

Commission for Environmental Cooperation Operational Plan 2019–2020

28 February 2020



This Operational Plan was approved by the Parties
to the
North American Agreement on Environmental Cooperation.

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Council Reflections on 25 Years of Environmental Cooperation in North America

This Operational Plan marks an important anniversary of the Commission for Environmental Cooperation (CEC), an innovative organization established under the North American Agreement on Environmental Cooperation (NAAEC) by the Parties to the North American Free Trade Agreement to foster cooperation on environmental issues associated with increasing trade, economic, and social connections. Since 1994, the CEC has been a catalyst for productive cooperation among the Governments of Canada, Mexico and the United States, and all those working to protect the region's environment and the health of its ecosystems and population.

North Americans have the privilege of living in an environment rich in natural resources, one that provides the energy, materials, food and fresh water that we rely on for our health and prosperity. The continent's diversity of landscapes—from rivers to deserts, mangroves to mountains, and its flora and fauna, including vital pollinators—all contribute to our enjoyment of life, food security, and overall well-being. The decision to safeguard this invaluable heritage and the benefits we derive from it was a progressive move by leaders who understood the potential for adverse impacts from expanding cross-border trade activities.

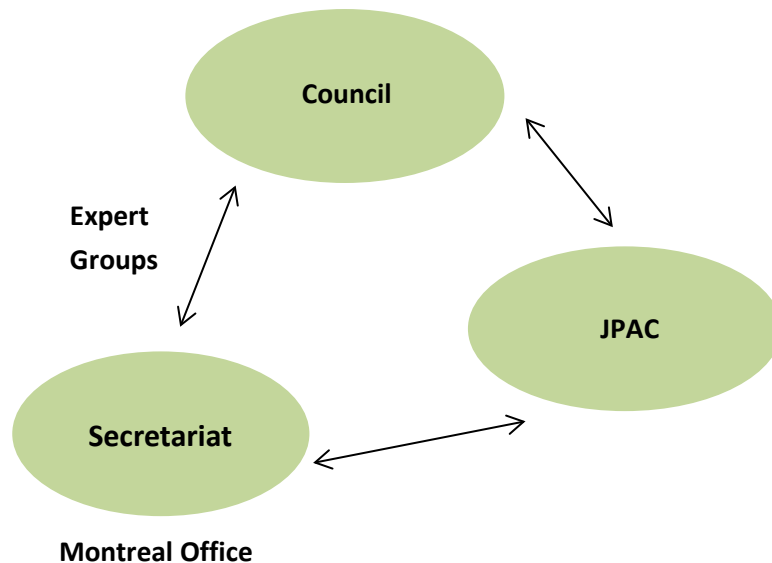
Among the original CEC projects was an effort to protect the habitat of the institution's emblematic species, the monarch butterfly—with work on the topic continuing to this day. Over time, our approach and cooperative work have been guided by evolving national, regional and global priorities, along with advancements in science and knowledge concerning our changing environment. The scope of our work has ranged from gaining a better understanding of pollutants in the environment and minimizing the risks posed by hazardous substances of common concern; to engaging fishermen and farmers in strategies that would protect cross-border ecosystems and the migratory routes of species; to promoting sustainability in the built environment and in energy and transportation infrastructure; to our work today, which acknowledges the need for building the resilience of communities to extreme weather and climate events and for sustainable growth that takes into account the environmental, social and economic dimensions of human activities.

As Canada, Mexico and the United States become increasingly interconnected, so too have the links between North America and the rest of the world become stronger in light of shared interests and concerns. By fostering cooperation with agencies and partners in the three countries on the development of information, tools, and capacities, the CEC continues to be instrumental in supporting the Parties' domestic, regional and global efforts to respond to the environmental challenges facing our planet.

As we celebrate the CEC's 25th anniversary and look forward to the future, we recognize that we can only fulfill our commitment to sustainable development and environmental stewardship by engaging a variety of stakeholders as partners in our work. These include communities, whose local efforts contribute to knowledge and capacity that can be shared across the region; Indigenous peoples, whose traditional ecological knowledge can inform environmental management practices; private sector champions, whose leadership can promote sustainable growth; and North America's youth and the academic community, whose imagination and creativity can devise innovative solutions to today's environmental issues. Through these partnerships, we can act on our shared responsibility for effective environmental stewardship, for our benefit and that of future generations.

Our Work

The CEC supports cooperation among Canada, Mexico and the United States to foster the protection of the North American environment for the well-being of present and future generations, and to promote sustainable development based on mutually supportive environmental and economic policies. We fulfill this mandate through our three constituent parts: the Council, the CEC's governing body composed of the ministers of the three national environmental agencies; the Secretariat, which provides support to the Council and manages the implementation of CEC projects and activities; and the Joint Public Advisory Committee (JPAC), composed of citizens from the private and public sectors of the three countries who advise the Council on matters within the scope of the NAAEC and ensure active public participation and transparency in the CEC's activities.



The CEC's cooperative work program is supported by trilateral working groups of government experts, as well as by stakeholders representing the private sector, nongovernmental organizations, indigenous communities, academia, and the public. Our work encompasses a variety of activities, which are described in greater detail in the following pages. These activities are grouped under:

1. **Cooperative Projects:** Issue-focused projects designed to advance the Council priorities set out in the five-year Strategic Plan.
2. **Cross-cutting Initiatives, Tools, and Resources:** Ongoing efforts that build regional capacities and serve as models for other efforts. These initiatives are often developed in parallel with innovative, web-based datasets, training modules, guidance documents and other resources aimed at a variety of audiences.
3. **Stakeholder Engagement Mechanisms:** The Joint Public Advisory Committee (JPAC), the Submissions on Enforcement Matters (SEM) process, and other mechanisms that engage North American stakeholders in our work and promote transparency and dialogue.

4. **Tracking the CEC's Performance and Impact:** The CEC has established a results-based management process to evaluate our activities and projects, to demonstrate progress in meeting the Parties' environmental priorities for the region, and to share relevant accomplishments. The long-term impact of the CEC's work is also assessed on an ongoing basis and includes our contribution to international efforts. The performance measurement framework enhances the CEC's accountability and reporting, and informs actions to help us meet our objectives more effectively.
5. **Communications:** Through the CEC's publications, press releases, web presence, audiovisual products and use of social media, we strive to inform, educate, and engage the public and all stakeholders about our activities and the environmental topics they address, to advance sustainable growth and the health of the region's ecosystems and population.

Cooperative Projects, 2019–2020

The following projects support efforts to conserve, protect and enhance the North American environment. They encompass ongoing and new work relating to promoting a circular economy and resource efficiency; community adaptation, resilience, and improved air quality; conservation of species and ecosystems; and engaging Tribes/First Nations/Indigenous communities.

These projects will be implemented between 1 July 2019 and 31 December 2020 and conclude the current five-year Strategic Plan. The complete project descriptions, including activities and budgets, are presented in Appendix I.

1. Modernizing the data exchange system for hazardous waste transfers

Pursuant to relevant regulations, Canada, Mexico and the United States control the import and export of hazardous wastes by exchanging notice and consent prior to shipping these wastes across their borders. This project is designed to update the Notice and Consent Electronic Data Exchange (NCEDE) system to facilitate the seamless exchange of notifications relative to cross-border movements of hazardous waste and have the flexibility to respond to updates in regulations, with the goal of protecting the North American environment.

2. Using volunteer observer networks to monitor precipitation and wildfires

The availability of critical data for improving predictions of and response to extreme events, such as droughts, floods, and wildfires, and for alerting citizens to life-threatening situations in a timely manner, is poor in some regions of North America. This project aims to assess the feasibility of establishing and expanding citizen science observer networks to complement federal and subnational observational capacities and improve decision-making and preparedness.

3. Costing floods and other extreme events

Understanding the economic costs of floods and other extreme weather and climate events is central to addressing impacts, allocating adequate resources for monitoring and preparedness, and building resilient communities. At present, methods for estimating the costs of flood damage vary significantly across North America. This project aims to develop a

standardized methodology for assessing the cost of extreme floods, and to extend it to a multi-hazard assessment incorporating other extreme events (e.g., hurricanes, tornadoes, forest fires, landslides) as a resource for decision-makers.

4. Improving the effectiveness of early warning systems for drought

The economic, environmental, and social impacts on communities of drought and its attendant hazards—including wildfires, floods, and landslides—are significant. While regionally-integrated drought monitoring and early warning systems can help decision-makers mitigate negative impacts, there is uncertainty among local planners, emergency managers, and others about which early warning indicators and planning tools are most appropriate to support drought management. The project aims to improve the understanding of the best locally-relevant indicators for monitoring drought in specific climate regions; to increase local capacity; and to strengthen existing partnerships across North America.

5. Using remote sensing to prepare for and respond to extreme events

Remote sensing applications for early warning systems and climate change monitoring play a significant role in disaster management. A number of applications exist, but providing relevant and timely geospatial information to first responders remains a challenge because of a lack of infrastructure allowing them to connect to these technologies. The objective of this project is to improve the capacity of emergency managers, first responders, and decision-makers to use real-time satellite imagery to complement existing tools and practices for preparedness and response to extreme events in disaster-prone regions.

6. Preventing and reducing food loss and waste

CEC work in 2017–2018 produced knowledge and resources to support a consistent regional approach to measuring food loss and waste and developing youth education tools. This project aims to test these products with the user community (businesses operating in the food sector and youth/youth organizations) to refine them, ensure they meet users' needs, and foster broader uptake in North America. It also includes engaging companies through the development of case studies, and pursuing a North America-wide marketing campaign to build awareness among youth and encourage them to take action.

7. EcolInnovation Network

This project is a new initiative that aims to enhance traditional academic programs and provide tools and resources for innovation, entrepreneurship and sustainable growth training to youth and communities in North America. The objective is to foster the creation of innovation hubs at academic institutions in North America to improve capacities and access to exchanges and resources for youth and community entrepreneurs, and to expand linkages among these North American innovation hubs.

8. Community solutions for reducing marine litter

Marine litter is a global problem that affects economies, ecosystems and potentially, human health. This project builds on the low-technology approach adapted from the Trash-Free Waters framework. The project supports marine litter mitigation efforts across North America by building the capacity of decision-makers and organizations and replicating successful multi-stakeholder approaches in other communities and watersheds. It aims to increase awareness in coastal and inland communities of the connections between consumer behavior and solid waste management practices upstream, and marine litter prevention downstream.

9. Strengthening regional pollinator conservation to secure local benefits

Pollinators support the reproduction of the majority of wild plants and 75% of crop species, and are crucial to food security, human well-being and natural ecosystems. However, the number of pollinators has declined due to habitat loss and degradation, intensive agricultural management, widespread use of agrochemicals, pathogens, invasive species and climate change—resulting in the need for conservation actions and the engagement of stakeholders in different sectors. This project aims to develop a North American Pollinator Conservation Framework with recommendations for decision making, leveraging existing pollinator conservation efforts across the region; and to promote stakeholder engagement through increased awareness of the ecological and socio-economic benefits of pollinators for local communities.

10. Strengthening adaptation capacity in Marine Protected Areas

Marine Protected Areas (MPAs) are key to maintaining ocean resilience, when they are adaptively managed to respond to threats such as ocean warming, species shifts and disastrous events. Previous work included the development of tools to help identify vulnerabilities in coastal ecosystems and communities and adaptation measures to respond to these vulnerabilities. Leveraging this past work, the current project builds the capacity of MPA practitioners to manage the impacts from global and regional changes, allowing MPAs to contribute to healthier, more resilient marine ecosystems. It also aims to strengthen MPA capacity for adaptation planning by increasing networking and collaboration among MPAs, and by using these networks to exchange knowledge and experiences.

11. Indigenous Network for Traditional Ecological Knowledge (TEK)

To further enhance the engagement of Indigenous representatives in CEC activities, this project aims to develop a network of Indigenous TEK holders through a series of targeted consultations in the three countries. Work to be undertaken also includes finalization of the compilation of relevant frameworks and mechanisms in Canada, Mexico and the United States, related to the engagement of Indigenous communities associated with TEK (initiated under the 2017–2018 Operational Plan).

Cross-cutting Initiatives, Tools and Resources

Through the following innovative activities, the CEC provides current information, state-of-the art tools, and resources to support the efforts of government officials, the private sector, academic and research institutions, nongovernmental organizations, and communities relative to environmental and sustainable growth:

The North American PRTR Initiative

The North American Pollutant Release and Transfer (NA PRTR) Initiative, a cornerstone of the CEC's efforts relating to pollutants and health, compiles and analyzes data from the PRTRs of Canada, Mexico and the United States through the Taking Stock Online website and report series. This resource features a searchable database and tools that provide access to North American PRTR data for communities, the private sector, academia, and policy makers. The Taking Stock report series presents PRTR data analyses and additional information on the amounts, sources and management of industrial pollutants across the region. Through regular public meetings, the North American PRTR Initiative also engages stakeholders in discussions about industrial pollution and strategies for promoting sustainability within industry.

