6th Annual Science Policy Awards of Excellence - Youth Category
CSPC is proud to present its 6th Annual Science Policy Awards of Excellence - Youth Category which follows in the spirit of our 2013 Young Generation Award.

This award recognizes a young individual (student, postdoctoral fellow, researcher, entrepreneur, etc.) under the age of 35 who developed an innovative and compelling evidence-based policy that will make a positive difference to Canadians. Proposals were to be connected to one or more of the themes for the 2020 CSPC Conference. This award is designed not only to highlight innovative, evidence-driven policy ideas, but also to encourage innovative young people who may not currently be studying, or working on, public policy to develop and share their policy ideas.

The Selection Committee was impressed by the quality of the submissions and the dedication of the applicants so they wanted to share the best of these innovative evidence-based policy proposals with the CSPC community.

Please join us in congratulating our 2020 winner Hannah Harrison for her proposal “Improving seafood direct-marketing for Canadian economic resilience and food security” and our runners-up, Nadwa Elbadri and Andrea Reid.

2020 Winner: Hannah Harrison
Postdoctoral Scholar
Department of Geography, Environment & Geomatics
University of Guelph

2020 Runner-up:
Nadwa Elbadri
Masters Candidate
University of Waterloo
“Evaluation of Microbial Health Risks Facing Migrant Workers in Canada’s Seasonal Agricultural Worker Program (SAWP)”

2020 Runner-up:
Andrea Reid
Incoming Assistant Professor
Indigenous Fisheries, Institute for the Oceans and Fisheries, University of British Columbia
“Restoring Canada’s Pacific Salmon for a Resilient, Socially Just Future”
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CSPC would like to extend very warm thanks to the distinguished members of our 2020 Awards Selection Committee for their valuable time, commitment and enthusiasm for encouraging young people to consider how they might contribute to evidence-based policy.

Proposals were blind-reviewed and the Committee enjoyed learning about the incredible diversity and passion of the applicants once the winners had been selected and the applicants were revealed.

2020 CSPC Awards Selection Committee

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Vice President
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Emily De Sousa
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A special thank you to Naveed Aziz and Christina Stachulak, Wendi Zhou, Hamed Babazadeh, Brigit Viens, and Majid Naji, for all of their work on making this award possible.

Naveed Aziz
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Brigit Viens
PhD
NSERC

Majid Naji
Senior Scientist
OZ Optics
Impact of the Award

2nd CSPC Award Winner (2016)—Amani Saini  
“Using Genetic Tests to Prevent Adverse Drug Reactions”

“Since receiving the award, I've started a not-for-profit called Adverse Drug Reaction Canada which is advocating for the need to use genetic testing to identify gene variants in Canadians that can cause an adverse drug reaction, and then using this knowledge to guide the prescription of drugs. I knew I wanted to start a not-for-profit for awhile because my younger sibling had almost passed away from an adverse drug reaction. Receiving the Canadian Science Policy Award really was an endorsement by the science community that it had a great proposal, and it gave me the assurance I needed to move forward with this idea.”

3rd CSPC Award Winner (2017)—Sierra Clark  
“Residential Woodburning in Canada: Health and Climate Effects and Intervention Strategies”

“The exercise of even just writing this policy proposal and trying to extend and push my communication skill set was an asset in and of itself. Of course, being recognized for my contribution was an amazing feeling. It did make me seriously consider future career in government, working in the policy world, and that's something that I wouldn't have really desired or just didn't even cross my mind prior to applying for this award.”

5th CSPC Award Winner (2019)—Emily De Sousa  
“Eliminating Seafood Fraud: A Fishy Approach to Food Policy”

“The biggest takeaway for me was that it was just it was validating as a young researcher it got rid of any impostor syndrome that I had, and really made me feel confident that what I was doing was right it was right for me. I am exactly where I'm supposed to be, and the work that I'm doing is meaningful and impactful and important to Canadian policy. I am eternally grateful to the Canadian Science Policy Centre for awarding me with these Excellence Award in 2019 because it was really a perfect stepping stone to my Masters and gave me the confidence that I needed to be a strong researcher that I am today.”
2020 WINNER - Hannah Harrison
Improving seafood direct-marketing for Canadian economic resilience and food security

BIOGRAPHY
Hannah Harrison is a postdoctoral scholar at the University of Guelph, and currently studies community-supported fisheries, Great Lakes commercial fisheries, and the human dimensions of fish cultivation. Originally from Alaska, Hannah grew up in a small fishing community working on boats and exploring tide pools. She earned her B.S. and M.S. at the University of Alaska Fairbanks, and has worked in a wide variety of interesting jobs, including as a commercial fisherman, fisheries technician, suicide hotline counselor, research assistant, volunteer EMT, radio show host, and environmental consultant. After university, Hannah served in the U.S. Peace Corps in Zambia, and afterward earned her PhD in Norway before fulfilling her lifelong dream of moving to Canada. She now makes her home in Guelph, and enjoys fostering animals for the human society, quilting, ballroom dance, and getting outside in her spare time. She remains passionate about studying and eating local fish.

INSPIRATION
“I have worked in fisheries for many years – as a fisherman, as a consultant, and now as a scientist. One of the greatest frustrations I hear from fishing communities is how hard they work to stay afloat and adapt to change, but how little appreciation and support they receive from the public who want their seafood. I want to change that. When COVID-19 struck, fisheries all over North America struggled to adapt to yet another massive change, but those that were already involved in direct-marketing of seafood seemed to fair much better than those who sold to traditional ‘Big Seafood’. I was inspired by the stories of those fishermen to identify and propose changes that could strengthen all of Canada’s small-scale fisheries, and the coastal communities that depend on them. In particular, ways that we as a seafood consuming society can support fishermen through appropriate infrastructure development, easing of red tape to allow for locally-appropriate direct-marketing of seafood, and strengthen Canada’s relationship with the men and women who bring sustainable proteins to our shores every day.”

