on the fact that if we build a new storm-water drainage system (including a new damming system), then Muskoka's stakeholders

can improve their current livelihoods is a new thought which will be mentioned in the final report, which helps stakeholders deal with and plan for climate change. As a whole, Expert #4 and #2 believe that if stakeholders better understand how they will be impacted by climate change, they can mitigate the impacts of climate change on Muskoka and improve their livelihoods, which aligns with the preliminary results section.

The results from question #6 align with the preliminary findings. Expert #6 stated that the best way to plan for climate change is to make adaptations that best balance Muskoka's economy and public health, aligning with the preliminary findings. Expert #6, uniquely, stated that I should compile all of the findings from these interviews and the results #1A section into a succinct executive summary that gives suggestions to specific stakeholders in the region on how to plan for a deal with the effects of climate change. Expert #1 also mentioned that I should try to provide these suggestions to local government officials and recreational business owners on what they can do to help stakeholders maintain or improve their livelihoods. These are excellent suggestions by Expert #6, as they align precisely with what I desire to do.

Section #2 Conclusion

There are apparent similarities between results #1A and results #2A. The effects of climate change on Muskoka's infrastructure, public health, recreation, economy, and stakeholders' livelihoods will become worse and harder to manage by mid-century. Floods will destroy more docks and homes. HAB's, tick-borne illnesses, and extreme heat/cold days will cause more intense and widespread effects on public health. Although summer recreation may increase due to warmer temperatures, the results suggest this increase may be offset by the expected substantial decrease in winter recreation. All of the effects of climate change will impact Muskoka's economy. These effects, when compiled, can drastically impact stakeholders' livelihoods. However, many of the results suggest that these effects can be mitigated (and sometimes prevented) if stakeholders have adequate predatory information to adapt to climate change. In order to be adaptive, stakeholders must have access to information which details what impacts climate change has had currently in Muskoka and will have by mid-century and how to prepare for these changes. In order to accomplish this, I have created an executive summary at the top of this document which details how Muskoka's climate will change and how local governments and stakeholders can adapt to these changes. Also, it is essential to note that these

climate situations are run under an RCP 8.5 situation, and if global agreements, such as the Paris agreement, are reached, then these effects of climate change on Muskoka may be less severe than anticipated.

SECTION #3: UNDERSTANDING OPINIONS AROUND THE CORONAVIRUS PANDEMIC

Introduction

The Coronavirus Pandemic has caused many health and anxiety issues in Canada. These issues are reflected in the effects of the virus on stakeholders and their contrasting opinions regarding it. The region's economy and public health have been suffering from the pandemic's effects since last March, where the district recorded its most ever new COVID-19 cases, a whopping 4,250 (Government of Canada, 2021). March is a time of low visitation (Stats, 2021), and there are only around 60,000 permanent residents, implying that around 5-7% of permanent residents may have had the virus (Government of Canada, 2021). Even though the number of new daily cases has diminished since then (around 345 a day as of July) (Government of Canada, 2021), tensions between stakeholders in the region are still present. Specifically, there is an urban-rural divide regarding opinions around city dwellers (mainly short-term visitors or tourists and seasonal residents) driving up North to Muskoka to visit or live in Muskoka for the summer (Paikin, 2020). There are also tensions around locals and drivers with U.S license plates (Goldfinger, 2020). These tensions arise because permanent residents seem not to be wanting seasonal residents or tourists visiting the region during this pandemic. However, there is also the fact that many permanent residents rely on seasonal residents and tourists as a source of economic revenue, as currently, tourism and seasonal homeowners account for 25% of all jobs and 57% of the district's economic base (TNS Canadian Facts, 2007). This overall trade-off between economic prosperity and increased COVID-19 cases, as well as stakeholder opinions around it, merits much closer attention and analysis.

In order to further analyze these trade-offs to benefit stakeholders, I will be collecting data to provide an understanding to stakeholders of why there are different opinions around seasonal residents and tourists living in or visiting Muskoka during the pandemic. I will also provide suggestions on how to mitigate the conflicts associated with these opinions to help improve the livelihoods of all who inhabit or visit the region. Therefore, in this section, I will use all available online empirical data and combine that with new data collected from expert interviews to understand better where stakeholders stand on issues around the Coronavirus Pandemic.