North American Environmental Atlas

Created through a cooperative effort involving scientists and map makers from Natural Resources Canada, the US Geological Survey, Mexico's *Instituto Nacional de Estadística y Geografía*, and other national agencies, the North American Environmental Atlas combines and harmonizes data from the three countries to allow for a continental and regional perspective on cross-border environmental issues. It seamlessly integrates accurate cartographic data, including maps, documentation, and interactive map layers that can be used by decision-makers, land managers, nongovernmental organizations, researchers, and international organizations to support research, analyses, and environmental management activities in relation to a variety of environmental issues. The Atlas continues to grow in breadth and depth as more thematic maps are created through the work of the CEC and its partners.

North American Land Change Monitoring System

The North American Land Change Monitoring System (NALCMS) is an ongoing collaboration among Canada, Mexico, and the United States to monitor changes over time in land cover, the observed physical cover on the terrestrial surface of North America (e.g., forests, rivers, soil, and permafrost). The NALCMS is an integral part of the North American Environmental Atlas. NALCMS products are used for a variety of applications, including land-use planning, ecosystem monitoring following natural and anthropogenic events, wildlife habitat mapping, and water quality assessments.

Stakeholder Engagement Mechanisms

The engagement of the public and all stakeholders is a priority of the CEC, and is achieved through the following mechanisms:

Joint Public Advisory Committee

The Joint Public Advisory Committee (JPAC) is composed of citizen representatives from Canada, Mexico and the United States. JPAC holds consultations with the public and provides advice to the CEC Council. In 2019–2020, JPAC will continue to engage, provide access and

transparency to, and consult the North American public through meetings and other activities, in order to develop informed advice to the Council.

Submissions on Enforcement Matters (SEM)

The SEM process is a mechanism established under the NAAEC that allows citizens and nongovernmental organizations to raise concerns on an alleged failure of any of the three Parties to enforce an environmental law. The process aims to promote transparency and public participation by enhancing understanding of environmental law in North America. The CEC will continue to address submissions and prepare factual records, as appropriate, to help inform decisions and understanding regarding environmental issues.

Engagement of Tribal/ First Nations/Indigenous Communities and Traditional Ecological Knowledge (TEK)

In 2017 the Council established the Traditional Ecological Knowledge (TEK) Expert Group (TEKEG) (formerly the Roster of TEK Experts) to provide advice to the Council on opportunities to apply TEK to the work of the CEC, and on policy recommendations. Since then, in accordance with the Council's vision, several of our cooperative projects include opportunities for engaging Indigenous communities and TEK.

Youth Engagement and Leadership to Address North America's Shared Environmental Priorities

As future leaders, youth continue to be engaged in our cooperative projects through education and citizen science, in addition to other activities and mechanisms such as the Youth Innovation Challenge, the EcoInnovation Network project, and our Joint Public Advisory Committee (JPAC).

North American Partnership for Environmental Community Action (NAPECA)

Since 2010, this community grants program has supported environmental management and sustainable growth projects by nonprofit and nongovernmental organizations, by engaging the public to implement actions at the local level and cultivate shared responsibility for the environment. The launch of the next NAPECA cycle is being prepared for the summer of 2019.

Budget

Commission for Environmental Cooperation							
2019-2020 Budget							
(all figures in Canadian dollars)							
REVENUES				2020	%	2019	%
Parties' Contributions (US\$7,650,000, exchange rate at US\$1.31/CDN\$ in 2020, and US\$1.34/CDN in 2019)				10,053,630		10,234,935	
Apportioned Amount from Surplus Funds				1,774,170		1,806,165	
TOTAL REVENUES				11,827,800	(Note 1)	12,041,100	(Note 1)
EXPENSES							
DELIVERABLES							
Cooperative Projects				3,158,000		1,919,000	
Council-Supported Initiatives				500,000		0	
North American Partnership for Environmental Community Action (NAPECA)				0		1,500,000	
Submissions on Enforcement Matters (Articles 14 & 15)				150,000		150,000	
Communications and Outreach				225,000		160,000	
Independent Reports (Article 13)				0		0	
Tracking Pollutant Releases and Transfers in North America (PRTR)				100,000		65,000	
Performance Measurement and Reporting				75,000		50,000	
CEC Interactive Platforms				75,000		75,000	
				4,283,000	36%	3,919,000	33%
INSTITUTIONAL SUPPORT AND MAINTENANCE							
Council Support				270,000		270,000	
JPAC Support				350,000		270,000	
TEK Expert Group Support				70,000		30,000	
Stakeholder engagement and Partnership development				100,000		0	
Information System Infrastructure Maintenance				145,000		50,000	
Strategic and Transition Planning				105,000		100,000	
Institutional Transition				1,274,170		1,806,165	
				2,314,170	20%	2,526,165	21%
ADMINISTRATIVE AND MANAGEMENT							
Salaries, Benefits and Professional Development				2,930,300		2,760,000	
Operating Expenses				575,000		610,000	
External Administrative Support				280,000		280,000	
Relocation/Orientation, Recruitment				50,000		150,000	
Executive Director's Office				65,000		50,000	
				3,900,300	34%	3,850,000	32%
Contingency Fund				1,330,330	10%	1,745,935	14%
TOTAL EXPENSES				11,827,800	100%	12,041,100	100%

Note 1: Revenues are based on US\$9,000,000 at the Bank of Canada rate in effect on 15 December 2019 (for 2020 budget), and 15 December 2018 (for 2019 budget).

Budget (Cooperative Projects)

OPERATIONAL PLAN 2019–2020 - COOPERATIVE PROJECTS		BUDGET YEAR 1 (2019)	BUDGET YEAR 2 (2020)	TOTAL BUDGET (2 YEARS)
		C\$	C\$	C\$
1	Modernizing the data exchange system for hazardous waste transfers	29,000	473,000	502,000
2	Using volunteer observer networks to monitor precipitation and wildfires	80,000	70,000	150,000
3	Costing floods and other extreme events	230,000	350,000	580,000
4	Improving the effectiveness of early warning systems for drought	275,000	160,000	435,000
5	Using remote sensing to prepare for and respond to extreme events	60,000	120,000	180,000
6	Preventing and reducing food loss and waste	360,000	495,000	855,000
7	Innovation hubs for sustainable economies	340,000	320,000	660,000
8	Community solutions for reducing marine litter	120,000	380,000	500,000
9	Strengthening regional pollinator conservation to secure local benefits	220,000	370,000	590,000
10	Strengthening adaptation capacity in Marine Protected Areas	170,000	155,000	325,000
11	Indigenous network for Traditional Ecological Knowledge (TEK) [in development]	35,000	265,000	300,000
	Total, all Cooperative Projects	1,919,000	3,158,000	5,077,000

Appendix I – Cooperative Projects

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Project 1. Modernizing the data exchange system for hazardous waste transfers

1. Budget: C\$502,000

Year 1 (1 July–31 Dec. 2019): C\$29,000

Year 2 (1 Jan.–31 Dec. 2020): C\$473,000

2. Short statement of the issue/need identified (and known gaps); the project objective(s) and activities to address the issue; and expected outcomes and benefits/beneficiaries (by 31 Dec. 2020):

Pursuant to the legal frameworks controlling imports and exports of hazardous wastes across North America, Canada, Mexico and the United States exchange notice and consent notifications prior to shipping hazardous wastes. The Notice and Consent Electronic Data Exchange (NCEDE) is a system developed through the CEC in 2012 to enable the three countries to process these notifications efficiently and effectively to protect the North American environment through appropriate control of transboundary hazardous waste movements. Currently, Canada is using the NCEDE in conjunction with the United States, while the electronic exchange of notices and consents between Mexico and the United States is being tested. In the interim, notifications from Mexico are exchanged with the other two countries on paper or via e-mail, which is much more time-intensive. The objectives of this project are to: 1) update the NCEDE application to reflect domestic and international regulatory developments; 2) fully integrate the system and capacities to work seamlessly in the three countries; and 3) develop and implement an ongoing maintenance approach that permits future upgrades in technology. This project will allow the three countries to exchange notifications in a much more efficient and effective way, and that accommodates changes to reflect current and future regulations.

3. Select the strategic priority(ies) from the 2015–2020 Strategic Plan and the 2019–2020 priority areas that the project addresses:

2015–2020 Strategic Priorities	2019–2020 Priority Areas
<input type="checkbox"/> Climate Change Mitigation and Adaptation <input checked="" type="checkbox"/> Green Growth <input checked="" type="checkbox"/> Sustainable Communities and Ecosystems	<input checked="" type="checkbox"/> Circular Economy – Resource Efficiency <input type="checkbox"/> Adaptation/Mitigation/Resiliency/Air Quality <input type="checkbox"/> Tribal/First Nations/Indigenous Communities and Traditional Ecological Knowledge (TEK) <input type="checkbox"/> Conservation of Species and Protected Areas

4. Explain how the project can achieve more impact through trinational cooperation, and why the CEC is the most effective vehicle to undertake this work:

The NCEDE provides a seamless communication system that allows Canada, Mexico and the United States to efficiently transmit and respond to notices and consents to facilitate legal and environmentally-sound cross-border transport and environmentally sound management of hazardous waste. There are significant cost efficiency gains in working trilaterally rather than developing three separate bilateral data and communications systems. The NCEDE establishes commonalities between regulatory and technical data so that the data can be exchanged in an understandable and meaningful way between the three countries. These commonalities need to be synchronized prior to updating the NCEDE. The CEC was instrumental in facilitating the initial development of the NCEDE and continues to be the best mechanism to enable the cooperation among the three countries to update the NCEDE.

5. Describe how the project may capitalize on, or advance, the relationship between ecosystems, job creation, gender impacts, and income generation:

Improving existing NCEDE data exchange between the North American countries directly improves environmental protection through the more efficient control of hazardous waste exports and imports. For example, it can prevent unauthorized dumping and recycling of hazardous waste that could lead to environmental and health risks—particularly for vulnerable populations (e.g., women and children) that are exposed to these contaminants through their work or in their communities. The use of a trilateral electronic system supports paper-less information-sharing; extensive reduction in processing delays; and more efficient decision-making, as the current NCEDE has had a significant economic impact on recycling and waste management companies. The effective management of waste through international trade also supports job creation in the three countries, as each country develops better technology and processes to manage waste and recyclables.

6. Describe how the project complements, or avoids duplication with, other national or international work:

The exchange of information on notices and consents prior to shipping hazardous wastes supports the implementation of numerous domestic and international regulations applicable for transboundary hazardous waste movements.

7. Describe how the project engages traditional ecological knowledge (TEK) experts or Tribal/First Nations/Indigenous communities, if applicable. If not applicable, explain why:

While this project has the potential to positively impact all North American communities, it primarily involves enforcement agencies in the three countries.

8. Describe how the project engages youth, if applicable. If not applicable, explain why:

While this project has the potential to positively impact North American youth, it primarily involves enforcement agencies in the three countries.

9. Identify the designated representatives of agencies committed to developing and implementing this project (the Project Steering Committee); as well as other organizations that could potentially be involved, or benefit from it (e.g., federal agencies, other levels of government, academia, the private sector, civil society):

Name of Project Steering Committee Member	Affiliation (Country)
Anne-Marie St-Laurent Thibault (Waste Reduction and Management Division)	Environment and Climate Change Canada (ECCC)
Yemisi Dare (Waste Reduction and Management Division)	ECCC
James Doyle (Business Applications and Solution Development)	ECCC
Marinés Hurtado Cardenas (<i>Dirección de Materiales y Residuos Peligros</i>)	<i>Secretaría de Medio Ambiente y Recursos Naturales—Semarnat</i> (Mexico)
Jesús Ignacio López Olvera (<i>Subdirector de movimientos transfronterizos</i>)	Semarnat (Mexico)
Azucena Olivares Ángeles (<i>Jefa del Departamento de Importación y Exportación de Residuos Peligrosos</i>)	Semarnat (Mexico)
Camilo Oviedo Bautista (<i>Director General de Tecnología de la Información y Telecomunicaciones—DGIT</i>)	Semarnat (Mexico)
Rodolfo Yáñez Ramírez (<i>Subdirector de Análisis y Documentación—DGIT</i>)	Semarnat (Mexico)
Rick Picardi (Office of Resource Conservation and Recovery)	US Environmental Protection Agency—EPA
Laura Coughlan (Office of Resource Conservation and Recovery)	US EPA
Jana Tatum (Office of Resource Conservation and Recovery)	US EPA

Name of Project Steering Committee Member	Affiliation (Country)
Darnell Wilson (Office of Resource Conservation and Recovery)	US EPA
Roy Chaudet (Office of Mission Services)	US EPA

Other organizations/individuals (if applicable)	Country
N/A	

10. In the following table, describe: the project objective(s) and the activities and subtasks planned to achieve the objective(s); the corresponding outputs, expected results and how they will be measured (performance measures); baselines (if known), and targets by end of the project; and the timeline and budget (to 31 December 2020).