OPPORTUNITY FOR ACTION
Canada is the 6th largest seafood exporter in the world, sending over 2/3rds of domestically caught seafood to foreign markets[1]. Canadian seafood imports comprise a substantial portion of seafood eaten domestically, and unfortunately often comes from less sustainable fisheries than those in Canadian waters.
Imported seafood supply chains also continue to struggle with traceability and labeling, making it difficult to assess their sustainability and for consumers to make informed choices about the seafood they consume[1]–[3]. While the export-driven nature of Canada’s seafood industry has been quite profitable for large players, it has led to the increasing consolidation of permits, licenses, quota, and other key fishing infrastructure (such as processing plants and boats) into the hands of fewer and fewer individuals [4]. This trend has, in turn, driven up the cost of entry into many fisheries across Canada, in part preventing new generations of fishermen from entering the industry, and pricing some seafood products out of local markets[5]. While there was already evidence to suggest that these trends threaten the resilience of Canada’s fishing industry[4], the COVID19 pandemic has demonstrated how fragile this consolidated, export-driven seafood industry can be.

In March of 2020, fisheries around Canada (and the world) were unable to open due to the global collapse of seafood markets as restaurants and other fresh retail markets ground to a halt overnight. Those fisheries already underway found themselves with nowhere to sell or process their catch[6], [7], and fishermen struggled to cover the costs of their fishing livelihood [8]. Meanwhile, as seafood became unavailable from traditional retailers (e.g., grocery stores, restaurants), consumers turned to local fishermen to try to access fresh seafood, resulting in a significant increase in demand for local seafood products[9], [10]. While some harvesters were able to adapt their operations to meet this demand[11], many fishermen were unable to respond due to localized constraints such as restrictive regulatory conditions and lack of appropriate infrastructure to support direct-marketing of seafood to consumers [12]. As a result, fishermen unnecessarily struggled to maintain solvency and many required significant financial aid from federal and provincial governments[13]. Similarly, consumers were unable to access sustainable, locally-produced sources of high-quality protein during a critical time of food supply chain disruptions, further weakening local food security.

Regulatory barriers to localized direct-marketing of seafood have been acknowledged before [14], [15] and some provinces have taken steps to remove barriers and allow harvesters to sell their product directly to local consumers, including individuals and restaurants [16]. Still, barriers remain[15], and previous interest from provinces, fishermen, and consumers around Canada to see development of direct-marketing oriented community-supported fisheries (CSFs) and other alternative seafood networks (ASNs) [17]–[19] has been rekindled by the COVID-19 pandemic. As COVID-19 continues to challenge seafood markets throughout Canada, this is an ideal moment to re-think Canada’s relationship with seafood and reshape regulatory priorities around production of and access to Canadian seafood products.

Canadian seafood consumers are ready for change[20], and the pandemic offers Canadian policy makers three key opportunities. First, to prioritize local food security and resilience within Canada’s small-scale fishing industries, and the coastal communities that rely upon them, particularly within economically depressed provinces. Second, to lessen Canada’s reliance on unsustainable and poorly traced and labeled foreign seafood. Third, to strengthen Canada’s reputation as a leader in the production and sales of sustainably produced and harvested seafood products.
PROPOSED ACTION
To address the three priorities laid out above, I suggest a few key areas where policy changes could be effective.

1. Remove regulatory barriers to direct-marketing of local seafood products
In many provinces, regulations around the direct sale of seafood into local markets are made at the provincial level. To better prioritize and support local food security and resilience within Canada’s small-scale fishing communities, provincial policy makers should remove regulatory barriers to the direct sale of local seafood products for both household consumption and local retail (e.g., restaurants). There are a few examples of ways that these changes could be brought about.

The substantial cost of becoming legally compliant with existing direct-marketing procedures, as well as the sometimes arduous process of identifying, obtaining, completing, and filing the paperwork to do so, are significant barriers for seafood harvesters. To address these problems, permits (or other permissions) to allow direct sales and purchases should be low cost or free for both harvesters and consumers, and the process to obtain appropriate permission for direct-marketing should be streamlined and standardized as much as possible to ease unnecessary logistical and administrative burdens on harvesters. Another approach would be to address regulations around where seafood is sold from, such as from a boat, dock, or other location, and ensure that they are reflective of the realities of the fishing industry. For instance, fish in Newfoundland must be sold on a vessel or dock, requiring consumers to enter potentially hazardous working waterfront space. While food safety is, of course, an essential element of seafood preparation and sale, regulations should be revised to lay out conditions for safety, health, and well-being for consumer and harvester, rather than dictate specific conditions that may not apply across the board in a very context-dependent industry.

2. Invest in working waterfronts, food hubs, and the next generation of fishermen
At the federal and provincial level, policy makers could prioritize the funding and enhancement of working waterfront spaces that provide appropriate infrastructure for seafood harvesters to operate direct-marketing businesses. As fishing fleets age and decline in number, working waterfronts around Canada have also become a low priority, often supplanted by tourism or other non-fishing interests. Commercial fisheries are not dissonant to other waterfront uses, and the opportunity for tourists and locals in coastal communities to see fish being landed and sold is important in maintaining social understanding and acceptance of the industry. Federal and provincial economic and political support for waterfront maintenance and the development of food hubs and other public infrastructure (such as direct marketing manuals [21]) for seafood processing, sale, and local distribution are critical to supporting the establishment and growth of the seafood direct-marketing sector. Similarly, a national “Eat Canadian Seafood” campaign would drive consumer interest and support in local seafood consumption and infrastructure.
Improving seafood direct-marketing for Canadian economic resilience and food security

A secondary benefit to these investments would be the development of local resilience to food insecurity, and support for the next generation to enter the fishing industry. As seafood is a high nutritious source of protein in communities that are often far away from food distribution sites, building in mechanisms by which local people can access seafood is critical to enduring food supply chain disruptions such as those witnessed during COVID-19. Supporting the development of this infrastructure also creates opportunities for young people to engage with the seafood supply chain, and decentralizes power and control over fishery access, thereby making it accessible to young fishermen.

REFERENCES


RUNNER-UP - Nadwa Elbadri
Evaluation of Microbial Health Risks Facing Migrant Workers in Canada’s Seasonal Agricultural Worker Program (SAWP)

BIOGRAPHY
Nadwa holds a Bachelor of Engineering and Management from McMaster University, and is currently pursuing a Master of Applied Science at the University of Waterloo, in the Department of Civil and Environmental Engineering. Her interests fall at the interface of interdisciplinary work between engineering and the social sciences. Her current masters project looks at quantifying the microbial health risks faced by migrant workers in Canada’s seasonal agricultural worker program. Nadwa’s professional experience includes working for a utility expanding infrastructure in rural and remote communities, including first nation communities in Canada, in addition to supporting infrastructure projects on volunteer trips abroad. During that time, she learned the importance of adequate infrastructure in supporting community health and growth. She is passionate about using her skills as an engineer to support small and vulnerable communities.