Methods

To effectively provide information on phenomena related to the Coronavirus pandemic to stakeholders, I first collected online evidence, which detailed the number of Coronavirus cases and tensions around these cases between permanent residents, seasonal residents, and short-term visitors or tourists. Specifically, I used online news articles and other online sources and information from my 2020 summer research project to analyze the different stakeholder opinions around the virus and its impacts on Muskoka's economy and public health. Although there were not many findings, there was enough to start engaging with topics and tensions around the Coronavirus in Muskoka. These findings were then provided in the *"Results #1*: *Preliminary Findings of Opinions around the Coronavirus"* and were discussed in the *"Discussion #1: Preliminary Findings of Opinions around the Coronavirus"* portions of this section. To further the findings on stakeholder opinions around the Coronavirus pandemic, I engaged in eight expert interviews (Table 1.0). I already had the contact information of some of the interviewees, but for the ones I did not, I searched for it on google. These interviewees were relevant to interview based on the findings of the Results #1 portion of this section. These interviews were conducted from Monday, June 28th to Friday, July 9th, 2021. All interviews were conducted remotely via zoom and followed an interview protocol approved by the Hamilton College Institutional Review Board. Interviewees were asked anywhere from three to six questions on coronavirus-related phenomena (Table 2.0). To make sure I did not miss any results, I recorded the interviews with the interviewees' consent. To show these results, I listed each of the six questions on the Coronavirus pandemic and the most significant answer(s) for each, along with the interviewee(s) that made the claim. This information was then recorded into the "*Results #2: Local Experts Knowledge on Opinions around the Coronavirus"* and discussed in the *"Discussion #2: Local Experts Knowledge on Opinions around the Coronavirus"* portion of this section.

Results #1: Preliminary Findings of Opinions around the Coronavirus

The available online results show tensions between permanent residents with seasonal residents and short-term visitors or tourists. As mentioned in the introduction, permanent residents do not want urban-living seasonal residents or tourists coming into Muskoka to stay or visit (Paikin, 2020), especially if they are traveling from America (Goldfinger, 2020). Even though there is no provincial law preventing anyone who lives in a big city in Ontario from

traveling to Muskoka, when the coronavirus became widespread in Canada around March 2020, public health officials warned city dwellers to stay home because they could bring the virus with them to more sparsely populated areas of Ontario, including Muskoka (Paikin, 2020). This warning frustrated many. On one side of the argument, permanent residents deserve access to safe conditions where an increase in Coronavirus cases would result from their behavior, not that of city dwellers (Goldfinger, 2020). On another side of the argument, short-term visitors or tourists and seasonal residents (especially those that own a home there) deserve access to enjoy pristine and beautiful environments, especially during a pandemic (Goldfinger, 2020). On the third side of the argument, permanent residents still want short-term visitors or tourists to come up and consume their products and other economic offerings to maintain their livelihoods and economic security (Goldfinger, 2020). All three of these arguments are important to focus on, as they have been around since the start of the pandemic (Court, 2020) and matter to stakeholders and their livelihoods. To more effectively layout these arguments, I am going to provide the reasons why they are argued and which type of stakeholder, on average, maybe aligning with each:

Argument #1: Permanent residents deserve access to low coronavirus cases (safe conditions).

In this argument, you predominately have permanent residents arguing that seasonal residents and short-term visitors or tourists should not be coming to visit Muskoka because they already have a home and should stay there to avoid and increase in cases in Muskoka. This argument has some good points to back it. For one, there is a large population of Muskoka that are older (defined as 50+) (Stats, 2021), and older people are more likely to die or have health-related issues if they contract the Virus (CDC, 2021). Secondly, there are finite health resources in Muskoka, and if cases increased like expected, hospitals and ICU beds could be overrun (Paikin, 2020). The third and final argument that the results show is that visitors of Muskoka, on average, visit for pleasure, and this pleasure can wait until the coronavirus is at manageable levels or vaccines have been widely distributed (Goldfinger, 2020). This argument as a whole suggests that many permanent residents may want to keep Muskoka's environment and economy to themselves in order to prevent a rapid increase in COVID-19 cases at the expense of

Muskoka's economy and other stakeholders (seasonal residents and short-term visitors or tourists) not having the privilege of accessing the region.

Argument #2: Non-permanent resident's deserve access to Muskoka, especially during a pandemic.