OBJECTIVE 1	Update the existing NCEDE system to reflect changes to Canadian, Mexican and US hazardous waste export and import regulations.	
Activity 1, budget year 1 and year 2	Define work plan for trilateral work group and IT experts. Budget: Year 1: C\$24,000; Year 2: C\$0	
Output(s)	Work plan with roles and responsibilities established	
Expected results, performance measures	Fully operational steering committee.	
Baseline (current status), if known	Project leads have been designated by each country; the participation of IT experts is to be formalized	
Target (by Dec. 2020)	Working groups are established and have met four times (with one meeting by teleconference)	
Subtask 1.1	Identify key participants	When: Aug.–Sept. 2019

Subtask 1.2	Define work plan and group roles, responsibilities	When: Aug.–Sept. 2019
Subtask 1.3	Establish meeting schedule.	When: Aug.–Sept. 2019
Activity 2, budget year 1 and year 2	Define scope, revise the existing system documentation, and secure technical support for work implementation. Budget: Year 1: C\$5,000; Year 2: C\$165,000	
Output(s)	<ul style="list-style-type: none"> - Trilateral agreement on the scope of the required updates - Revised and updated trilateral data standards/schemas - Updated configuration/ change management planning document - Statement of work for IT consultant services 	
Expected results, performance measures	<ul style="list-style-type: none"> - Clear scope of work to be performed under the project - Documented processes/tasks to be accomplished - Technical expertise defined for IT contract - IT services to do the work are secured 	
Baseline (current status), if known	No path forward exists for updating or maintaining the NCEDE, and the current documentation is outdated and requires revision and updating	
Target (by Dec. 2020)	All project documentation revised and updated	
Subtask 2.1	Define scope, revise the existing system documentation, and secure technical support for work implementation	When: Aug. 2019–Jan. 2020
Activity 3, budget year 1 and year 2	Update Mexico's host system. Budget: Year 1: C\$0; Year 2: C\$37,000	
Output(s)	<ul style="list-style-type: none"> - Documented requirements for the update of Mexico's host system - Updated and fully operational Mexico host system 	
Expected results, performance measures	Stability in Mexico's system	
Baseline (current status), if known	Mexico is currently testing the stability of its system with the United States; however, further updates are required for full synchronization	
Target (by Dec. 2020)	A fully operational domestic system in Mexico	

Subtask 3.1	Assess/address operational issues affecting Mexican system stability	When: Dec. 2019–June 2020
Subtask 3.2	Implement updates	When: Dec. 2019–June 2020
Activity 4, budget year 1 and year 2	Implement IT updates to NCEDE. Budget: Year 1: C\$0; Year 2: C\$267,000	
Output(s)	<ul style="list-style-type: none"> - Updated schemas, data elements, look-up tables - Updated application in a test environment - Synchronization among the three updated host nodes - Revised system documentation and Standard Operating Procedures - Fully operational NCEDE that exchanges data efficiently - IT expertise available for launch support 	
Expected results, performance measures	<ul style="list-style-type: none"> - Stabilization of the host nodes for transmission and receipt of information between countries - NCEDE is launched and operational in the three countries 	
Baseline (current status), if known	NCEDE application does not reflect current and upcoming regulatory changes and technological advancements in host systems	
Target (by Dec. 2020)	NCEDE is updated and running	
Subtask 4.1	Review/update XML schemas and other coding changes	When: Dec. 2019–June 2020
Subtask 4.2	Test the NCEDE to correct issues (e.g., User Acceptance Testing)	
Subtask 4.3	Update NCEDE nodes for each country	
Subtask 4.4	Update system documentation to reflect changes	
Subtask 4.5	Align launch and deploy system in the three countries	
Subtask 4.6	Conduct system adjustments to ensure smooth operations	

OBJECTIVE 2	Develop an ongoing maintenance approach enabling future upgrades in technology and changes to the NCEDE.	
Activity 5, budget year 1 and year 2	Define approach for ongoing maintenance; review and update existing documentation. Budget: Year 1: C\$0; Year 2: C\$4,000	
Output(s)	<ul style="list-style-type: none"> - Revised documentation identifying the maintenance approach - Detailed protocols for future update 	
Expected results, performance measures	Agreement among the three countries on a maintenance approach to enable future system updates	
Baseline (current status), if known	No agreement for updating the NCEDE exists, leading to a risk of NCEDE obsolescence	
Target (by Dec. 2020)	A maintenance approach and plan developed	
Subtask 5.1	Develop an ongoing maintenance approach enabling future NCEDE upgrades in technology and changes.	When: Jan.–June 2020

11. Describe post-project expected impacts:

Expected impact	SMART performance measure(s)
By December 2020, stabilization and sustained functionality of the NCEDE for all partner countries	Full exchange between US and Mexico is enabled. Improved processing times for notices.
By April 2021, built-in capacity for change requests by any partner country, to reflect future regulatory and domestic system changes	100% of notice information exchanged electronically among the three countries, following regulatory updates in Canada.
An established mechanism for continued contact among the 3 countries for documentation updates and communication.	Number of trilateral communications for updates on any changes among the three countries.

Project 2. Using volunteer observer networks to monitor precipitation and wildfires

1. **Budget:** C\$150,000

Year 1 (1 March–31 Dec. 2019): C\$80,000

Year 2 (1 Jan.–31 Dec. 2020): C\$70,000

2. **Short statement of the issue/need identified (and known gaps); the project objective(s) and activities to address the issue; and expected outcomes and benefits/beneficiaries (by 31 Dec. 2020):**

The availability of critical data for improving predictions of extreme events, such as droughts, floods, and wildfires, and for alerting citizens to life-threatening situations in a timely manner, is poor in some regions of North America. Data on precipitation are sparse in areas west of the Mississippi River in the United States, and in western Canada and northern Mexico. Partnering with volunteer environmental observation networks offers a flexible, low-cost approach to improving prediction, preparedness and response to extreme events by filling data gaps in these regions. Proven citizen science mechanisms exist, such as the Community Collaborative Rain, Hail and Snow Network (CoCoRaHS: www.cocorahs.org/Content.aspx?page=countries); and the EPA's SmokeSense project (www.epa.gov/air-research/smoke-sense-study-citizen-science-project-using-mobile-app), but these vary in capacity, detail, and availability across North America. This project will assess the feasibility of establishing and expanding the CoCoRaHS network and other networks (e.g., SmokeSense) of citizen science observers in the three countries, to complement federal and state meteorological capacities. A key objective will be to explore how to engage volunteers, particularly Tribal and Indigenous communities and youth, through training and outreach. Through the development of more robust observational networks in the region, citizens, governments and scientists can improve decision making and be better prepared to mitigate the impacts of extreme weather and climate events.

3. **Select the strategic priority(ies) from the 2015–2020 Strategic Plan and the 2019–2020 priority areas that the project addresses:**

2015–2020 Strategic Priorities	2019–2020 Priority Areas
<input checked="" type="checkbox"/> Climate Change Mitigation and Adaptation	<input type="checkbox"/> Circular Economy – Resource Efficiency
<input type="checkbox"/> Green Growth	<input checked="" type="checkbox"/> Adaptation/Mitigation/Resiliency/Air Quality
<input type="checkbox"/> Sustainable Communities and Ecosystems	<input checked="" type="checkbox"/> Tribal/First Nations/Indigenous Communities, Traditional Ecological Knowledge (TEK)
	<input type="checkbox"/> Conservation of Species and Protected Areas

4. Explain how the project can achieve more impact through trilateral cooperation, and why the CEC is the most effective vehicle to undertake this work:

Working trilaterally would allow for the sharing of best practices and protocols leading to the successful establishment and expansion of existing monitoring networks across the North American region (e.g., strengthening of CoCoRaHS in existing areas, along with expansion into Mexico). The CEC's previous role in the expansion of other capacity-building projects, such as AirNow-International and the Local Environmental Observer (LEO) Network, demonstrates that it is an effective vehicle for this type of work. Weather systems and other climate events often affect cross-border areas and therefore, having access to data across the continent would be very helpful in monitoring those systems and understanding the severity and extent of their impacts. The quality and value of the data will increase with trilateral standardization and training for network observers and managers.

5. Describe how the project may capitalize on, or advance, the relationship between ecosystems, job creation, gender impacts, and income generation:

Certain weather indicators, such as precipitation, are common denominators among the three countries and can be easily measured by citizen scientists. A storm system may initially affect one ecosystem in Mexico, then progress northward to affect others in the United States and Canada (or vice-versa). By measuring across integrated ecosystems, scientists, municipalities, farmers, ranchers, water authorities, wildlife managers, and others, can get a better idea of how much precipitation fell at their locations and how it affects local watersheds and coastal areas (e.g., shellfish harvesting). The positive economic impacts from this project include preventing loss of income (e.g., in the agricultural sector), more efficient use of resources, including recovery/compensation for an event, and improved weather forecasts.

6. Describe how the project complements, or avoids duplication with, other national or international work:

The CoCoRaHS citizen monitoring network currently complements other rainfall networks in the continental United States, Puerto Rico, the Bahamas and Canada, by filling in data gaps and acting as a calibration tool for automated gauges, satellite estimates and radar rainfall estimates. The network's daily precipitation data are currently integrated into many Meteorological Service products and operations in the United States (<https://twj.media/wp-content/uploads/2018/09/Story.-with-cover.reduced.pdf>; National Centers for Environmental Information - Global Historical Climate Network: <https://www.ncdc.noaa.gov/data-access/land-based-station-data/land-based-datasets/global-historical-climatology-network-ghcn>); and Canada (e.g., Canadian Precipitation Analyses). Promoting the strengthening and expansion of CoCoRaHS and other networks through this project would facilitate data collection, sharing and transboundary collaboration and monitoring relevant to extreme events.

7. Describe how the project engages traditional ecological knowledge (TEK) experts or Tribal/First Nations/Indigenous communities, if applicable. If not applicable, explain why:

CoCoRaHS is an example of how a volunteer network can engage with Indigenous communities, particularly along national borders. The Navajo Nation in New Mexico and Arizona has several observers reporting daily rainfall. In Canada, CoCoRaHS has worked with First Nations and established new monitoring sites, partly to support local data needs. Through their measurements and observations, communities can see how TEK scientifically correlates to this base of knowledge. The outreach and communication portion of the assessment will establish criteria to strengthen the engagement of Indigenous communities in volunteer observer networks.

8. Describe how the project engages youth, if applicable. If not applicable, explain why:

Due to their scientific observational opportunities, volunteer networks are a good way to work with youth. CoCoRaHS and other volunteer networks allow youth to be engaged in learning about their local weather and climate, while playing a vital role in providing daily precipitation measurements, especially in remote locations. For over 20 years, CoCoRaHS has been engaged with US and Canadian schools; in addition, young people can take measurements at home. The process of collecting, reporting and using the data provides a rich learning environment, requiring only a simple rain gauge and a mobile device for transmitting observations. The Smoke Sense application is also being developed for use as a K-12 educational project providing instructional resources that can be incorporated into the classroom. Through the assessment component of this project, additional methods by which youth can be engaged will be identified.