INSPIRATION
“I spent the last year learning about temporary migration in the Canadian context, diving deep into the labour migration program bringing in migrant seasonal workers to participate in Canada’s agriculture industry. Throughout, it was clear the vital role workers play in safeguarding food security and the Canadian economy, while unfortunately also facing increased health risks during their tenure. I was shocked to learn that very little information was collected and reported on the health of this very hidden group of society, given the nature of their temporary status. Current circumstances with the COVID-19 pandemic, have exacerbated the health risks faced by this population bringing them to the forefront of public discourse. Given these unique circumstances, my goal is to use this opportunity to advocate on workers behalf by understanding and identifying the factors contributing to their microbial health risks and ultimately finding ways for mitigation and control of the risks they face.”

OPPORTUNITY FOR ACTION
Seasonal farmworkers are amongst the many workers that come to Canada under the Temporary Foreign Worker Program (TFWP). Annually, roughly 50,000 workers come to participate in the long-standing Seasonal Agricultural Worker Program (SAWP), a federally managed labour migration program [1].
Seasonal migrant farmworkers, mainly from Mexico and the Organization of Caribbean States, come to participate in agricultural work opportunities in an attempt to respond to the labour shortage in the Canadian agricultural sector [2].

Seasonal workers fulfill specific on-farm, primary agricultural activities. These activities include care, breeding, and sanitation of animals as well as planting, harvesting, and preparation of crops [3]. This seasonal labour force is a key contributor to addressing Canadian food security and a crucial part of safeguarding the economy. Migrant workers can make positive contributions to a farm’s performance, and productivity, bringing in culturally unique skills. In Canada migrant workers fill a necessary labour gap on an annual basis, making them an experienced, reliable, and consistent workforce [2]. In 2017 27.4% of employees in crop production were foreign workers [4]. The growth of the SAWP has transformed the Agricultural industry in Canada over the last few decades shifting Canada into a net exporter from a net importer of key crops and accounting for about 6.7% of Canada’s total GDP [5],[6].

However, despite the requirement for health screening prior to arrival, research has shown that migrant farmworkers face a range of known specific health threats during their tenure in Canada. These include physical trauma causing musculoskeletal disorders, and microbial exposures causing gastrointestinal illnesses [7]. Previous studies have also shown that migrant farmworkers face increased vulnerability to infectious diseases given the nature of their work and precarious living arrangements [8]. Although reported data describing their health is scant, there is evidence of infectious enteric disease spread causing gastrointestinal illness amongst this population. Data collected from 2006-2010 in a study by the Norfolk General Hospital in Simcoe Ontario from 888 migrant worker visits showed that gastrointestinal illnesses were the second-highest diagnosis at (13%) [9]. The current COVID-19 pandemic has also undoubtedly magnified the health risks tied to the spread of infectious disease in migrant workplace settings. Substandard living arrangements, often in residences exceeding occupational densities, and the lack of essential and permanent amenities such as washing facilities also hinder workers’ ability to effectively adhere to public health measures, continuing to amplify the challenges associated with maintaining Canadian food security when their critical contributions are compromised [10],[4]. Specifically understanding enteric pathogen exposure pathways facing migrant farmworkers in their agricultural work settings and identifying enabling factors through a risk-based approach, is necessary for the protection of migrant worker microbial health. Highlighting the need and providing effective risk-based tools to protect migrant worker health in our broader policy development will safeguard Canadian food security, contribute to the protection of overall public health, and generate strong industry-related contributions in support of the economy.
The recommendations below are based on the use of a risk-assessment approach highlighting key factors contributing to elevated microbial health risks faced by seasonal farmworkers. The primary goal of the recommendations seeks to promote a mutual benefit for both Canadian farms and migrant workers, through the implementation of effective microbial risk mitigation and control strategies.

**PROPOSED ACTION**
A hazard assessment approach was used to investigate the pathways and transmission routes of enteric pathogens in the migrant worker setting. The approach synthesizes factors enabling migrant pathogen exposures and emphasizes gaps hindering the control of microbial risk. The following proposal highlights four migrant worker-related factors contributing to an elevated risk of enteric illnesses and provides goals to mitigating specific factor risk.

1. **Controlling pre-harvest sources of enteric pathogen contamination**
   Workers can be exposed to elevated levels of pre-harvest sources of microbial contamination, given their job responsibilities. Sources of pre-harvest contamination propagating the risk of exposure include; the handling of manure, the type of irrigation water, irrigation method and crops grown, and the presence of domestic and wild animals on-site [11]. Control of these factors, for microbial risk mitigation, can be achieved by:
   - a. Ensuring agricultural best management practices are followed. Best practices, supported in the literature for control of manure contamination include instituting a 90-120 day rule for harvesting produce after application of manure [12].
   - b. Utilizing micro irrigation methods such as drip and subsurface mechanisms, limiting the amount of water on crop surfaces, and minimizing the risk of microbial contamination [13],[11].
   - c. Considering locations of animal rearing sites relative to waterways, and establishing adequate buffer zones for effective control of pathogen transmission pathways [12].

2. **Enforcing infrastructure standards to disable microbial exposure pathways**
   Infrastructure issues contributing to the microbial risk faced by migrant workers can be grouped into exterior and interior issues, concerns tied to hygiene, the temporary nature of their work, and access to clean drinking water. Exposure to risk can be mitigated through:
   - a. Access to full-time housing/amenities yearly, and removal of temporary infrastructures such as temporary portable heaters; inadequate laundry & hand washing facilities; inadequate food refrigeration, heating, and storage [14],[15].