In this argument, you predominately have seasonal residents and tourists arguing that they deserve access to Muskoka. This argument has some good points to back it. For one, many seasonal residents own a cottage and feel that they deserve access to enjoy it, especially if they are not receiving a property tax rebate (which they are not currently) (Goldfinger, 2020). Short-term visitors or tourists and seasonal residents argue that they deserve access to quiet and naturally beautiful environments, especially if they come from busy city life that currently consists of lockdowns, high coronavirus cases, and low livelihoods for most compared to before the pandemic (Teitel, 2021). This argument as a whole suggests that many seasonal residents and short-term visitors or tourists want to access Muskoka and enjoy its natural beauty and alleviate their stress levels, despite the potential effects of their visitation on public health.

Argument #3: Permanent residents want visitors coming up to maintain their economy

As stated in the introduction, many permanent residents rely on seasonal residents and short-term visitors or tourists as a significant source of their revenue (TNS Canadian Facts, 2007). In this argument, you have permanent residents arguing for seasonal residents and short-term visitors or tourists to be allowed to come up to Muskoka whenever they want (Paikin, 2020). This argument has some good points. For one, Muskoka's economy derives around half of its profits from seasonal residents and short-term visitors and tourist's annual consumption, and because economic prosperity is such a significant determinate of a strong citizenry livelihood (Robbins, 2020), all should be allowed in Muskoka to consume, despite the increase in COVID-19 cases that is expected (Paikin, 2020). Secondly, this argument allows for the most significant number of stakeholders to be happy, as it would align with the values of some permanent residents and virtually almost every seasonal resident and short-term visitor or tourist (Paikin, 2020). This argument as a whole suggests that permanent residents want seasonal residents and short-term visitors or tourists to continue their travel plans up north to stimulate Muskoka's economy, producing a better economic livelihood for those who live in and visit the

region (especially those who rely on outside visitation for revenue), despite potential determinantal effects on public health.

Discussion #1: Preliminary Findings of Opinions around the Coronavirus

After reviewing the available results from the *"Results 1: Preliminary Findings"* section, it has become clear that there are no "one-size-fits- all-solution" to the issue of an increase in economic activity and coronavirus cases as a result of Muskoka's non-permanent resident stakeholders visiting or living in Muskoka. If policymakers in the region decided to ban non-essential travel into Muskoka, then seasonal residents and short-term visitors and tourists would miss out on the pristine environment and, therefore, opportunities Muskoka has to recreate and get away from busy and pandemic affected urban lifestyles. If policymakers decide to continue allowing seasonal and short-term visitors or tourists up to Muskoka, some permanent residents will be unhappy with this, as coronavirus cases would almost definitely increase. However, many permanent residents rely on visitation to spur their economy, promoting seasonal residents and short-term visitors or tourists to come visit or live in Muskoka and consume goods and services. This argument aligns with the values of argument #2, which states that non-permanent residents deserve access to Muskoka, especially during a pandemic, leaving argument #1 to be the opposing one. Judging from the preliminary results, argument #3 makes the most sense and is currently the one that seems to be the most widespread among stakeholders. Despite this, more data must be collected to conclude that this is indeed the most widely accepted argument among stakeholders. Also, more data in general needs to be collected on stakeholder opinions around the Coronavirus pandemic. This data would not only help provide clarity on stakeholder opinions, but this clarity, when provided to stakeholders, can help improve their livelihoods, which is the ultimate goal of this report.

Results #2: Local Experts Knowledge on Opinions around the Coronavirus

Many of the results correlate to the preliminary findings (*Section #2B: Results and Discussion #1*). In order to effectively display these results, I will give the expert(s) opinion(s) which best answer each of the six interviews questions (Table 2.0). Below are the answers to the questions, along with a discussion section that explains the significance of these answers:

Question #1: Would you agree that it is best for all stakeholders (including seasonal residents and tourists) to have access to stay in the region during the coronavirus pandemic? If so, how do we convince permanent residents of this?