9. Identify the designated representatives of agencies committed to developing and implementing this project (the Project Steering Committee); as well as other organizations that could potentially be involved, or benefit from it (e.g., federal agencies, other levels of government, academia, the private sector, civil society):

Name of Project Steering Committee Member	Affiliation (Country)
Rick Fleetwood	Environment and Climate Change Canada
Myles Weishar	Community Collaborative Rain, Hail and Snow Network—CoCoRaHS (Canada)
Ian Nichols	CoCoRaHS (Canada)
Trevor Hadwen	Agriculture and Agri-Food Canada—AAFC
Humberto Hernández Peralta	<i>Servicio Meteorológico Nacional</i> —SMN (Mexico)
Raúl Rivera Palacios	SMN (Mexico)

José Luis Carrasco Martínez	SMN)Mexico)
Henry Reges	CoCoRaHS (United States)
Steve Hilberg	CoCoRaHS (United States)
Nolan Doesken	CoCoRaHS (United States)
Julian Turner	CoCoRaHS (United States)
Russ Schumacher	CoCoRaHS (United States)
Noah Newman	CoCoRaHS (United States)
Chris Fiebrich	Oklahoma Mesonet (United States)
Wayne E. Cascio	US EPA
Tim Watkins	US EPA
Annette Guiseppe-Elie	US EPA
Odalys Martínez	National Weather Service (United States)
Rosalina Vázquez-Torres	National Weather Service (United States)

Other organizations/individuals (if applicable)	Country
<ul style="list-style-type: none"> - US Drought Monitor - NOAA: National Operational Hydrologic Remote Sensing Center - NOAA: NIDIS - NOAA: NWS Forecast Offices and River Forecast Centers - USDA - meteorologists, hydrologists, conservation authorities - citizen science projects (e.g., SciStarter's Project Finder utility; and the CitizenScience.gov catalog of projects). 	United States
<ul style="list-style-type: none"> - conservation and watershed groups - provincial government: Environment, Transportation, Public Safety - AAFC (Drought Monitor) - meteorological companies, snow clearing services, construction companies, aquaculture companies, dam operators. 	Canada
<ul style="list-style-type: none"> - Comisión Nacional para la Prevención de Riesgos Sanitarios (Cofepris) 	Mexico

10. In the following table, describe: the project objective(s) and the activities and subtasks planned to achieve the objective(s); the corresponding outputs, expected results and how they will be measured (performance measures); baselines (if known), and targets by end of the project; and the timeline and budget (to 31 December 2020).

OBJECTIVE 1	Expand and strengthen the CoCoRaHS across North America.	
Activity 1, Budget year 1 and year 2	Conduct a feasibility study and meeting to assess the needs for expanding and strengthening the CoCoRaHS network in North America. Budget: Year 1: C\$40,000; Year 2: C\$40,000.	
Output(s)	Feasibility study evaluating commitments needed from key institutions; availability of technology, training materials; translation needs; and communication and volunteer recruitment processes (with a focus on engaging Indigenous communities and youth).	
Expected results, performance measures	Identified data users and decision makers have a clear roadmap of the costs, logistical needs, and processes for establishing and strengthening or expanding the CoCoRaHS network.	
Baseline (current status), if known	Gaps in CoCoRaHS precipitation data have been identified in rural regions west of the Mississippi River in the United States, western Canada and a large part of northern Mexico.	
Target (by Dec. 2020)	<ul style="list-style-type: none"> - The level of effort and time needed to expand CoCoRaHS into Mexico, Western Canada and rural regions west of the Mississippi R. are quantified - The assessment describes methods for engaging Indigenous communities and youth. 	
Subtask 1.1	Conduct a feasibility study that outlines the level of effort necessary to strengthen and expand the CoCoRaHS network.	When: Autumn 2019
Subtask 1.2	Conduct a meeting with representatives of CoCoRaHS and agencies in the three countries tasked with predicting/monitoring drought and flood, to discuss results of the feasibility study and next steps for CoCoRaHS expansion.	When: Spring 2020
OBJECTIVE 2	Assess the feasibility of expanding other citizen science monitoring networks across the region.	

Activity 2, Budget year 1 and year 2	Identify other citizen monitoring networks (e.g., SmokeSense) and convene them to assess the feasibility of expanding one or more of them across the region. Budget: Year 1: C\$40,000; Year 2: C\$30,000.	
Output(s)	Workshop summary report outlining the environmental monitoring gaps across the region; existing citizen science networks and lessons learned; and recommendations on how to strengthen/expand one or more of these networks.	
Expected results, performance measures	Greater understanding (for approx. 20 representatives of agencies from the three countries) of the monitoring data gaps across North America for extreme events.	
Baseline (current status), if known	Currently, SmokeSense is only available in the United States, and there is a lack of understanding of the monitoring data gaps and needs in each country.	
Target (by Dec. 2020)	<ul style="list-style-type: none"> - Additional data gaps are identified - At least one citizen science monitoring network is identified for strengthening/expansion - At least three participants from key agencies in each country attend the workshop. 	
Subtask 2.1	Hold a workshop with representatives of citizen science monitoring networks to learn more about them, identify needs and data gaps, share lessons learned, and discuss potential collaboration and expansion of network(s).	When: Spring 2020

11. Describe post-project expected impacts:

Expected impact	SMART performance measure(s)
By Dec. 2021, there is a clear path forward about the implementation of the CoCoRaHS network in Mexico and the expansion of the network and in Western Canada.	The CoCoRaHS network has been expanded in Western Canada (increased coverage) and a pilot expansion has been implemented in Mexico's northern states.
By Dec. 2021, there is enhanced engagement of citizen monitoring networks, such as SmokeSense or others identified through this project, for use across North America.	Increase in the number of other citizen monitoring networks engaged in filling data gaps.

Project 3. Costing Floods and Other Extreme Events

1. **Budget :** C\$580,000

Year 1 (1 April–31 Dec. 2019): C\$230,000

Year 2 (1 Jan.–31 Dec. 2020): C\$350,000

2. **Short statement of the issue/need identified (and known gaps); the project objective(s) and activities to address the issue; and expected outcomes and benefits/beneficiaries (by 31 Dec. 2020):**

Understanding the economic costs of floods and other extreme events is central to addressing impacts, allocating adequate resources for monitoring and preparedness, and building resilient communities. At present, methods for estimating the costs of flood damages vary greatly among federal and sub-national jurisdictions across North America, with significant data gaps in assessing uninsured losses. Furthermore, much information is not adequately geo-referenced or available in real time, and the economic impacts of cascading multi-hazards (e.g., dry season > forest fires > floods > landslides) are not well documented. As a result, government agencies and private entities cannot easily assess priorities for infrastructure and institutional investments to enhance disaster resilience. These information gaps also limit joint Canadian-Mexican-U.S. responses to extreme events impacting multiple jurisdictions. The main objective of this project is to develop a standardized methodology for assessing the cost of extreme floods across North America, through collaboration among government agencies, community representatives, private sector partners, and domain experts (the end-users of this methodology and data generated from it). A second objective will be to extend this methodology to a multi-hazard assessment (e.g., hurricanes, tornadoes, forest fires, landslides). Such an approach, applied across the three countries, will enable systematic investments by governmental agencies to enhance resilience to extreme events, reduce future economic impacts, and support real-time monitoring and disaster response. A common cost assessment methodology will also enable regional collaboration in applied and targeted research on future impacts of extreme events, operations for mitigating impacts of extreme events, and coordinated policymaking among the three countries. This project will guide the future development of a centralized portal for researchers, insurance industry, communities, and businesses to access information relevant to preparing for weather-related hazards.

3. Select the strategic priority(ies) from the 2015–2020 Strategic Plan and the 2019–2020 priority areas that the project addresses:

2015–2020 Strategic Priorities	2019–2020 Priority Areas
<input checked="" type="checkbox"/> Climate Change Mitigation and Adaptation <input type="checkbox"/> Green Growth <input type="checkbox"/> Sustainable Communities and Ecosystems	<input type="checkbox"/> Circular Economy – Resource Efficiency <input checked="" type="checkbox"/> Adaptation/Mitigation/Resiliency/Air Quality <input checked="" type="checkbox"/> Tribal/First Nations/Indigenous Communities, Traditional Ecological Knowledge (TEK) <input type="checkbox"/> Conservation of Species and Protected Areas

4. Explain how the project can achieve more impact through trinational cooperation, and why the CEC is the most effective vehicle to undertake this work:

Given the interconnectivity of extreme events in North America, the development of a common costing methodology would result in more harmonized responses between the governments and in the private sector, and provide integrated information to at-risk communities to enhance resilience. Because these events have the potential to impact multiple jurisdictions, their economic costs can only be estimated if jurisdictions use standardized methods to collect and report data. Therefore, involvement of agencies in the three countries in the project design and implementation will be critical to its success. Trinational collection and sharing of standardized economic cost data enhance the opportunity to understand differential impacts in various settings and for the disaster risk community to learn and apply lessons from across the continent. Through its connections with agencies in each country and history of developing successful trilateral projects, the CEC is the most effective vehicle to undertake this work.

5. Describe how the project may capitalize on, or advance, the relationship between ecosystems, job creation, gender impacts, and income generation:

Improving and standardizing the costing of floods helps account for financial and physical losses, including lost productivity, and can inform planning and resilience to reduce such losses. Without standardized data, it is difficult for societies to make investment decisions for enhanced and resilient infrastructure, and to develop proactive hazard plans or public awareness activities. In addition, the lack of standardized data makes it difficult to assess which communities are most at risk of floods, or losses due to floods. By standardizing data reporting and dissemination processes, jurisdictions will be enabled to make these

assessments and decisions effectively and efficiently. This will also ensure that businesses are able to protect their valuable assets. Moreover, while the focus of this project is on the economic impacts of floods, the lessons learned can help inform future efforts relating to impacts of other extreme events.

6. Describe how the project complements, or avoids duplication with, other national or international work:

In the United States, governmental agencies are assigned to collect information on the economic impacts of extreme events at national and subnational levels—for example, physical damage to residential, commercial, and public buildings; loss of time and productivity; damage to vehicles, offshore energy platforms, and public infrastructure; agricultural assets (crops, livestock, and timber); and disaster restoration and wildfire suppression costs. In Canada, Public Safety Canada administers the Disaster Financial Assistance Arrangements whose regional offices assist with damage assessments, interpretation of guidelines, surveillance of private damage claims, and so on. In Mexico, the National Center for Disaster Prevention (Cenapred) collects information from the public and private sectors and estimates the cost of damages from natural and human-induced hazards, including flood and droughts. However, there are considerable discrepancies at the federal level in harmonizing and integrating the pertinent economic information, and no trilateral coordination currently exists. This project will build on existing information and institutional mechanisms and the shared learning will add value to these ongoing efforts—for example, the data collected and standardized in this project could be included in the next US *National Climate Assessment* report, due in 2023.

7. Describe how the project engages traditional ecological knowledge (TEK) experts or Tribal/First Nations/Indigenous communities, if applicable. If not applicable, explain why:

For many communities, the value of protection against or preparation for extreme events is not necessarily financial or economic, but one representing a continuation of valuable traditional ceremonies, protection of specific species and management of hunting or fishing areas. Indigenous peoples may value ecosystems that are threatened by floods, and traditional ecological knowledge (TEK) can contribute to understanding how these valued systems are affected. This knowledge is often protected by elders or other members of Indigenous communities, and this project can help specify indicators or data that are useful measures of flooding. To incorporate TEK into the project methodology, US, Mexican and Canadian Indigenous representatives will be engaged in the expert workshop for project planning. An Indigenous Perspectives Workshop will also be held in early 2020 and will include research and academic organizations with established partnerships with Indigenous communities. This workshop will dovetail with the expert workshop for designing a multi-hazard assessment methodology.

8. Describe how the project engages youth, if applicable. If not applicable, explain why:

This project will create learning and research opportunities for youth, notably students enrolled in secondary and higher education. These students will be engaged in research, trilateral exchanges, and co-op placements at partner agencies. Youth perspectives in understanding the economic costs of extreme events and use of social media for disseminating findings will be a key element of this project. The interaction of youth and elders is also an important part of working with Indigenous peoples. We propose to invite Indigenous youth to actively participate in the Indigenous Perspectives Workshop, especially college or university students who are working toward becoming leaders in environmental issues.

9. Identify the designated representatives of agencies committed to developing and implementing this project (the Project Steering Committee); as well as other organizations that could potentially be involved, or benefit from it (e.g., federal agencies, other levels of government, academia, the private sector, civil society):

Name of Project Steering Committee Member	Affiliation (Country)
Zafar Adeel	Pacific Water Research Centre (Canada)
Nikki Hastings	Natural Resources Canada (NRCan) – National Scale Geohazard Risk (Canada)
Paula McLeod	NRCan – Canada Centre for Mapping and Earth Observation (Canada)
Robin Bourke	NRCan (Canada)
Guadalupe Matías Ramírez	<i>Centro Nacional de Prevención de Desastres—Cenapred</i> (Mexico)
Martín Jiménez Espinoza	Cenapred (Mexico)
Edith Bonilla López	<i>Comisión Nacional del Agua—Conagua</i> (Mexico)
Andrea Isela Alejandro Zarco	Conagua (Mexico)
Alejandro Corona Mariscal	Protección Civil (Mexico)
Renee McPherson	South Central Climate Adaptation Science Center/Univ. of Oklahoma (United States)

Gregg Garfin	Southwest Climate Adaptation Science Center/University of Arizona (United States)
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Other organizations/individuals (if applicable)	Country
NOAA: National Centers for Environmental Information; National Weather Service economists	United States
US Corps of Engineers	United States
US Geological Survey: state water science centers; regional climate adaptation science centers	United States
EPA water quality assessment	United States
Federal Emergency Management Agency—FEMA	United States
US Census Bureau	United States
Environment and Climate Change Canada (ECCC)	Canada
Insurance Bureau of Canada	Canada
Google Maps, Yelp, Waze (such models can help in the development of a system of measuring, reporting, and disseminating standardized impacts data)	International

10. In the following table, describe: the project objective(s) and the activities and subtasks planned to achieve the objective(s); the corresponding outputs, expected results and how they will be measured (performance measures); baselines (if known), and targets by end of the project; and the timeline and budget (to 31 December 2020).