Nadwa Elbadri  
*Evaluation of Microbial Health Risks Facing Migrant Workers in Canada’s Seasonal Agricultural Worker Program (SAWP)*
b. Explicitly including water systems serving farms with workers within O Reg. 170 under the Safe Drinking Water Act as a designated facility. Alternatively, where systems are deemed small drinking water systems under Reg 319/08, frequent inspections before, during, and after migrant arrival should be stipulated in this unique permanently temporary arrangement [16],[17].

c. Instituting hygienic segregation through the utilization of barriers between the sleeping kitchen and bathroom areas in the living space, and introducing designated worker break & meal areas in the worksite [18],[19].

3. Mitigating occupational hazards that lead to potential microbial exposures
Occupational hazards associated with increased exposure to microbial health risks faced by migrant workers include; lack of appropriate and complete training and inadequate data collection for analysis and compliance [20]. The following tactics can be used for the reduction of the risk of exposure:

   a. Instituting standardized training, and introducing specific training such as Water, Hygiene, and Sanitation (WASH) in workers' preferred language, while ensuring completion through a centralized data management system.

   b. Using specific coding to identify worker diagnoses in hospitals and WSIB files, for data analytics needed to identify points propagating microbial risk

   c. Providing the right Personal Protective Equipment (PPE) to disable the pathway of exposure [20].

4. Removing barriers to microbial risk mitigation by modifying and strengthening SAWP policies
The last factor indirectly contributing to worker microbial health risks, manifests in way of a barrier hindering risk control strategies. Microbial risk mitigation effectiveness can be improved by the removal of barriers and updates to the following program policies:

   a. Ensuring access to health care by enabling worker mobility through transportation services, and by supporting multilingual and consultation services within the healthcare system [10].

   b. Eliminating the transfer and loaning of workers from one farm to another, to reduce the risk of microbial cross-contamination.
Evaluation of Microbial Health Risks Facing Migrant Workers in Canada’s Seasonal Agricultural Worker Program (SAWP)

REFERENCES

RUNNER-UP—Andrea Reid
Restoring Canada’s Pacific Salmon for a Resilient, Socially Just Future

BIOGRAPHY
Dr. Andrea Reid is a citizen of the Nisga’a Nation and an incoming Assistant Professor with the University of British Columbia’s Institute for the Oceans and Fisheries (starting January 2021). There, she will lead the Indigenous Fisheries Research Unit, working to build a national and international hub for the study and protection of culturally significant fish and fisheries. Her research program adopts highly interdisciplinary and applied approaches to improving our understanding of the complex interrelationships between fish, people and place. Reid’s PhD in Biology (Carleton University ’20) centered on multiple stressor effects on Pacific salmon, using tools and insights from Western and Indigenous sciences in tandem. Reid is a cofounder of Riparia, a Canadian charity that connects diverse young women with science on the water to grow the next generation of water protectors. She is also a National Geographic Explorer (Grantee ’12,’15,’16,’19) and a Fellow of The Explorers Club (Fi’19).

INSPIRATION
“Nisga’a Sim’oogit Hleek Dr. Joseph Arthur Gosnell CC OBC, a highly decorated chieftain in my Nation, once told me, “Salmon, the mainstay of our Nation. Not just the Nisga’a, but from Alaska to California. We’re salmon people, our diet has been salmon for thousands of years.” Recently, on August 18th, 2020, Chief Joe passed away – the same day that the First Nations Leadership Council declared the collapse of Pacific sockeye, one of the most sacred and valued of all fish. I grew up in a small oceanside community where fish figured prominently in all aspects of coastal life. As a direct result, I have dedicated my career and life to the study and protection of these remarkable creatures, which have underpinned the diets, ceremonies, ways of life and wellbeing of salmon people since time immemorial. Urgent action is needed now so salmon can continue doing so for generations to come.”

OPPORTUNITY FOR ACTION
Abundant and sustainable Pacific salmon populations are critical culturally, ecologically, economically and politically to Canada. In fact, the last remaining large-scale Canadian fisheries targeting wild fish involve the five species of Pacific salmon. However, the future of these fish is being called into question as policy and management failings result in a lack of coordinated effort and attention, from a local to national scale.
Andrea Reid
Restoring Canada’s Pacific Salmon for a Resilient, Socially Just Future

Pacific salmon are an essential and sacred traditional food. They provide a leading source of nutrients and protein to First Nations throughout British Columbia (BC) [1] and have shaped Indigenous cultural practices, languages and even worldviews throughout their range and since time immemorial [2]. They are also a public icon and are designated as an official symbol of BC [3].

Salmon have long been recognized for their critical ecological role in supporting ocean and freshwater food webs, where adult salmon carcasses provide a fundamental source of nutrients to stream and riparian environments throughout coastal Pacific watersheds [4], [5].

Salmon fishing is also a significant economic sector in BC, supporting more than 8,000 jobs and creating over $200 million in tax revenues annually, with wholesale commercial fishery landings valued at $100 million each year and the recreational fishery generating nearly $1 billion in annual economic impact [6], [7].

In the political sphere, Pacific salmon fisheries are flashpoints for federal–provincial and federal–Indigenous relations, as well as between the Canadian and United States governments. Recent First Nations treaties (e.g., Nisga’a) even involve a right to fish for salmon, with specific allocations for Food, Social and Ceremonial (FSC) fisheries based on the total return of salmon to Canada [8].

The incredible importance of these fish across systems and sectors can, simply, not be overstated. But their future is increasingly destabilized and uncertain as their populations appear in growing numbers in assessments performed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) [9].

In 2009, the Prime Minister of Canada called a judicial inquiry into the long-term declines of Pacific sockeye – the most valuable species harvested in the multi-sector fishery [7] and highly prized across many Indigenous Nations [2]. The ‘Cohen Commission’ investigated the complex science, policy and management issues possibly contributing to declining sockeye populations, putting forward 75 actionable recommendations to chart a new course for Pacific sockeye [10], but these unfortunately have yet to be taken up in any meaningful way over the last almost decade.

Tellingly, on August 18th, 2020, the First Nations Leadership Council declared the collapse of Pacific sockeye and stated that this collapse will ultimately threaten livelihoods and a way of life [11]. “First Nations leadership has been calling on the Federal Government to take real action to save Pacific salmon stocks for decades now,” stated Robert Phillips of the First Nations Summit in the recent press release. “Fisheries and Oceans Canada has consistently failed to take our calls seriously. It is now time for their failure to be recognized.” [11].
Tellingly, on August 18th, 2020, the First Nations Leadership Council declared the collapse of Pacific sockeye and stated that this collapse will ultimately threaten livelihoods and a way of life [11]. “First Nations leadership has been calling on the Federal Government to take real action to save Pacific salmon stocks for decades now,” stated Robert Phillips of the First Nations Summit in the recent press release. “Fisheries and Oceans Canada has consistently failed to take our calls seriously. It is now time for their failure to be recognized.” [11].