Expert #14, 13, and 12 best answered this question. Expert #14, who is a Permanent resident that lives in Muskoka but does not own a business, stated that even though he does not benefit monetarily from outside visitors, it is best for all stakeholders (including seasonal residents and tourists) to have access to stay in the region during the coronavirus pandemic. At first, Expert #14 mentioned that they were very hesitant in believing that it was best for all stakeholders to access the region, but once they started to realize how much their friends, family, and peers relied on visitation for the economy, they decided it was best to open the region up to all. Expert #14, being a permanent resident, said that the best way to convince all permanent residents that it is best for all stakeholders to have access to the region is to provide them an understanding of why it is essential to do so. Expert #14 said to emphasize the considerable economic (and potentially social) advantages outsiders bring to the Muskoka region. Expert #13, an owner of a resort focused on winter recreation, agrees that it is best for all stakeholders (including seasonal residents and tourists) to have access to stay in the region during the coronavirus pandemic. Expert #13 stated that they own a business and rely on visitors for a significant source of their revenue, even though visitation is much lower in the winter months. Expert #13 said that it is easy to convince permanent residents who own businesses that all stakeholders should have access to Muskoka, but it is much harder to convince those who do not own a business that relies on visitation. To address this, Expert #14 said that those who do not own a business or rely on outside visitors should still encourage high visitation as it spurs the economy, ultimately making the infrastructure, amenities, and services in the region more advanced and widespread. Expert #14 said that they know many people who discourage outside visitors from entering the region because of the increase in expected coronavirus cases. Although this may be true, Expert #14 was highly confident that it was best for all stakeholders to access the region during Covid and that we must convince as many permanent residents of this as possible. Expert #12, a worker at a summer recreational business focused on golf, said they believe all stakeholders should have access to the region, but only if they are vaccinated. Expert #12 said there is no doubt an increase in cases will occur with high visitation from stakeholders. However, Expert #12 said that they are comfortable with all stakeholders being in the region if

they are vaccinated. Expert #12 said that the easiest way to convince permanent residents' visitation from stakeholders is acceptable would be to allow for the ones that are vaccinated to do so. Expert #12 said that it would be hard for permanent residents not to want fully vaccinated people into the region, given the success of the vaccines and the economic (and potentially social) benefits that come with increased visitation.

Question #2: Do you see the coronavirus as a long-lasting threat to Muskoka's public health and/or economy?

Expert #10 and #13 best answered this question. Expert #10, an owner of a grocery store, says that there will be a long-lasting effect of COVID-19 on Muskoka's economy but only temporary effects on public health. Expert #10 said that their grocery store was severely impacted by COVID-19, as many seasonal residents and tourists did not frequent the region during this time, and they lost many sales. However, these losses in sales are temporary for Expert #10 but long-lasting for businesses that needed to shut or close down, Expert #10 said. Regarding public health, Expert #10 believes that it is just a matter of getting double vaccinated, as they believe in the success of the vaccines. Expert #13, an owner of a resort focused on winter recreation, says that the coronavirus drastically impacted their business, but it survived and is expected to thrive this coming winter. Expert #13 worried much more about the impacts of climate change on their business rather than the past, current, and future impacts of the coronavirus. Regarding public health, Expert #13 also agrees that if everyone is double vaccinated, then the impacts of the coronavirus on the region will be minimal. However, Expert #13 mentioned that people were suffering (and on rare occasions dying) from effects associated with the coronavirus. As a whole, Expert #10 and #13 agree that there were effects of the coronavirus on the economy, and vaccinations are the key to securing adequate public health and a thriving economy.

Question #3: Is there a divide between stakeholders regarding opinions around the coronavirus?

Expert #7 and #8 best answered this question. Expert #7, a permanent resident who lives in Muskoka but does not own a business, explains that there has always been a rural/urban divide between stakeholders in Muskoka but the coronavirus exacerbated this divide. Expert #7 has

lived in Muskoka their whole life and explains that there are different values between stakeholders in the region, mainly due to economic differences. Many seasonal residents have access to better environments in the region than permanent residents do due to the economic divide (seasonal residents tend to be much wealthier, on average) (Watson, 2017). These economic differences lead to changes in the region's economy, social, and built environments and can sometimes be at the expense of permanent residents, Expert #7 explained. Also, Expert #7 said that due to the coronavirus, there are now more tensions between stakeholders because many permanent residents (especially at the start of COVID) did not want outside visitors or seasonal residents entering the region and Expert #7 admitted to be one of those people. Expert #7 explained that seasonal residents have permanent homes (mainly in coronavirus hot spots like Toronto) and that they should stay there to avoid exposing permanent residents to the virus. Expert #8, an employee of a non-profit focused on Muskoka's heritage, says that there have always been tensions between stakeholders. Expert #8 said that everyone has different needs, especially in regions with different seasonal demographics and overall disparities in income between stakeholders. As explained by Expert #8, these differences are not going anywhere anytime soon and only have been exacerbated by the effect associated with coronavirus. Expert #8 said that each stakeholder group should try to understand the opinions of the other, as understanding is the key to mitigations around tensions between permanent residents, seasonal residents, and short-term visitors or tourists. As a whole, Expert #7 and #8 believe that there are tensions between stakeholders regarding the virus, and increased understanding between stakeholder groups is the key to unlocking a better relationship between these different groups in Muskoka.