OBJECTIVE 1	Develop a common methodology for costing the impacts of floods and other extreme events.
Activity 1, Budget year 1 and year 2	Develop a systematic methodology to calculate the costs of impacts from floods and other extreme events. Budget: Year 1: C\$90,000; Year 2: C\$0.

Output(s)	A compilation of methodologies (and information gaps) in the three countries.	
Expected results, performance measures	The basic building blocks for this project are developed (including a better understanding of the costing methodologies and the gaps and needs to address across North America).	
Baseline (current status), if known	No harmonized methodology exists.	
Target (by Dec. 2020)	Publication of a peer-reviewed paper on the consolidated, standardized methodology developed through this project.	
Subtask 1.1	Compile methodologies used in each country.	When: April–Aug. 2019
Activity 2, Budget year 1 and year 2	Apply the common methodology to data for extreme events from the last 5 years. Budget: Year 1: C\$140,000; Year 2: C\$115,000.	
Output(s)	<ul style="list-style-type: none"> - Data compilation for the 2013–2017 period, through collaboration with partner organizations - Summary and analysis of 2013–2017 trends/patterns. 	
Expected results, performance measures	<ul style="list-style-type: none"> - Trilateral collaboration on applying a standardized methodology, and experience provided to North American graduate students - Better understanding of patterns and trends, over a five-year period, of flood-related economic damages in the three countries. 	
Baseline (current status), if known	Databases exist in each country, but no trinational analysis of economic damages from floods has been undertaken.	
Target (by Dec. 2020)	A consolidated, North American database for 2013–2017 data (by March 2020); and a peer-reviewed paper on analysis of data trends/patterns (submitted by Dec. 2020).	
Subtask 2.1	Meet with partner organizations, place graduate students at partner organizations (at least 4 co-ops of 3 months); compile data for 2013–2017.	When: July 2019–March 2020
Subtask 2.2	Analyze the data and consider the necessary structure for a common, North American platform.	When: January–October 2020
Subtask 2.3	Prepare a summary of the data analysis/results.	When: January–October 2020
Activity 3, Budget year	Hold workshops to review the compiled information and methods for costing multi-hazards. Budget: Year 1: C\$0; Year 2: C\$175,000.	

1 and year 2		
Output(s)	<ul style="list-style-type: none"> - Workshops incorporating information about Indigenous perspectives and methodological approaches to multi-hazard assessments - Briefing document on project outcomes for decision-makers in the three countries - Project summary and recommendations published in peer-reviewed publication (e.g., Bulletin of the American Meteorological Society) 	
Expected results, performance measures	Communities and decision-makers have a common methodology for expanding the list of extreme events beyond floods, with prioritized indicators based on Indigenous and other community needs.	
Baseline (current status), if known	Some elements have been discussed in sections of climate assessment reports, but there has been no focused discussion on North America.	
Target (by Dec. 2020)	Decision-makers in the three countries have information to support the costing of floods and other extreme events; and information has been disseminated to the wider community via peer-reviewed publication.	
Subtask 3.1	Hold a 2- or 3-day workshop to discuss Indigenous perspectives and which indicators align with Indigenous values; and to discuss with experts how to include other extreme events in the costing methodology.	When: Jan. 2020–March 2020
Subtask 3.2	Hold a workshop with experts on methodological approaches for multi-hazard economic impacts.	When: May 2020–July 2020
Activity 4, Budget year 1 and year 2	Develop online case studies to demonstrate the use of the methodology to analyze multi-hazard risks (one location per country). Budget: Year 1: C\$0; Year 2: C\$60,000.	
Output(s)	Three online case studies (one per country) demonstrating the use of the standardized methodology to analyze multi-hazard risks.	
Expected results, performance measures	Better understanding of the methodology for a multi-hazard cost assessment.	
Baseline (current status), if known	Various case studies have been published on the web, but do not use a standardized methodology or economic measures.	

Target (by Dec. 2020)	Standardized tool is available to the public online.	
Subtask 4.1	Develop online case studies (one per country) demonstrating the use of the standardized methodology to analyze multi-hazard risks.	When: Feb.–Dec. 2020

11. Post-project expected impacts:

Expected impact (by when: month, year)	SMART performance measure(s)
By Dec. 2021, there is a standardized flood-costing mechanism is adopted by project partners, including federal and state-level governments in North America.	The US, Mexico, and Canada have adopted the study's recommendations as standards for costing floods.
By Dec. 2022, the flood-costing methodology is being incorporated in planning for enhanced community resilience and disaster planning at the national scale.	The number of communities, insurance companies and planning agencies at the national scale that have incorporated the flood-costing methodology in their disaster planning.
By June 2021, efforts are initiated to develop and deploy a multi-hazard-costing methodology for cascading hazards (e.g., fires > floods > landslides).	A trilateral partnership proposal has been developed and submitted to request funding for the next phase of work (i.e., to extend the design of these standards to cascading multi-hazards).

Project 4. Improving the effectiveness of early warning systems for drought

1. **Budget:** C\$435,000

Year 1 (1 March–31 Dec. 2019): C\$275,000

Year 2 (1 Jan.–31 Dec. 2020): C\$160,000

2. **Short statement of the issue/need identified (and known gaps); the project objective(s) and activities to address the issue; and expected outcomes and benefits/beneficiaries (by 31 Dec. 2020):**

The economic, environmental, and social impacts on communities of drought and its attendant hazards—including wildfires, floods, and landslides—are significant. Coordination and communication among Canada, Mexico and the United States during recent droughts have been instrumental in minimizing impacts such as reduced agricultural productivity, large wildfire outbreaks, and water shortages. While regionally integrated drought monitoring and early warning systems can efficiently mitigate negative impacts, such systems primarily exist at national and regional levels; at local levels, there is uncertainty among planners, emergency managers, water managers, and others about which early warning capabilities, monitoring indicators, and planning tools are most appropriate to support drought management. It is also essential to “nest” local drought early warning systems within larger-scale systems, and to link them with other local systems, to ensure effective and rapid information flows and low-cost responses at all levels. The goal of this project is to strengthen the ability of communities at local levels in the three countries to predict, prepare for and respond to drought impacts. This project has three main objectives:

- Improve the understanding of which indicators are most relevant for monitoring drought within specific climate regions, by developing a set of guidelines adapted to North America;
- Increase local capacity to use available drought information for planning and risk (including multi-hazard) management, by comparing and identifying best practices in each country for drought preparedness, planning, and mitigation;
- Strengthen existing trilateral partnerships across North America by assessing the uses, and user needs, relative to the North American Drought Monitor (NADM) and by improving NADM tools and access.

3. Select the strategic priority(ies) from the 2015–2020 Strategic Plan and the 2019–2020 priority areas that the project addresses:

2015–2020 Strategic Priorities	2019–2020 Priority Areas
<input checked="" type="checkbox"/> Climate Change Mitigation and Adaptation <input type="checkbox"/> Green Growth <input type="checkbox"/> Sustainable Communities and Ecosystems	<input type="checkbox"/> Circular Economy – Resource Efficiency <input checked="" type="checkbox"/> Adaptation/Mitigation/Resiliency/Air Quality <input checked="" type="checkbox"/> Tribal/First Nations/Indigenous Communities, Traditional Ecological Knowledge (TEK) <input type="checkbox"/> Conservation of Species and Protected Areas

4. Explain how the project can achieve more impact through trinational cooperation, and why the CEC is the most effective vehicle to undertake this work:

In 2001, the governments of Canada, Mexico and the United States established a trilateral partnership to improve monitoring of climate extremes in North America and to provide decision-makers with essential information for planning, mitigation, and response activities. The initial focus of the partnership was drought, and the outcome was the development of the North American Drought Monitor (NADM) product and community, which has improved drought monitoring and reporting to better meet the needs of users and decision-makers. Additionally, through the establishment of the North American Climate Services Partnership (NACSP), trilateral cooperation and coordination have been strengthened in the areas of data exchange, forecasting, and monitoring. Building on the NADM and NACSP and national-level initiatives, the project will leverage established user engagement techniques and tools to improve local capacity in the three countries. Through its expertise in promoting trilateral cooperation, the CEC will facilitate identification of regional priorities and pilot opportunities to strengthen the ability of the three countries to predict, prepare for, and respond to drought impacts.

5. Describe how the project may capitalize on, or advance, the relationship between ecosystems, job creation, gender impacts, and income generation:

Drought can have extensive impacts on ecosystems and sectors that rely upon water availability in the three countries. For example, long-term drought has been linked to significant decreases in crop and livestock production, increased susceptibility to wildfires, and reduced energy output from hydropower plants. Improved understanding and cooperation relative to drought will improve both economic (e.g., cattle grazing, movement of livestock to better pastures) and ecological (e.g., management of

riparian corridors) conditions. Improved connectivity between national and international drought monitoring efforts and local communities, including Tribal/Indigenous communities and island territories and states, will sustain the functioning and resilience of ecosystems on which they depend (e.g., the effective management of water resources preserves the fish and wildlife that are important for local businesses and recreation).

6. Describe how the project complements, or avoids duplication with, other national or international work:

Canada, Mexico and the United States have a long history of working collaboratively on drought issues, specifically through the North American Drought Monitor (NADM), a trilateral collaboration to monitor and communicate drought conditions and impacts across the continent. The objectives included in this project were identified by the three countries to address priority science and service needs relative to enhancing and complementing existing North American drought early warning, monitoring, and response capabilities. While these activities have been identified as priorities for all three countries, the drought community has not been able to undertake them due to resource constraints.

7. Describe how the project engages traditional ecological knowledge (TEK) experts or Tribal/First Nations/Indigenous communities, if applicable. If not applicable, explain why:

This project will engage Indigenous communities in order to incorporate traditional ecological knowledge pertaining to drought early warning monitoring, mitigation and planning. Drought-related issues that can be informed by TEK include:

- How the timing of drought affects crop harvesting or planting
- In desert regions, how a dry dry-season differs from a dry wet-season
- How drought affects culturally important plants and animals, and how this project can lessen these impacts
- What knowledge and capacity are needed relative to snow drought in the northern United States and Canada
- What are effective processes for incorporating TEK into local, regional, national and/or transboundary drought early warning systems, in order to strengthen them.

8. Describe how the project engages youth, if applicable. If not applicable, explain why:

Developing the next generation of weather and climate-smart managers, planners, and local officials is essential to developing resilience to extreme events. This project will offer concrete opportunities for youth engagement in the three countries, including through student training. For example, graduate students will be targeted to assist in the compilation and analysis of information for specific project components (e.g., guidelines for drought indicators; stakeholder engagement activities/workshops).