Until Canada and the department of Fisheries and Oceans (DFO) is prepared to move the dial on the Cohen Commission recommendations, and to equitably include Indigenous Nations at the decision-making table and uphold our national responsibilities to the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP) [12], then we are likely to see the continuation of the status quo approach to salmon management, which is highly exclusionary and failing to meet the Wild Salmon Policy’s mandate of conserving Canada’s wild Pacific salmon and their habitats.

The recommendations below aim to strengthen this policy so these critical fish and fisheries can once again be made resilient.

PROPOSED ACTION

The proposed actions below center on leveraging and enriching existing policy levers for improving the current state and future of wild Pacific salmon in Canada, ultimately helping to realize the Wild Salmon Policy’s main mandate of conserving salmon and protecting their critical habitats.

1) Fully implement the Wild Salmon Policy and Cohen Commission recommendations immediately

In 2005, the Wild Salmon Policy (WSP; formally known as “Canada’s Policy for Conservation of Wild Pacific Salmon”) was developed [13]. In 2012, recognizing the little ground that had been gained on the ambitious and innovative policies that constitute the WSP, the Cohen Commission put forward multiple recommendations pertaining to the implementation and transparent reporting on WSP progress. For instance, recommendations #5 through #7 deal specifically with the implementation, funding and reporting on, respectively, WSP progress [10]. Fast forward to today, and we have a five-year draft strategy wherein changes to the WSP are proposed and further discussions and deliberations are planned [14]. Meanwhile, salmon monitoring efforts continue to erode, and many salmon populations experience increasingly severe declines [15].
Immediate action, retaining all Strategies and Action steps contained in the original WSP, rather than continued contemplation in the midst of an ecological crisis, is needed if we are to make a positive impact on wild salmon populations before it is too late — or in effect “Counting the books while the library burns” [16]. Indeed, “Further reviewing, re-examining, or reopening of the policy [WSP] would be a poor use of limited funds in the Pacific Region. The Wild Salmon Policy is more timely and important than ever and it should be fully implemented immediately” [17].

2) Reduce mixed-stock ocean fisheries & return to in-river fisheries targeting specific stocks

During this period of apparent inaction on WSP strategies and action steps, evidence suggests that severe salmon declines could have been avoided over this timeframe had specific Canadian fisheries been reduced [15]. Instead of fishing in river systems targeting known salmon populations as was the case for many Indigenous fisheries in the region pre-colonization, major commercial salmon fisheries now predominate in the marine realm where they capture mixed salmon populations as they co-migrate before segregating to their natal rivers and streams [18]. This inadvertently means that healthy populations that can sustain harvest are getting caught alongside smaller populations that simply cannot [19]. By shifting, or rather returning, to Indigenous fisheries approaches that target principally in-river populations, more selective fishing policies could be practiced in line with Canada’s Policy on Selective Fishing in Canada’s Pacific Fisheries [20].

This would require a restructuring of current management priorities, putting conservation and FSC fisheries ahead of commercial and financial interests, as is already prescribed by the Allocation Policy for Pacific Salmon [21], as well as legislated by the Canadian Constitution.

3) Create a strategy for equitable Indigenous inclusion in Pacific salmon management decisions

The full, equitable, and rightful inclusion of Indigenous peoples at the Pacific salmon management decision-making table is long overdue [11]. Rather than calling for the addition of WSP strategies and action steps or Cohen Commission recommendations specific to this key consideration, there needs to be a broad-scale application of equity, diversity, and inclusivity principles to all of the decisions made and actions taken under these essential salmon policy instruments.

While DFO affirms its commitment to “collaborative approaches and new ways of working together” and “working in partnership with Indigenous peoples,” the current draft strategy excludes any indication of how these collaborations will be built, maintained and evaluated [18]. A blueprint or plan must thus be put in place to both guide these efforts and provide a benchmark against which progress can be tracked and assessed.
Andrea Reid
Restoring Canada’s Pacific Salmon for a Resilient, Socially Just Future

REFERENCES


HONOURED PARTICIPANT - Kuheli Dasgupta

Science as a global effort: governance, impact and collaborations

BIOGRAPHY

As a research student in science, I have always been fascinated by the ways innovations have shaped the future of humanity. Being a single girl child in a family of accountants and teachers, my inspiration for learning was instilled at a young age, which was further fuelled during my adolescence through some amazing science classes at high school and a hobby for hiking trips around the magnificent Himalayas in my homeland of India. This led me to appreciate the diversity in the natural world which was eventually transformed into a curiosity for the biology of our existence. I then transitioned into studying biotechnology in my undergrad, culminating in a master’s thesis in cancer biology which in my opinion, is the most fascinating rogue player that has metamorphosed with life itself! This now further fuels me to continue my doctoral studies in the domain of immune-oncology of the brain at UofT.

INSPIRATION

“While the pandemic has brought the world to its knees, it has opened our eyes to the stark realities of poor healthcare, lack of investment in research, improper dissipation of scientific knowledge from institutions to the general public as well as disparities in socio-economic structures. Added to it, we are witnessing the fault-lines in our government policies to drive sustainable development, better social reforms as well as investments into grass-root changes for better access to education and healthcare. While all populations around the country are grappling with these mammoth problems, the Canadian diaspora of international students have been the hardest hit of the lot. With myriad troubles like mental health issues owing to COVID-19, uncertainty in post graduation scenarios and work permits, no financial security and the stress of worrying for their loved ones in distant homelands, the neglect towards this large community motivates me to tackle this issue.”