Question #4: Do you think the tensions between stakeholders will last beyond the virus?

Expert #8 and #9 best answered this question. Expert #8, an employee of a non-profit focused on Muskoka's heritage, stated in the last question that there were always tensions in the region between stakeholders and believes tensions will last beyond the virus. Expert #8 said that even though Covid cases are diminishing, stores are opening back up, and vaccines are rolling out quickly, there will always be tensions between stakeholders in the region due to the economic and social differences between stakeholders. Expert #8 said there are just too many differences in values between stakeholders for there not to be tensions, although these tensions

can be mitigated through increased understanding. Expert #9, who is an employee of a business that sells alcoholic beverages, also believes that there are tensions between stakeholder groups but thinks that many permanent residents are not as upset with other stakeholders as many believe. Expert #9 lived in the area thier whole life and believes there is indeed a narrative that permanent residents do not want stakeholders entering the region. However, once vaccines become widespread, Expert #9 believes these tensions will be mitigated. Despite this fact, Expert #9 believes there will always be tensions between stakeholder groups that will last beyond the effects of the virus, but these tensions can be mitigated with increased understanding. As a whole, Expert #8 and #9 believe that there are tensions between stakeholder groups that will last beyond the virus, but these tensions can definitely be mitigated through increased understanding.

Question #5: Do you think the combination of effects that the coronavirus and climate change have on Muskoka's stakeholders are the worst they have ever seen or experienced in history?

Expert #8 and #11 best answered this question. Expert #8, who is an employee of a non-profit focused on Muskoka's heritage, believes that it is quite possible for the combination of effects that the coronavirus and climate change have on Muskoka's stakeholders are the worst they have ever seen in history. However, Expert #8 argues that there were historic lumber and tannery regimes that caused disastrous effects on Muskoka's natural environment, and this could have been the worst time for nature lovers and the natural environment of Muskoka. When thinking about stakeholder livelihoods, Expert #8 does believe that the combination of the effects of the virus and climate change are the worst Muskoka has ever seen in history. Expert #8 said that the coronavirus caused so much stress and lifestyle changes, and climate change continues to cause natural disasters such as intense floods and storms, and together, these forces severely cause severe disruptions to Muskoka stakeholder livelihoods. Expert #11, an owner of a summer recreational business focused on watersports, says that the effects of climate change and the coronavirus are the worst effects Muskoka's stakeholders have ever seen. Expert #11 said that their mental health suffered from the lifestyle changes and anxieties associated with the coronavirus, and sees the effects of climate change only getting worse. As a whole, Expert #8 and #11 believe that the combination of effects that the coronavirus pandemic and climate

change have on Muskoka's stakeholders are the worst they have ever seen in history, especially regarding their general livelihoods.

#6: How can I best help provide an understanding to permanent residents on why other stakeholders should be able to access the Muskoka region, event during a pandemic?

The Expert that best answered this question was Expert #7, a permanent resident who did not own a business and was slightly hesitant to want other stakeholders to enter the region during Covid because of the increase in expected cases. Even though Expert #7 is a permanent resident that preferred little to no visitation, Expert #7 argues that if people like themselves better understand how much permanent residents (whether they own a business or not) rely on other stakeholders for sources of economic income, then they may be more inclined to want them to frequent the region, regardless of Covid. Expert #7 said that permanent residents must be provided with information that explains why another stakeholder must enter the region for their livelihoods. Expert #7 admitted that there were indeed benefits for all stakeholders, and if these are better understood, then tensions between stakeholder groups may be mitigated. Overall, Expert #7 was hesitant to agree that it was best for all stakeholders to enjoy the region but ended up believing that that was indeed the correct value to have, as every stakeholder should have access to the region in order to help maintain or improve upon their livelihoods.