9. Identify the designated representatives of agencies committed to developing and implementing this project (the Project Steering Committee); as well as other organizations that could potentially be involved, or benefit from it (e.g., federal agencies, other levels of government, academia, the private sector, civil society):

Name of Project Steering Committee Member	Affiliation (Country)
Trevor Hadwen	Agriculture and Agri-Food Canada
Barrie Bonsal	Environment and Climate Change Canada—ECCC (Canada)
Brian Fuchs	National Drought Mitigation Center (United States)
Shannon Burke	American Planning Association (United States)
Meredith Muth	NOAA/OAR (United States)
Richard Heim	National Centers for Environmental Information (United States)
David Brown	Department of Agriculture (United States)
Elizabeth Weight	National Integrated Drought Information System (NIDIS) (United States)
Mark Shafer	SCIPP/University of Oklahoma (United States)
Martin Ibarra Ochoa	<i>Servicio Meteorológico Nacional</i> – SMN (Mexico)
Humberto Hernández Peralta	SMN (Mexico)
Ricardo Prieto González	SMN (Mexico)
Reynaldo Pascual Ramírez	SMN (Mexico)
Adán Carro de la Fuente	<i>Comisión Nacional del Agua</i> —Conagua (Mexico)
Edwin Fernando Zetina	Conagua (Mexico)
Cesar Velazquez Mireles	Conagua (Mexico)
Horacio Rubio Gutiérrez	Conagua (Mexico)
Sol Ortiz García	<i>Secretaría de Agricultura y Desarrollo Rural</i> —Sader (Mexico) [formerly Sagarpa]
Javier Vicente Aguilar Lara	Sader (Mexico)
Juan Bernardo Orozco Sánchez	Sader (Mexico)
Leticia Albarrán Mena	Sader (Mexico)
Baltazar Guerrero García	<i>Comisión Nacional de las Zonas Áridas</i> —Conaza (Mexico)
Alejandro Cruz Castellón	Conaza (Mexico)

Víctor Manuel Rodríguez Moreno	<i>Instituto Nacional de Investigaciones Forestales, Agrícolas y Pecuarias—INIFAP (Mexico)</i>
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Other organizations/individuals (if applicable)	Country
<ul style="list-style-type: none"> - Environment and Climate Change Canada—ECCC - Canadian Institute of Planners - Manitoba Drought Task Group - Saskatchewan Moisture Monitoring Committee - Alberta's Drought and Excessive Moisture Advisory Group - British Columbia's Drought Working Group 	Canada
<ul style="list-style-type: none"> - National Oceanic and Atmospheric Administration—NOAA - United States Department of Agriculture—USDA - National Drought Mitigation Center—NDMC - NOAA: Climate Program Office's Drought Task Force - NOAA: National Integrated Drought Information System—NIDIS (Regional Drought Early Warning Systems - DEWS) - NOAA: National Weather Service forecast offices; Regional Integrated Science and Assessments programs, regional climate centers 	United States
<ul style="list-style-type: none"> - <i>Comisión Nacional del Agua—Conagua</i> 	Mexico
<ul style="list-style-type: none"> - Drought experts - Indigenous groups - Agriculture and water managers, municipal, regional and federal governments - Community planners, water district and emergency preparedness managers. 	Across North America

10. In the following table, describe: the project objective(s) and the activities and subtasks planned to achieve the objective(s); the corresponding outputs, expected results and how they will be measured (performance measures); baselines (if known), and targets by end of the project; and the timeline and budget (to 31 December 2020).

OBJECTIVE 1	Assess regional use of drought indicators to improve drought early warning systems.	
Activity 1, Budget year 1 and year 2	Remote convening of regional drought experts to discuss and tailor the <i>WMO Handbook of Drought Indicators and Indices</i> to North American regions. Budget: Year 1: C\$160,000; Year 2: C\$45,000.	
Output(s)	<ul style="list-style-type: none"> - <i>North American Drought Indicators Guidelines</i> on which drought indices to use in each climate region. - A new web interface for access to the guidelines and information for specific regions or locations. 	
Expected results, performance measures	Individuals and organizations working on risk management have an improved understanding of drought conditions in their locations, as evidenced by number of agencies and communities/regions using the new guidelines.	
Baseline (current status), if known	Current indicators are global in nature, and need to be tailored to individual countries and subnational and cross-border areas and climate regions.	
Target (by Dec. 2020)	<ul style="list-style-type: none"> - Publication of <i>North American Drought Indicators Guidelines</i>. - Journal article(s) to follow, as well as a web-based interface to host the guidelines. 	
Subtask 1.1	Gather information, via webinars and targeted outreach, on how commonly-used indicators perform in North American regions; and how these indicators relate to drought impacts in different regions, and at different time scales.	When: June–Dec. 2019
Subtask 1.2	Present/review key findings of the analysis, at a joint session with the Spring 2020 NADM Forum workshop.	When: May 2020
Subtask 1.3	<ul style="list-style-type: none"> - Compile final recommendations into Guidelines document. - Communicate new Guidelines to the expert community via journal publications and presentations; and to local practitioners via existing networks and the new web interface. 	When: May–Oct. 2020
Subtask 1.4	Develop a new (or leverage existing) web interface to host Guidelines	When: Oct.–Dec. 2020

OBJECTIVE 2	Improve local capacity to use available drought information for planning and risk management.	
Activity 2, Budget year 1 and year 2	Improve the ability of local communities to manage risk in a multi-hazards context. Budget: Year 1: C\$27,000; Year 2: C\$85,000.	
Output(s)	<ul style="list-style-type: none"> - Internal summit report with recommendations for best practices, improved training to address barriers, incorporating drought planning into local/regional hazard planning, methods for engaging communities; etc. - Publication of survey findings for primary drought information providers. 	
Expected results, performance measures	<ul style="list-style-type: none"> - Improved product delivery and use of products for drought and multi-hazard planning - Incorporation of local perspectives - Changes in local use of drought information. 	
Baseline (current status), if known	There is uncertainty about the influence of existing national and continental products, such as national drought monitors, on local communities' response, including their level of trust in the accuracy of the existing tools.	
Target (by Dec. 2020)	<ul style="list-style-type: none"> - At least 20 experts from agencies and Tribal/Indigenous/First Nations and island states/ territories) in each country participate in the summit - At least six regional group meetings (at least two focus groups per country) - At least 3 communities from each country participating in the survey. 	
Subtask 2.1	Convene regional groups in different climate regions (networks of local communities) to ensure dissemination of tools and best practices, and to enable local officials to participate in open discussions about their use of monitoring products, perceptions of the accuracy of drought monitoring/prediction, and plans to integrate tools and new guidance.	When: July–Dec. 2019
Subtask 2.2	Survey local officials to assess the products they access, specific use of them and frequency of access.	When: July–Dec. 2019
Subtask 2.3	Host a summit of high-level drought experts from each country to discuss approaches to drought mitigation and barriers to monitoring, prediction, impact management, and inter/intra agency coordination, and improving management, communication with stakeholders.	When: March 2020

OBJECTIVE 3	Improve access to the North American Drought Monitor (NADM) information.	
Activity 3, Budget year 1 and year 2	Conduct assessment of the NADM product and process, aimed at improving the product. Budget: Year 1: C\$88,000; Year 2: C\$30,000.	
Output(s)	Final report with recommendations on improvements that can be made to the access and use of the NADM and national monitors, including indicators for drought early warning and planning.	
Expected results, performance measures	<ul style="list-style-type: none"> - Improvements to the web interface and products, and development of tools to enhance usability. - Increased access and use of NADM information via the website. 	
Baseline (current status), if known	No formal user assessment has been conducted of the NADM.	
Target (by Dec. 2020)	Conduct 2 or more webinars and a user survey targeting at least 10 stakeholders in each country.	
Subtask 3.1	Hold a series of webinars and conduct a survey to provide information and engage users who were unable to attend the face-to-face meeting.	When: June–August 2019
Subtask 3.2	In conjunction with the NADM Forum (Spring 2020), host a user engagement workshop in which users describe their use of the NADM.	When: May 2020
Subtask 3.3	Compile final report and communicate with NADM stakeholders via networks and publications.	When: June–Nov. 2020

11. Describe post-project expected impacts:

Expected impact	SMART performance measure(s)
By Dec. 2021, communities/regions have access and use the most suitable drought indicators.	Number of communities/regions using the new guidelines for drought planning.
By Dec. 2022, communities have an expanded network of drought monitoring and planners (e.g., international,	20% increase in local officials' access of pertinent drought monitoring tools, as measured by web metrics.

Tribal/First Nation/Indigenous communities, states).	
By Dec. 2021, decision makers have access to improved information on the status of drought across North America.	10% increase in the number of NADM information users (via the website), as compared to 2018 baseline.

Project 5. Using remote sensing to prepare for and respond to extreme events

1. **Budget:** C\$180,000

Year 1 (1 March–31 Dec. 2019): C\$60,000

Year 2 (1 Jan.–31 Dec. 2020): C\$120,000

2. **Short statement of the issue/need identified (and known gaps); the project objective(s) and activities to address the issue; and expected outcomes and benefits/beneficiaries (by 31 Dec. 2020):**

Remote sensing applications for early warning systems and climate change monitoring play a significant role in disaster management, as a result of their high temporal resolution and large area coverage. A number of applications exist to promote and facilitate the accessibility of these tools for data users, such as NASA's range of near-real-time disaster response products. However, varying levels of data accessibility, technical capacities and experienced personnel present significant barriers to the wide adoption of such applications. Moreover, providing relevant and timely geospatial information to first responders remains a challenge because of a lack of infrastructure allowing them to connect to these technologies. The objective of this project is to improve the capacity of emergency managers to use real-time satellite imagery to complement existing tools and practices for preparedness and response to extreme events. This will be done by:

- Identifying best available options for early warning systems, and the disaster-prone regions that would benefit from enhanced access to satellite imagery;
- Conduct workshops in areas identified as having an established need for training on the use of satellite imagery and response tools for floods, drought, and forest fires.

The information from this project will be used to build the capacities of local and regional first responders, emergency managers, and decision-makers in disaster-prone regions relative to obtaining and using real-time satellite imagery in the preparation and response to these events.

3. Select the strategic priority(ies) from the 2015–2020 Strategic Plan and the 2019–2020 priority areas that the project addresses:

2015–2020 Strategic Priorities	2019–2020 Priority Areas
<input checked="" type="checkbox"/> Climate Change Mitigation and Adaptation <input type="checkbox"/> Green Growth <input type="checkbox"/> Sustainable Communities and Ecosystems	<input type="checkbox"/> Circular Economy – Resource Efficiency <input checked="" type="checkbox"/> Adaptation/Mitigation/Resiliency/Air Quality <input type="checkbox"/> Tribal/First Nations/Indigenous Communities, Traditional Ecological Knowledge (TEK) <input type="checkbox"/> Conservation of Species and Protected Areas

4. Explain how the project can achieve more impact through trinational cooperation, and why the CEC is the most effective vehicle to undertake this work:

The three countries in North America have each developed certain capabilities for prediction, detection, early warnings, response and reconstruction for disasters and environmental events, which do not heed borders. The exchange of knowledge and experiences among the countries, facilitated by the CEC, will enable the strengthening of capacities and foster future collaborations, including peer-to-peer exchanges. By sharing expertise, lessons learned, assets, and infrastructure, first responders, emergency managers, and planners across North America can improve existing early warning systems and more effectively respond to events in real time.

5. Describe how the project may capitalize on, or advance, the relationship between ecosystems, job creation, gender impacts, and income generation:

In recognition of the wide-ranging impacts of disasters, ecosystem-based adaptation (EBA) and ecosystem-based approaches to disaster risk reduction (Eco-DRR) will be incorporated into project activities. Through the compilation and sharing of information among the three countries, this project will be useful for regularly updating and improving early warning systems and, in this way, will help mitigate risks from extreme events, particularly in vulnerable regions.

6. Describe how the project complements, or avoids duplication with, other national or international work:

In recent decades, efforts have been made to improve early warning systems. Satellite technologies contribute to the improvement of such warning systems through better threat monitoring; the use of satellite telecommunications to transmit

data from sensors in remote sites to observatories where threats are monitored; and the use of remote sensors to develop a more accurate and updated understanding of locations that are vulnerable to such threats. Sharing information on the advancements and uses of these technologies will support further development of early warning systems in our three countries. This project provides areas of opportunity in relation to remote sensing that can be leveraged across existing initiatives, such as the North American Ensemble Forecasting System, the North American Drought Monitor program, the Open Geospatial Consortium, and the Global Observation of Forest and Land Cover Dynamics (GOFC-GOLD).

7. Describe how the project engages traditional ecological knowledge (TEK) experts or Tribal/First Nations/Indigenous communities, if applicable. If not applicable, explain why:

Indigenous communities may be disproportionately impacted by extreme events, such as floods and wildfires, in their traditional territories. The involvement of Indigenous communities and organizations in improving first responders' access to relevant and timely geospatial information can contribute to the successful implementation of this project. It will be important to promote new tools in relation to enhanced early warnings (e.g., mobile applications), with these tools eventually available in different Indigenous languages.

8. Describe how the project engages youth, if applicable. If not applicable, explain why:

The primary audiences for the capacity-building workshops are regional and local emergency managers. However, the workshops could be conducted in university facilities, which would leverage participation from students conducting research in this field. Service feeds can be made to Indigenous communities, and to help increase youth involvement in remote areas.