OPPORTUNITY FOR ACTION

The Canadian institutes of higher learning have been putting in large efforts in the directions of scouting for the best of global talents into the educational landscape and eventually the workforce. These efforts bring forth its own set of challenges such as catering to a community of diversity, making inclusions into the regulations which allow for growth of the individual as well as holistic benefit of the institution, adding to its repertoire of myriad teaching, training and outreach efforts.
In order to achieve the above milestones, every institution has stepped up to put in rigorous efforts for improving the international experience through increased student engagement, better graduate community support and flexible work/study options. However, isolated and fragmented efforts by the institutions do not allow tackling the whole range of the problem! Part of the challenge lies in the limited resources of the institutions as well as dearth of a coordinated large-scale effort. Adding to the woes is the lack of engagement from individuals of international and marginalized communities, as well as frugal support from the government to these institutions. With the BLM movement gaining traction in North America, the fragile landscape of including foreign nationals into positions of decision-making has become more urgent now than ever.

In light of the impact on students, the federal government has made commendable efforts to support domestic students through the payment of Canada Emergency Student Benefits (CESB), but most eligible international students are only allowed to apply for EI or CERB. The criteria for successfully being able to apply for these benefits come with their own set of challenges leaving most low-income or newly arrived students in a very volatile situation. Added to it, the pandemic has brought its own set of mental health challenges for every individual, and the ramifications of those are worse for international students who are already adjusting to a new culture, trying to fit into a new way of life while trying to meet their academic and professional goals. Additionally, the global anxiety regarding the advent of a vaccine and its associated success as a key player to turn the tide on the economy, are all uncertainties which are weighing heavy on the massive group of international students in Canadian institutions. Many such students are in doubt of their future in a foreign land while some are even reconsidering shifting back to their homelands upon their degree completion. If allowed to continue, this situation will have a devastating brain-drain effect on the Canadian economy which will lose a lot of valuable working individuals with Canadian experience serving in various cadres of the society.

In order to meet these challenges, we need to devise solutions which are custom-tailored for this vulnerable community, and would be readily available at their fingertips. While major economic reforms are a far-cry under the current scenario, carefully planned steps to support their life experience and dissipate the professional and psychological stress can act as major contributors to a Canadian success story for supporting international students. This in turn could bolster Canada as a destination for education, and allow mitigating the loss in international student population which is choking almost all universities across the country.

PROPOSED ACTION

A recent study conducted by the Toronto Science Policy Network at the University of Toronto has already shed light on the impact of the pandemic upon graduate and professional students. Having been conducted across all departments of the University, it gives a holistic idea about several challenges faced by the students. However, as part of my policy proposal I would like to focus on a small subset of
international students who may not form the bulk of the student cohort but have the potential to turn the tide in the education paradigm of Canada!

With the increasing cases of COVID-19 and ill-managed immigration policies, the US has become a difficult destination for study or work for many talented individuals across the globe. While Canada’s immigration policies and improved work culture allow for drawing focus to its opportunities, there is still a substantial work space available which could allow better engagement of the local communities with a global platform to foster a feeling of collaboration.

The first to achieve this dream would be initiate grass-root changes which equip universities and high schools with better tools to address the issue. One such approach would be to partner with the student support groups in the campuses, organize workshops to educate them about the various ways to enrich the community experience as well as empower them to contribute in decision-making steps to garner community support. Secondly, creation of special advisory panels and inclusion of people from racially marginalized communities, which act as a bridge between policy-creation and implementation, would act as a buffer to allow good representation of current student needs. This would also nurture the leadership potential in students at their respective institutional domains which in turn allow a custom-fit approach to focus on each school’s individual needs.

Next, creation of an online support caucus from the government to discuss and direct steps for welfare of these communities and engage support for their mental health (such as creation of a mental health toll-free line with individuals adept at several foreign languages would allow the international student to enjoy some familiarity while discussing ongoing challenges in life), would allow for better out-reach. This could see a drop in crime rates, domestic violence as well as suicides in all marginalized communities and hence significantly impact the social landscape of the nation.

Lastly, implementation of improved policies to take off the financial stress, such as creation of emergency funds for international students or extension of the work hours on a study permit (from 40 hours in summer to 40 hours for the whole upcoming term), inclusion of nominal benefits (like health checks or vaccines for flu, MMR etc) would create much superior living conditions and reduce the paranoia caused by food shortages, rent/ mortgage insecurities.

All of these approaches taken together, would create a better international student experience and make Canada a study/work hub post the COVID-19 era.
BIOGRAPHY
Emma Finlayson-Trick is a second-year medical student at the University of British Columbia (UBC) and holds a MSc in microbiology and immunology from Dalhousie University. Her interests include infectious diseases, medical microbiology, and science communication. Recently, Emma completed a summer interning with the B.C. Patient Safety and Quality Council where she investigated the cognitive barriers to hand hygiene amongst healthcare staff in a local emergency department. Emma is the senior co-editor-in-chief for the UBC Medical Journal and leads the microbiome analysis for a project examining the effects of iron supplementation on gut health in Cambodia. She is also currently organizing Vancouver’s first Soapbox Science event to promote the visibility of women in science, technology, engineering, and mathematics. Emma is eagerly pursuing a career as an infectious disease specialist with an interest in medical policy and governance.

INSPIRATION
“This past year I was placed in a family practice clinic where many of the patients had experiences with homelessness. In speaking with these individuals, I became acutely aware of how much time and energy they devoted to accessing resources, such as shelter, food, and healthcare. Following these interactions, I found myself wanting to help improve homeless health and wellbeing, but I was daunted by such a broad and complex area of care. Fast forward a few months and the COVID-19 pandemic hit. While I was quickly pulled from clinical experiences to protect my own health, I was reminded of the homeless patients from clinic and I worried about how they would manage to advocate for their needs during a pandemic. As I learned more about the lack of pandemic planning in regards to homelessness I became inspired to write this policy proposal.”

OPPORTUNITY FOR ACTION
The last two decades have been punctuated with pandemics (SARS, H1N1, Zika, and COVID-19) that have jeopardized the health and safety of people around the world. To mitigate the impact of future pandemics, countries rely on pandemic planning. A key component of planning is recognizing vulnerable populations—children, pregnant women, the elderly, and people with chronic conditions are most commonly noted—and implementing strategies to reduce their risk of infection. While homeless people
have historically been left out of pandemic planning, they too represent a vulnerable population. Homeless people are diverse, and they experience multiple health challenges including poorer health outcomes, inadequate nutrition, and barriers to accessing healthcare and stable housing [1]. Furthermore, they are at a greater risk of contracting infectious diseases as they are required to survive in overcrowded environments and do not have the luxury of social distancing or “staying home” during a pandemic [2]. It is for these reasons, and many more, that homelessness poses unique challenges to pandemic planning. Nevertheless, pandemic preparedness is a collective responsibility that involves not only government and community agencies, but also empowered citizens [3]. Homeless people, like anyone else, need to be equipped to help themselves and others during a pandemic.