Discussion #2: Local Experts Knowledge on Opinions around the Coronavirus

The results from the expert interviews stimulate much discussion about stakeholders' opinions on the coronavirus pandemic. Specifically, the results have allowed for conclusions to be drawn on stakeholder opinions of whether seasonal residents and short-term visitors or tourists should be allowed to access and frequent the Muskoka region. On one side of the argument, permanent residents deserve access to low coronavirus cases (safe conditions) and, therefore, other stakeholders should stay at their primary homes. On the other side of the argument, non-permanent residents deserve access to Muskoka, especially during a pandemic, and permanent residents want visitors coming up to maintain their economy—Both outcomes of these arguments unfolding imply an increase in coronavirus cases, affecting all stakeholders, including permanent residents. There is no correct answer on how best to manage these trade-offs. However, there is a more popular one, which is for an increase in visitation to spur

Muskoka's economy, aiding in maintaining their economic well-being and general livelihoods of most stakeholders at the expense of potentially increasing total coronavirus cases. The following paragraphs will outline how the interviews went regarding expert opinions around these arguments and general information regarding the COVID-19 pandemic.

The results from question #2 mainly align with argument #3, which is that permanent residents want visitors coming up to maintain their economy. Expert #14, although hesitant at first, thinks that all stakeholders should have access to the region due to the economic and social advantages with increased visitation. Expert #14 said that the best way to convince permanent residents that this is the best pathway forward would be to increase their understanding of how much the region relies on outside sources (seasonal residents and short-term visitors or tourists) for revenue purposes, which ultimately helps maintain or improve upon permanent residents' livelihoods. Expert #13 also believed that all stakeholders should be able to access it. Expert #13 relies on visitation for money, and although some of his peers do not want any outside visitors, Expert #13 argues that all stakeholders should have access because it will make Muskoka's economy thrive, providing better living conditions to all. The opinions of Expert #14 and #13 which suggest that permanent residents should (and many do) want all stakeholder into the region aligns with the ideas in the results and discussion #1 sections, as online evidence and expert opinions suggest that argument #3 is both the best option forward regarding maintaining or improving upon livelihoods and is currently the most widespread opinion among stakeholders. Despite the opinions of Expert #14 and 13, Expert #12 offered a slightly different opinion, which was that only stakeholders who are fully vaccinated should be able to enter the region. Expert #12 encourages visitation because they know it helps spur the economy and, therefore, the livelihoods of stakeholders, including themselves. However, Expert #12 also encourages strong public health and believes that allowing only those who are fully vaccinated best balances the different values between permanent residents, seasonal residents and short-term visitors or tourists. Although this argument does balance the values between stakeholders, it discourages those who are not vaccinated and feel they deserve access to the Muskoka they have allows known and loved, or even new visitors seeking to learn about and benefit from the region's beautiful environment. Therefore, the arguments and opinions of Expert #14 and 13 best align with the preliminary findings. More information regarding these arguments and the trade-offs associated with them will be posited in the proceeding paragraphs.

The results from question #2 show that there will be long-lasting effects of COVID-19 on the economy but not public health. Expert #10 believes that there will be long-lasting effects of the coronavirus on Muskoka's economy, but once vaccines are widely distributed, Expert #10 believes these effects will be minimal. Expert #13 also believes that there will be long-lasting effects of COVID-19 on the economy but not public health, as Expert #13 worries more about the effects of climate change. This idea that the coronavirus (and climate change) will impact the economy and public health aligns with the preliminary results, as these impacts will degrade Muskoka's stakeholders' livelihoods. One thing to note is Expert #13's point that they are more worried about the effects of climate change on public health than the coronavirus, which aligns with findings in the preliminary findings. As a whole, the results from question #2 show that there will be long-lasting effects of the coronavirus on the economy, but if the Muskoka region can secure vaccines and gain herd immunity, then the effects of this virus on public health will be negligible.

The results from question #3 show that there is indeed a divide between stakeholders in Muskoka regarding the coronavirus pandemic. Expert #7 stated that there has been and always will be tension between stakeholder groups because they have different stakes within the region, leading to different overall values and ideas of what the region is best suited for. Expert #7 is a permanent resident who discourages visitation from seasonal residents or short-term visitors or tourists due to the increase in expected cases, especially if these people are coming from coronavirus hot-spots like the GTA (Greater Toronto Area). Expert #7 attributes the trade-offs associated with increased visitation, leading to a thriving economy but an increase in cases versus a decrease in visitation leading to a hurting economy but thriving public health, to be the leading causes of these tensions between stakeholders. Expert #8 also agrees that there have been and always will be tensions between stakeholders due to these trade-offs and many others. However, Expert #7 also raised a significant point that if I can increase the understanding of the underlying values of stakeholder groups which leads to these arguments, then I will be able to better the livelihoods of all in the region as everyone may be more content regarding critical issues around the coronavirus pandemic. This is a significant point, as it aligns with what I wanted to do executive summary of this report: elevate stakeholder livelihoods by providing them suggestions and understandings better to manage issues and opinions around the COVID-19 crisis. This work will be provided in the executive summary. As a whole, the results from