9. Identify the designated representatives of agencies committed to developing and implementing this project (the Project Steering Committee); as well as other organizations that could potentially be involved, or benefit from it (e.g., federal agencies, other levels of government, academia, the private sector, civil society):

Name of Project Steering Committee Member	Affiliation (Country)
Vincent Decker	NRCan: Centre for Mapping and Earth Observation (Canada)
Michel Jean	ECCC: Canadian Centre for Meteorological/Environmental Prediction (Canada)
Jennifer Milton	ECCC: Canadian Meteorological Centre (Canada)

Paul Yang	ECCC: Canadian Meteorological Centre (Canada)
Joanne St-Coeur	ECCC: Prediction Services (Canada)
Dennis Dudley	ECCC: National Services (Canada)
Julio César Castillo Urdapilleta	Agencia Espacial México—AEM)
Jesús Roberto Romero Ruiz	Agencia Espacial México—AEM
Humberto Hernández Peralta	<i>Servicio Meteorológico Nacional—SMN (Mexico)</i>
Raúl Rivera Palacios	SMN (Mexico)
José Luis Carrasco Martínez	SMN (Mexico)
José Luis Solís Aguirre	SMN (Mexico)
Jesús Heriberto Montes Ortiz	<i>Comisión Nacional del Agua—Conagua (Mexico)</i>
Luis Antonio Aguilar Meza	Conagua (Mexico)
José Armando Alanis de la Rosa	<i>Comisión Nacional Forestal—Conafor (Mexico)</i>
Eduardo Cruz Castañeda	Conafor (Mexico)
Alejandro Corona Mariscal	Protección Civil (Mexico)
Guadalupe Matías Ramírez	<i>Centro Nacional de Prevención de Desastres—Cenapred (Mexico)</i>
Martín Jiménez Espinoza	Cenapred (Mexico)
Davida Streett	National Oceanic and Atmospheric Administration—NOAA: Satellite Analysis Branch (United States)
Wilfrid Schroeder	NOAA: Satellite Analysis Branch (United States)
Martin Medina	NOAA: International and Interagency Affairs Division, United States

Angelica Gutierrez	NOAA (United States)
Ricardo Quiroga	National Aeronautics and Space Administration—NASA (United States)

Other organizations/individuals (if applicable)	Country
<ul style="list-style-type: none"> - National Centers for Disaster Prevention; - National forest services; - National water services; - USGS – Core Systems Science - State/provincial/local emergency planning and disaster management agencies - Academic institutions with remote sensing programs - Public safety agencies. 	United States
<ul style="list-style-type: none"> - Conagua’s national meteorological service; - Mexico’s <i>Centro Nacional de Prevención de Desastres</i> (Cenapred) - Mexico’s <i>Instituto Nacional de Ecología y Cambio Climático</i> (INECC) - Mexico’s <i>Instituto Nacional de Estadística y Geografía</i> (INEGI) 	Mexico
<ul style="list-style-type: none"> - Bruce Macnab, Wildland Fire Information Systems - First Nations Health Authority - Assembly of First Nations – Emergency Services 	Canada
<ul style="list-style-type: none"> - Open Geospatial Consortium Disasters Pilot - Global Observation of Forest Cover and Land Use Dynamics (GOFC-GOLD) - AmeriGEOSS (Global Earth Observation System of Systems) 	International

10. In the following table, describe: the project objective(s) and the activities and subtasks planned to achieve the objective(s); the corresponding outputs, expected results and how they will be measured (performance measures); baselines (if known), and targets by end of the project; and the timeline and budget (to 31 December 2020).

OBJECTIVE 1	Improve the capacity of emergency managers, first responders and other decision-makers to access and use satellite imagery to prepare and respond to extreme events.	
Activity 1, Budget year 1 and year 2	Identify and assess best available options for early warning systems, and identify disaster-prone regions that have a need for training. Budget: Year 1: C\$5,000; Year 2: C\$0.	
Output(s)	Three expert webinars and summaries (internal documents) with recommendations for best available early warning systems for drought, flood and wildfires, and identification of disaster-prone regions that have a need of training.	
Expected results, performance measures	<ul style="list-style-type: none"> - Best available options for early warning systems are identified and experience is exchanged among government experts and emergency response organizations (at various levels). - A clear indication of which locations would most benefit from training. 	
Baseline (current status), if known	A remote sensing workshop was held recently (2016) in Mexico City, hosted by the Mexican Space Agency (AEM), with 250 participants (in-person and remote).	
Target (by Dec. 2020)	Consensus on the best available options for early warning systems for drought, flood and wildfires to use in the three countries	
Subtask 1.1	Hold a webinar to identify best available options for early warning systems for wildfires, drought and flood	When: Summer–Fall 2019
Activity 2, Budget year 1 and year 2	Conduct workshops to exchange knowledge and provide training on the use of satellite imagery and response tools, and best practices to improve response capacity and modeling for early warning systems. Budget: Year 1: C\$55,000; Year 2: C\$120,000.	
Output(s)	<ul style="list-style-type: none"> - Three training workshops carried out in selected regions of North America. - Workshop summary report. 	
Expected results, performance measures	Enhanced capacity of workshop participants to use remote sensing applications to forecast and prepare for extreme events, and reduce barriers to disaster response.	
Baseline (current status), if known	Emergency managers, local planners and first responders in certain regions vulnerable to extreme events do not have the training, knowledge, or tools to use remote sensing applications for disaster forecasting.	
Target (by Dec. 2020)	40 emergency managers, first responders and local planners attend each workshop (+ 50 attendees remotely).	

Subtask 2.1	Host a workshop in Mexico (location TBD).	When: Late Fall 2019
Subtask 2.2	Host a workshop in Canada or United States (location TBD).	When: Spring 2020
Subtask 2.3	Host a workshop in Canada or United States (location TBD).	When: Summer 2020

11. Describe post-project expected impacts:

Expected impact	SMART performance measure(s)
By 2021, there is enhanced capacity of local and regional emergency managers to predict, prepare and respond to extreme events using remote sensing data and tools.	Number of participants and agencies that have been trained and understand how to use the knowledge and tools.
By Dec. 2022, there are improved procedures in place for information sharing for emergency response.	Shared evidence from users on the adoption of remote sensing technology for disaster forecasting, prevention, and response.

Project 6. Preventing and reducing food loss and waste

1. **Budget:** C\$855,000

Year 1 (1 July–31 Dec. 2019): C\$360,000

Year 2 (1 Jan.–31 Dec. 2020): C\$495,000

2. **Short statement of the issue/need identified (and known gaps); the project objective(s) and activities to address the issue; and expected outcomes and benefits/beneficiaries (by 31 Dec. 2020):**

This project builds upon outcomes of the CEC's OP 2017–2018 project, "Measuring and Mitigating Food Loss and Waste," as well as earlier projects aimed at addressing the need to prevent, recover and recycle food waste.¹ This previous work filled gaps in knowledge and developed resources (in particular, the "Practical Guide on Why and How to Measure Food Loss and Waste;" and the "Food Matters Action Kit") to support a consistent regional approach to measuring food loss and waste (FLW) and engaging youth through education tools to prevent, reduce, and recycle FLW. However, there remains a need to deploy and field test these products with the user community, and to use that feedback to refine the products to ensure that they meet user needs and foster broader use and uptake in North America. This project will also engage small and medium enterprises through the development of case studies; and engage youth through a trilateral marketing campaign to raise awareness and incentivize the uptake of the Food Matters Action Kit. This additional, extensive outreach to the user community will help ensure that these resources are widely used by youth and youth organizations, and by businesses operating in the food sector.

3. **Select the strategic priority(ies) from the 2015–2020 Strategic Plan and the 2019–2020 priority areas that the project addresses:**

2015–2020 Strategic Priorities	2019–2020 Priority Areas
<input checked="" type="checkbox"/> Climate Change Mitigation and Adaptation	<input checked="" type="checkbox"/> Circular Economy – Resource Efficiency
<input checked="" type="checkbox"/> Green Growth	<input type="checkbox"/> Adaptation/Mitigation/Resiliency/Air Quality
<input checked="" type="checkbox"/> Sustainable Communities and	<input checked="" type="checkbox"/> Tribal/First Nations/Indigenous Communities, Traditional Ecological

¹ Previous CEC projects include: (1) North American Initiative on Food Waste Reduction and Recovery; (2) North American Initiative on Organic Waste Diversion and Processing; and (3) Measuring and Mitigating Food Loss and Waste (FLW). These projects addressed the upper tiers (wasted food prevention and recovery for human consumption or animal feed), and lower tiers (food recycling option—e.g., anaerobic digestion) of the Food Recovery Hierarchy.

Ecosystems	Knowledge (TEK) <input type="checkbox"/> Conservation of Species and Protected Areas
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4. Explain how the project can achieve more impact through trilateral cooperation, and why the CEC is the most effective vehicle to undertake this work:

Trilateral cooperation in this area elevates the visibility of the work, and enhances the ability to enlist key North American and other international public/private sector partners and experts, which provides added value to the Parties. Such cooperation helps in leveraging resources, creates broader potential market opportunities for technology solutions, and expands the audience and value of outcomes and resources – allowing companies in North America to have consistent and effective methods for measuring food loss and waste, and youth to have shared awareness of how food waste reduction can benefit them and their communities.

5. Describe how the project may capitalize on, or advance, the relationship between ecosystems, job creation, gender impacts, and income generation:

This work is well-placed to promote and capitalize on the mutually reinforcing economic, environmental and social benefits associated with food waste prevention (e.g., mitigating environmental impacts from the inefficient use of economic, human and natural resources along the food supply chain); recovery programs (e.g., donation programs addressing food security needs in disadvantaged communities); and recycling programs (e.g., mitigating greenhouse gas (GHG) emissions by reducing organic waste in landfills). A growing body of analysis strongly supports this multi-faceted approach, which promotes efficiencies and reduced waste throughout the food production chain, encouraging more-sustainable food systems that incur social, economic and environmental benefits and opportunities for small and medium sized enterprises. With food waste occurring at the production, retail and consumer levels, integrating sustainability through a circular economy/resource efficient approach can be done at all stages.

6. Describe how the project complements, or avoids duplication with, other national or international work:

Measurement and educational tools have been developed with input from national and international experts to define synergies and avoid duplication. The current project builds on efforts to fill gaps identified by these experts.

7. Describe how the project engages traditional ecological knowledge (TEK) experts or Tribal/First Nations/Indigenous communities, if applicable. If not applicable, explain why:

The project will engage Indigenous communities in the implementation of the practical guide(s) to measure food loss and waste (FLW), and how to correlate measurements with environmental and socio-economic impacts. The project will also engage youth from urban, rural, and Indigenous communities to raise awareness of FLW issues through direct marketing of the Food Matters Action Kit.

8. Describe how the project engages youth, if applicable. If not applicable, explain why (max 100 words):

Objective 2 of this project calls for deployment and continued development of educational tools and resources targeted at youth to help them understand the importance of FLW and empower them to take action to prevent, recover and recycle food waste in their homes, schools, and communities.

9. Identify the designated representatives of agencies committed to developing and implementing this project (the Project Steering Committee); as well as other organizations that could potentially be involved, or benefit from it (e.g., federal agencies, other levels of government, academia, the private sector, civil society):

Name of Project Steering Committee Member	Affiliation (Country)
Michael VanderPol	Environment and Climate Change Canada—ECCC
Susan Fraser	ECCC
Claudia Sánchez	<i>Secretaría de medio ambiente y recursos naturales—Semarnat (Mexico)</i>
Eduardo Parra Ramos	
Krystal Krejcik	US EPA
Claudia Fabiano	US EPA
Maxwell Torney	US EPA
Elle Chang	
Ellen Meyer	

Name of Project Steering Committee Member	Affiliation (Country)
Vicky Salazar	

Other organizations/individuals (if applicable)	Country
<ul style="list-style-type: none"> - Companies in the food supply chain - Youth organizations across North America - Local governments, business associations, or international organizations to more broadly distribute the Practical Guide and the Food Matters Action Kit. 	Canada, Mexico, and the United States

10. In the following table, describe: the project objective(s) and the activities and subtasks planned to achieve the objective(s); the corresponding outputs, expected results and how they will be measured (performance measures); baselines (if known), and targets by end of the project; and the timeline and budget (to 31 December 2020).

OBJECTIVE 1	Increase the measurement of food loss and waste (FLW) by organizations in the food supply chain, and the correlation of FLW prevention, recovery and recycling with environmental and socio-economic impacts.
Activity 1, budget year 1 and year 2	Improve tools to measure FLW. Budget: Year 1: C\$235,000; Year 2: C\$270,000
Output(s)	<ul style="list-style-type: none"> - Updated and improved Practical Guide. - Additional resources to support promotion of the ideas, approaches and information in the practical guide (e.g., webinars, training workshops materials). - Case studies that demonstrate to the business community the organizational, financial, environmental, and social benefits of FLW measurement and mitigation.
Expected results, performance measures	<ul style="list-style-type: none"> - Input received from at least five organizations in each country, and up to 30 companies pilot-testing the Practical Guide. - A sharing mechanism created for companies involved in the pilot testing of the guide; technical assistance and training provided for companies using the guide for measuring FLW. - 21 select organizations (of various sizes and sectors) participate in case studies that showcase the value of FLW measurement and of the Practical Guide.