Several pathogens have the potential to cause pandemics, however, due to the unpredictable yet recurring nature of influenza, the World Health Organization specifically advocates for national pandemic influenza planning [4]. Canadian Pandemic Influenza Preparedness: Planning Guidance for the Health Sector (CPIP) is the only federal guidance document in Canada to support provincial and territorial pandemic planning [5]. Last updated in 2018, CPIP emphasizes that pandemic plans need to be equitable and fair, so decision makers are encouraged to “take health inequities into account and try to minimize them, rather than make them worse” [5]. Furthermore, CPIP recognizes that vulnerable populations “might become more marginalized if pandemic health services are streamlined into standard approaches to reach the general population” [5]. As such, provincial and territorial pandemic influenza plans are meant to address the requirements of local populations by guiding pandemic planning for organizations and health authorities. While the majority of plans focus strictly on influenza, CPIP and plans from British Columbia (B.C.) and New Brunswick (N.B.) state that they can be applied to other public health emergencies.

Following SARS and H1N1, researchers spoke with homeless populations and frontline workers across Canada to identify areas of pandemic planning in need of improvement [3],[6]. Notably, many of the same concerns were identified following both SARS and H1N1. These concerns fall into three main areas: communication, infection prevention and control, and system capacity. Seeing as very few steps have been taken to address these concerns in current provincial and territorial pandemic plans, there is clearly still a need for improvement [3]. If provinces and territories want pandemic plans that are equitable and fair, the needs of all vulnerable populations have to be considered. This proposal seeks to begin a conversation about how pandemic planning policy can better support those experiencing homelessness. The recommendations below attempt to address some of the inequalities that exacerbate the marginalization experienced by homeless populations during a pandemic.

PROPOSED ACTION
The proposed actions for provincial pandemic plans (PPPs) are inspired by observations made from SARS, H1N1, and COVID-19.
1. Update PPPs to reflect past experiences and ongoing research.
Despite intentions, PPPs are not regularly updated to reflect current knowledge and best practices. The B.C. plan, for instance, states that it will be revised every two years, but has not been updated since 2012. Moreover, there are still several plans — Quebec, Manitoba, N.B. — that have not been updated to reflect the lessons learned from the 2009 H1N1 pandemic [7]-[9]. As no plan has been updated since 2016, when a major study on homelessness and H1N1 was published, it is not surprising that Canada’s homeless population remains largely invisible in PPPs [3]. Ontario is the only province to currently provide homeless-specific guidelines [10].

I propose the following three recommendations to keep information up-to-date in PPPs and to improve the transparency of the planning process. Firstly, within each provincial Ministry of Health there should be a Provincial Pandemic Planning Committee (PPPC) dedicated to updating pandemic plans on a regular basis. The PPPCs would also be responsible for meeting with stakeholders, such as homeless citizens, to hear their concerns. Secondly, every CPIP update should be sent to the PPPCs so that they can make appropriate changes to the PPPs. Thirdly, PPPs should be accessible to the public through the “Pandemic Plan” page on the Government of Canada website so that stakeholders can see how their input is incorporated. Currently, only five plans are accessible through the website: Alberta, Manitoba, Ontario, Quebec, and N.B. [11].

2. Include housing for homeless in PPPs.
The Canadian response to homelessness, especially during a pandemic, does not adequately address the social (and broader structural) determinants of health. Pandemics have highlighted how congregate settings – for example prisons (which have important ties to the homeless population) – can escalate community spread of an infection [12]. Regardless of whether there is a pandemic, affordable housing is a global strategy used to prevent homelessness by limiting the time people spend on the street and in crowded shelters [3]. During a pandemic affordable housing has the added benefit of enabling homeless people to take control of their own pandemic response as the majority of public health guidelines are geared towards those with a home. I propose that PPPCs work with provincial housing to establish guidelines for the homeless to enable rapid and effective control of transmission. During COVID-19, the B.C. Government partnered with non-profits and municipalities to allocate hotel and community center spaces in Vancouver and Victoria to homeless people [13]. This action should set a precedent for including homeless housing in PPPs.

3. Include guidelines for safe consumption and overdose prevention sites in PPPs.
Guidelines for safe consumption and overdose prevention sites, which offer evidence-based harm reduction services, are missing from every PPP. I propose that PPPCs meet with front-line workers and site users to assess how to include these life-saving services into PPPs. COVID-19 has highlighted how important it is to include these sites in planning. Since March, major cities such as Vancouver have noted increases in overdose-related deaths [14]. These sites have been stretched to increase infection...
prevention and control measures while still serving a large number of people. Moreover, there are reports that many substances have become more toxic during COVID-19 putting further demands on these sites [15]. In response, the B.C. Government has moved towards a ‘safe supply’ of prescription opioids [15]. In order to live up to the mandate of CPIP, provinces need plans that seek to improve, rather than exacerbate, the health disparities in Canada.

REFERENCES

HONoured PARTICIPANT - Bridget McGlynn
No to Nitrogen:
Mitigating Microcystis Blooms in Lake Erie

BIOGRAPHY
Bridget McGlynn is a Master of Sustainability candidate in the Environmental Sustainability Research Centre at Brock University interested in social-ecological systems and water sustainability. Before attending Brock, she completed McMaster University’s Integrated Science program where she researched algal blooms in Lake Erie and learned the importance of interdisciplinary research and recognizing how systems are interconnected.

INSPIRATION
“The Great Lakes are an amazing resource for Canadians; they provide freshwater, wildlife habitat, economic opportunities, and recreational activities. Growing up on the shores of Lake Ontario, I was aware of some of the issues facing the lakes, such as pollution and invasive species, from a young age. However, learning about the drinking water emergency that occurred in Toledo in 2014 provided me with a clear, contextual link of how water quality in the Great Lakes impacts public health in the region. Uncontrolled algal blooms in Lake Erie pose a public health threat and climate change will exacerbate this issue. Outlining steps to mitigate algal blooms will help protect Lake Erie water quality and serve as an example of executional climate change adaptation to a broader audience.”