question #3 showed that there are indeed tensions between stakeholders and stimulated ideas around how to effectively help citizens who live in and visit the region better understand and deal with trade-offs and general impacts of the COVID-19 pandemic.

The results from question #4 show that there will be tensions between stakeholders that will last beyond the virus. Very similar to the last question, both Experts believed that there have been and always will be tensions between stakeholders, which will last beyond the virus. Expert #8 believes that although COVID-19 cases are diminishing, stores are opening back up, and vaccines are rolling out quickly, there will always be tensions between stakeholders in the region due to the economic and social differences between stakeholders. Expert #9 believed that there are fewer tensions than initially expected, especially regarding permanent residents' opinions of seasonal residents and short-term visitors or tourists. Expert #9, similar to Expert #7 in the previous question, believes these tensions could be mitigated through increased understanding. These results align with the preliminary findings in a sense that there are indeed tensions between stakeholders regarding the virus and the best way to mitigate these tensions is by providing permanent residents, seasonal residents, and short-term visitors or tourists the information they need to understand the different values of all who live in and visit the region and what this means for trade-offs associated with the level of visitation, economic activity, and public health. Fortunately, the ultimate goal of this summer research is to balance these trade-offs to provide the best livelihoods to Muskoka's stakeholders (balancing arguments #1, 2, and 3). It is important to note that I will also be using work from last summer to further explain this question's results, aiding in constructing the executive summary.

The results from question #5 show that the combination of effects that the coronavirus and climate change have on Muskoka's stakeholders have seen throughout history. Expert #8 says that the effects of both climate change and the coronavirus pandemic are the worst two events that are compounded together for stakeholders' livelihoods. Expert #11 says that the effects of the climate crisis and COVID-19 are the worst effects on themselves and surrounding stakeholders. These results align with the preliminary findings, as it seemed from the online evidence that climate change and the coronavirus pandemic have and are going to continue to cause many disruptions to Muskoka's economy and public health, degrading the livelihoods of stakeholders.

The results from question #6 show that it is best to provide an understanding to permanent residents (and other stakeholders) of how increased visitation spurs Muskoka's economy, which leads to better livelihoods for all, despite the slight increase in coronavirus cases that may occur. After talking with Expert #7, I noticed a common trend throughout all Experts that points towards the fact that increasing the understanding of trade-offs and phenomena related to stakeholder opinions around the coronavirus is the key to unlocking better livelihoods due to decreased tensions and a more thriving economy. If stakeholders like Expert #7, who do not own a business or rely on outside visitation for their primary source of income can understand these trade-offs, then other permeant residents in the same situation (as well as other stakeholder groups) can all work together to be more understanding and accepting, providing an ultimately better livelihood for all who inhabit the region. These results also align with the preliminary findings, like the belief that the best way to increase stakeholder livelihoods is to elevate their understanding of phenomena related to the coronavirus, such as different stakeholder values and what this means for trade-offs between Muskoka's economy and public health, which is precisely what Expert #7, as well as many others, suggested.

Section #3: Conclusion

It turns out that it may be best for all stakeholders to have access to the Muskoka region, even during the Coronavirus pandemic. All results show that many permanent residents want all stakeholders to access the region for economic, recreational, and pleasure purposes, despite the expected increase in coronavirus cases. This idea that many permanent residents want everyone to access the region aligns with the preliminary findings, where online evidence suggests that argument #3 makes the most sense and is currently the one that seems to be the most widespread among stakeholders. Muskoka's economy suffered greatly from the coronavirus pandemic, and stakeholders value rebuilding their economy over increased cases, especially since vaccines are now widely distributed (Government of Canada, 2021). I recognize that permanent residents deserve access to strong public health, which implies low visitation. However, given the vaccine roll-out, I think people can now frequent the region relatively safely, especially if they are vaccinated. Interestingly, many of the Experts believed that the combination of effects that climate change and the coronavirus have on Muskoka's stakeholders are the worst they have seen in history. Also, many worried more about the effects of climate change than the coronavirus on

Muskoka's public health and economy. Despite this, the coronavirus in Muskoka is still a pressing issue and stakeholders must better understand the tensions regarding it.

SECTION #2 AND 3: OVERARCHING CONCLUSION

Sections #2A and 2B have provided an abundance of information regarding the current and predicted effects of climate change and the coronavirus pandemic on Muskoka's stakeholders' livelihoods. Judging from the evidence at hand, both of these issues have and will continue to cause situations for Muskoka's stakeholders which may not be favorable or advantageous to their livelihoods. The effects of climate change are expected to worsen, and if local government and stakeholders (mainly permanent residents and seasonal residents) do not adequately prepare for these effects, then their livelihoods may drastically decline. Although the coronavirus pandemic's effects on public health are getting better, opinions around the virus and its current and predicted effects on Muskoka's economy (which directly impacts stakeholder livelihoods) must be understood by stakeholders. If stakeholder read this report, I believe they will be able to better adapt to climate change and manage tensions around the coronavirus pandemic. Please make sure to keep referencing the executive summary at the top of this document ("Section #1: An Executive Summary Focusing on Helping Stakeholders Deal with Climate Change and the Coronavirus Pandemic"), as it will help refresh you on what you need to do to manage these twin crises. Although we may not all be in the same boat, we are facing the same storms and we must work together to mitigate their effects and maintain or improve upon our current livelihoods.

Sincerely,

Andrew Court

FIGURES FOR SECTION #2

Table 1.0: Significance of interviewing each local expert along with the section that their opinions and knowledge will be referenced in. Note: Under the Institutional Review Board, I am unable to reveal the identity of interviewees and therefore, have only generalized their topic of expertise reasons for being interviewed.

Interviewee #	**Significance of Expert Interviewee**	**Section of Report**
1.	Employee of a local conservancy foundation	Section #2
2.	Local scientist that specializes in watershed health and management	Section #2
3.	Local climate scientist	Section #2
4.	Owner of a non-profit that is focused on Muskoka's sustainability	Section #2
5.	Local biologists that specialized in aquatic and terrestrial biodiversity	Section #2
6.	Local librarian that is focused on Muskoka's history	Section #2
7.	Permanent resident who lives in Muskoka but doesn't own a business	Section #3
8.	Employee of a non-profit focused on Muskoka's heritage	Section #3
9.	Employee of a business that sells alcoholic beverages	Section #3
10.	Owner of grocery store	Section #3
11.	Owner of a summer recreational business focused on watersports	Section #3
12.	Worker at a summer recreational business focused on golf	Section #3
13.	Owner of a resort that is focused on winter recreation	Section #3
14.	Permanent resident who lives in Muskoka but doesn't own a business	Section #3

Table 2.0: Questions asked to local Experts on climate change and coronavirus related questions.

Questions on Climate Change	**Questions on Coronavirus**
#1: What natural disaster do you currently worry about most when it comes potential effects on the built infrastructure of Muskoka? Is this the same for the predicted effects of climate change by mid-century?	#1: Would you agree that it is best for all stakeholders (including seasonal residents and tourists) to have access to stay in the region during the coronavirus pandemic? If so, how do we convince permanent residents of this?
#2: What natural disaster or climate situation do you worry about most regarding public health in Muskoka? Is this natural disaster the same when thinking by mid-century?	#2: Do you see the coronavirus as a long-lasting threat to Muskoka's public health and/or economy?
#3: Do you see the effects of climate change drastically impacting recreation (eco-tourism, water, and land recreation)? Do you think total tourism will increase or decrease?	#3: Is there a divide between stakeholders regarding opinions around the coronavirus?
#4: How drastic will the impact of climate change be on Muskoka's economy?	#4: Do you think the tensions between stakeholders will last beyond the virus?
#5: Given the predicted effects of climate change, how do you think Muskoka's stakeholders can maintain or even improve upon their current livelihoods and ways of life?	#5: Do you think the combination of effects that the coronavirus and climate change have on Muskoka's stakeholders are the worst they have ever seen or experienced in history?
#6: How do we best plan for climate change moving forward?	#6: How can I best help provide an understanding to permanent residents on why other stakeholders should be able to access the Muskoka region, event during a pandemic?

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