OPPORTUNITY FOR ACTION
Lake Erie provides more than 11 million people with freshwater and generates nearly $50 million in economic activity through shipping, fisheries, and tourism [1]; however, the modern, yearly late summer blue-green algae (cyanobacteria) blooms in the Western Basin of Lake Erie present a severe risk to ecosystem services, economic outputs, and public health [2].

By the 1960s and 70s, nutrient pollution of phosphorous and nitrogen resulted in severe algal blooms dominated by green algae. The implementation of the action plan outlined in the 1972 Great Lakes Water Quality Agreement (GLWQA) resulted in the significant decline of phosphorous pollution from point sources, such as wastewater treatment plants [3]. The guidelines of the GLWQA primarily focused on phosphorous as the limiting nutrient for algal growth and thereby the main target for mitigation strategies. This reduction in phosphorous led to a reduction of algal blooms by the early 1990s [4,5].
However, by the mid-1990s, the algal booms returned to Lake Erie. Modern Lake Erie algal blooms consist primarily of the cyanobacteria genus Microcystis. Previous green algae blooms would alter ecological services and recreational opportunities but did not impact human health. However, Microcystis blooms create a public health hazard through the production of microcystin, a liver toxin. In 2014, 500,000 residents of Toledo, Ohio experienced a ‘do not drink, do not boil’ water advisory due to harmful microcystin levels in tap water.

While limiting phosphorous pollution was a primary means of controlling green algae blooms in the 1970s, phosphorous appears to be only one of multiple factors influencing the cyanobacteria blooms in Lake Erie since the mid-2000s, as phosphorous levels are below that of 1972 but blooms are exceeding the records set 40 years prior [6].

Research has demonstrated the modern Microcystis blooms are co-limited by phosphorous and nitrogen [2,7,8]. Experiments have additionally displayed insufficient nitrogen concentrations result in the down-regulation of all microcystin toxin-producing genes in Microcystis that resulted in toxin concentrations below detectable levels in all samples [9]. This suggests further nitrogen limitations would reduce environmental nitrogen concentrations to levels that would impede not only growth but also toxin production. However, the understanding of the impact of nitrogen pollution is relatively recent and has not yet been reflected in policy, even though sampled Microcystis populations from other bodies of water have also displayed nitrogen limitation [10,11].

A recent assessment has forecasted that uncontrolled algal blooms could cost Canada $5.3 billion over the next 30 years [12]. As excessive microcystin concentration in lake water has already created a public health emergency in Toledo in 2014, future algal blooms may pose similar risks [13]. As climate change will likely result in larger and more severe algal blooms, immediate action is required to protect Lake Erie water quality.

**PROPOSED ACTION**
The following are proposed actions to expand the scope of the nutrient removal efforts to successfully minimize the severity of modern algal blooms.

1. **Recognition of Nitrogen in the GLWQA**
Phosphorus was the main target for nutrient reduction strategies for decades, both in Lake Erie and around the world, as previous sentiments expressed that reducing nitrogen pollution would be an ineffective method of mitigation [14]. A focus on reducing phosphorous pollution worked as a mitigation
strategy in the 1970s and 1980s, and while this same focus was transferred to the proposed mitigation strategies for modern blooms, they have proved insufficient in controlling bloom size and toxicity. Despite phosphorous levels below that of the 1970s, blooms are significantly larger [6]. As nitrogen influences microcystin production and Lake Erie bloom extent, the recognition of nitrogen as a limiting nutrient is essential for future successful mitigation policies. The role of nitrogen needs to be cited in Annex 4 of the GLWQA by the International Joint Commission (IJC). Without this preliminary step, the following mitigation measures may not be as effective for securing funds for implementation.

2. Urea reduction through fertilizer best practices

Microcystis’ preferences for specific nitrogen species suggest pollution reduction strategies should be targeted. Microcystis’ ability to selectively use urea as a sole nitrogen source suggests a reduction of environmental urea concentrations may impede the development of cyanobacteria blooms in Lake Erie [9]. Therefore, reduction of urea concentrations should be a target in algal bloom mitigation strategies. Reduction of urea pollution can occur via the implementation of best practices in urea fertilizer usage in the Maumee watershed. The Maumee watershed passes through northeastern Indiana into northwestern Ohio and is a major contributor of nutrient pollution as it passes through well-fertilized farmland and urban centres [8]. Since urea now represents over 50% of nitrogen sources in fertilizer and about 15% of bioavailable nitrogen in surface waters, urea represents a significant species in nitrogen enrichment [15,16]. The implementation of best management practices could reduce the fertilizer carried away in runoff. Best management practices for fertilizer usage needs to follow the four Rs: Right product, right rate, right time, and right place [2]. Ideally, the best management practices would optimize fertilizer uptake and minimize environmental losses [17]. The implementation of best practices would decrease the concentration of urea entering local waterways due to run off.

3. Wetland Restoration

The restoration of wetlands would reduce the urea load that eventually enters the Western Basin of Lake Erie. Approximately 95% of wetlands around the Western Basin of Lake Erie have been lost [18]. Wetlands have been demonstrated to absorb and transform various nitrogen and phosphorus species thereby removing it from the water column [19]. Marshes can remove suspended solids, particulate bound nutrients, and excessive algal growth from the connected lake [20]. Approximately 2–7% of the Maumee watershed would need to be converted to a form of wetland to make a significant reduction in nutrient loading [21]. Wetland restoration has been completed in other eutrophic basins to reduce nutrient loadings and subsequently algal bloom severity. The Kis (small)-Balaton Water Protection System (KBWPS) was constructed at the mouth of the main nutrient loading tributary of Lake Balaton, Hungary. The KBWPS, a wetland reconstruction, retains two-thirds of the phosphate and over half of the nitrate in the
incoming water [22]. The overall result was an increase in the water quality of Lake Balaton’s previously hypereutrophic basin [22]. Partial restoration of the Great Black Swamp, the wetland region that previously encompassed the western shore of Lake Erie, could produce comparable results.

REFERENCES