	<ul style="list-style-type: none"> - An improved Practical Guide that is trusted and accepted by organizations in the North American food supply chain as a valuable resource for FLW measurement. - Greater uptake of FLW measurement in North America. 	
Baseline (current status), if known	<ul style="list-style-type: none"> - The Practical Guide was published in March 2019, and no similar tool exists. - The Practical Guide did not benefit from a peer review or extended pilot testing process. 	
Target (by Dec. 2020)	<ul style="list-style-type: none"> - Publication of a revised Practical Guide. - Increased acceptance and uptake of the Practical Guide by organizations working across the North American food supply chain. 	
Subtask 1.1	Conduct peer review of the Practical Guide by organizations in each country's food supply chain through consultant services.	When: July–Dec. 2019
Subtask 1.2	Conduct pilot testing of the Practical Guide and get feedback from organizations; develop or use existing network to provide technical support to companies piloting the guide and measuring FLW.	When: July–June. 2020
Subtask 1.3	Develop up to 21 organizational case studies on FLW measurement across each country's food supply chain.	When: July 2019–Dec. 2020
Subtask 1.4	Revise the Practical Guide to improve its usability and usefulness, and develop supporting resources, such as video tutorials and Q&As.	
Subtask 1.5	Develop marketing and outreach strategy for Practical Guide and publish updated Guide and new supporting materials.	
Subtask 1.6	Translate the technical report entitled, "Quantifying Food Loss and Waste and its Impacts" into French and Spanish.	When: July–Dec. 2019
OBJECTIVE 2	Raise awareness of the impacts of FLW among youth from urban, rural and Indigenous communities, and provide tools for youth to use the Food Matters Action Kit to prevent, recover, and recycle food waste in their homes, schools, and communities.	
Activity 2, budget year 1 and year 2	Peer review and update the Food Matters Action Kit. Budget: Year 1: C\$15,000; Year 2: C\$70,000	

Output(s)	- A Food Matters Action Kit that is trusted and widely used by youth and youth organizations.	
Expected results, performance measures	<ul style="list-style-type: none"> - Improved Food Matters Action Kit that is accepted and widely used by youth organizations and educators in North America. - Input provided by at least 30 youth organizations (min. of 10 per country) that have used the Food Matters Action Kit, representing communities, schools, and Indigenous organizations. 	
Baseline (current status), if known	The current version of the Kit received input from Youth Advisory Committee members, but did not benefit from extended pilot testing or a peer review process.	
Target (by Dec. 2020)	Publication of an updated Food Matters Action Kit.	
Subtask 2.1	Conduct peer review of the Food Matters Action Kit.	When: July–Dec. 2019
Subtask 2.2	Revise Food Matters Action Kit.	When: Jan.–Dec. 2020
Activity 3, budget year 1 and year 2	Conduct a Marketing and Outreach Strategy to encourage uptake of Food Matters Action Kit through a marketing or public relations firm. Budget: Year 1: C\$110,000; Year 2: C\$155,000	
Output(s)	<ul style="list-style-type: none"> - A creative approach and message for a digital marketing campaign based on the imagery and videos developed for the Action Kit, to build awareness of food waste, of the Food Matters Action Kit, and to incentivize youth to take action in their homes, communities and schools. - Wide dissemination and ensured trilateral uptake of the Food Matters Action Kit by North American youth and youth-based organizations - Two to three high-level partnerships with youth organizations in North America 	
Expected results, performance measures	- Increased capacity of youth and youth organizations to prevent and reduce food waste	
Baseline (current status), if known	A number of organizations have created campaigns on food waste, but not at a regional scale. This will be the first time the CEC will implement a Digital Marketing and Outreach Strategy of this sort.	
Target (by Dec. 2020)	Completed campaign with a verifiable increased awareness of the need and capacity of youth and youth organizations to take action to prevent and reduce food waste (at least 30 high-level youth organizations implementing the Food Matters Action Kit - 10 from each country).	

Subtask 3.1	Develop a creative approach, message and concept incentivizing youth to implement actions to prevent/reduce food waste in their home, community or school, with metrics to measure outcome of campaign.	When: July–Dec. 2019
Subtask 3.2	Promote the uptake of the Food Matters Action Kit, including digital advertising; media and influencer relations campaign; participation in 4-5 high-profile events where, for example, CEC could host workshops.	When: July 2019–Dec. 2020
Subtask 3.3	Partner with 2-3 high-level youth organizations to drive awareness and adoption of activities in the Food Matters Action Kit through their outreach channels and program participants.	

11. Describe post-project expected impacts:

Expected impact	SMART performance measure(s)
By December 2021, there is increased measurement of food loss and waste (FLW) by the North American food industry.	Number of companies across North America that are measuring FLW using the measurement guide.
By December 2021, there is acceptance of the Practical Guide as a trusted resource that companies can use to begin measuring FLW, and widespread use of the Practical Guide.	Number of companies using the Practical Guide.
By 2021, there is an increased number of youth taking action to prevent, recover and recycle food waste in their homes, schools, and communities.	Number of youth organizations using the Food Matters Action Kit.

Project 7. EcoInnovation Network

1. **Budget:** C\$660,000

Year 1 (1 March–31 Dec. 2019): C\$340,000

Year 2 (1 Jan.–31 Dec. 2020): C\$320,000

2. **Short statement of the issue/need identified (and known gaps); the project objective(s) and activities to address the issue; and expected outcomes and benefits/beneficiaries (by 31 Dec. 2020):**

To enhance traditional academic programs and provide tools and resources to provide innovation, entrepreneurship and sustainable/green growth² training to students and communities in North America, the CEC launched this project at the 2018 CEC Council Session. The objective is to encourage the creation of innovation hubs at academic institutions and link them across the three countries to enhance education and provide tools for students and communities relative to entrepreneurship, innovation and sustainable design for green growth. The network is expected to be self-sustaining after 2020, and will support innovation hub development, facilitate student and expert exchanges and trilateral collaboration, and disseminate tools and resources to enhance knowledge and capacities related to enabling future leadership in entrepreneurship, innovation, and sustainable design for green growth. This project will:

- Establish criteria for innovation hub capacities and services;
- Develop and facilitate training and capacity building tools and resources among members to enhance existing sustainability education programs and create new hubs focused on entrepreneurship, innovation and sustainability for green growth;
- Improve capacities and access to exchanges and resources for students, young entrepreneurs, and communities to advance innovation, sustainable design, and for-profit green growth enterprises; and
- Recruit innovation hubs from academic institutions throughout North America and develop a framework and strategy to create a self-sustaining network.

3. **Select the strategic priority(ies) from the 2015–2020 Strategic Plan and the 2019–2020 priority areas that the project addresses:**

² The green economy aims to improve human well-being and social equity, while significantly reducing environmental risks and ecological scarcity (UNEP 2018; <https://www.unenvironment.org/explore-topics/green-economy/about-green-economy>).

2015–2020 Strategic Priorities	2019–2020 Priority Areas
<input type="checkbox"/> Climate Change Mitigation and Adaptation <input checked="" type="checkbox"/> Green Growth <input type="checkbox"/> Sustainable Communities and Ecosystems	<input checked="" type="checkbox"/> Circular Economy – Resource Efficiency <input type="checkbox"/> Adaptation/Mitigation/Resiliency/Air Quality <input checked="" type="checkbox"/> Tribal/First Nations/Indigenous Communities, Traditional Ecological Knowledge (TEK) <input type="checkbox"/> Conservation of Species and Protected Areas

4. Explain how the project can achieve more impact through trinational cooperation, and why the CEC is the most effective vehicle to undertake this work:

A trinational network of innovation hubs from academic institutions from Canada, Mexico and the United States will increase the quality and impact of this project by: 1) leveraging the best expertise in entrepreneurship, innovation and sustainability from all three countries to create or enhance hubs on innovation and entrepreneurship for green growth; 2) making these hubs and their services available to youth, students, experts and communities in all three countries; and 3) increasing the network's overall reach and opportunities for new partnerships, collaborations and memberships to support project objectives. The CEC will provide seed funding, coordination, outreach and expertise to create the network and build a strong foundation to ensure its sustainability post-2020.

5. Describe how the project may capitalize on, or advance, the relationship between ecosystems, job creation, gender impacts, and income generation:

Innovation hubs play a key role in sustainable economic development and job creation within the communities they serve, and beyond. A key feature of the innovation hubs is to provide equal access to students and the public to capitalize on training, tools and resources for innovation, sustainable design, entrepreneurship, and business development and sustainable innovation for students and communities in North America.

6. Describe how the project complements, or avoids duplication with, other national or international work:

This network represents a new opportunity for defining and promoting innovation and sustainable design hubs and programs at North American academic institutions and facilitating collaboration among North American academic institutions to enhance conventional academic education with capacities and tools for entrepreneurship, innovation and sustainable design for green growth. The network will expand linkages among national innovation hubs by building upon existing partnerships and networks

across North America to recruit academic members, leverage expertise, promote the exchange of education tools and knowledge, and find opportunities for collaboration throughout project implementation.

7. Describe how the project engages traditional ecological knowledge (TEK) experts or Tribal/First Nations/Indigenous communities, if applicable. If not applicable, explain why:

Academic institutions with strong links to Indigenous groups, as well as Indigenous communities and TEK experts are being invited to participate in the network. Indigenous students and public are welcome throughout the implementation of this project, and to participate in knowledge and student exchanges and collaborations with local communities. Additionally, the network can be informed by programs focused on Indigenous/local community entrepreneurship currently being delivered in academic institutions in North America.

8. Describe how the project engages youth, if applicable. If not applicable, explain why:

The innovation hubs and the network are a resource for students, young entrepreneurs and communities. Youth will benefit from the outcome of this project by having greater access to education, services, mentorship, training and overall resources from network members on entrepreneurship, innovation and sustainable design for green growth.

9. Identify the designated representatives of agencies committed to developing and implementing this project (the Project Steering Committee); as well as other organizations that could potentially be involved, or benefit from it (e.g., federal agencies, other levels of government, academia, the private sector, civil society):

Name of Project Steering Committee Member	Affiliation (Country)
Sarah Lubick Rob Woodbury Halil Erhan	Business of Design, Simon Fraser University, Vancouver, British Columbia, Canada
Anna Ehrhardt Carmela Cucuzzella	District 3, Concordia University, Montréal, Québec, Canada
Daniel Forget	Université Laval, Québec, Canada
Brock Dickinson	Economic Development Program, University of Waterloo, Waterloo, Ontario, Canada
Tom Wavering Brandt Smith Daniel Moses	Tom Love Innovation Hub, University of Oklahoma, Norman, Oklahoma, USA

Jeff Moore Cassandra Rigsby Haley Rader	Ronnie K. Irani Center for the Creation of Economic Growth (I-CCEW), Norman, Oklahoma, USA
Klaudia Manuela Sánchez Espíndola Miguel Ángel Santinelli Ramos	<i>Facultad de Responsabilidad Social, Universidad Anáhuac, Mexico City, Mexico</i>
Omar Chávez Alegría	<i>Facultad de Ingeniería, Universidad Autónoma de Querétaro, Querétaro State, Mexico</i>
TBC	University of Puerto Rico, Engineering School/other, United States

Other organizations/individuals (if applicable)	Country
Ameren at the University of Missouri	United States
Austin Technology Incubator at the University of Texas at Austin	United States
Centro CEMEX-Tec de Monterrey para el Desarrollo Sostenible , (CDCS) at Tecnológico de Monterrey	Mexico
Centro de Emprendimiento y Desarrollo Empresarial (CEDE), Univ. Iberoamericana (IBERO), Mexico City	Mexico
evolveGreen , at the University of Waterloo in Waterloo, Ontario	Canada
Laboratorio de Innovación Económica y Social (LAINES) at <i>Universidad Iberoamericana</i> (IBERO), Puebla	Mexico
Sustainable Development Solutions Network	International
International Business Innovation Association (INBIA)	International

10. In the following table, describe: the project objective(s) and the activities and subtasks planned to achieve the objective(s); the corresponding outputs, expected results and how they will be measured (performance measures); baselines (if known), and targets by end of the project; and the timeline and budget (to 31 December 2020).

OBJECTIVE 1	Launch a network by June 2019 that is self-sustaining by December 2020.	
Activity 1, budget year 1 and year 2	Develop a framework and strategy to create a self-sustaining network. Budget: Year 1: C\$70,000; Year 2: C\$10,000	
Output(s)	<p>A report describing current innovation hub efforts in the three countries, and the model for an ideal sustainable innovation hub (network's vision, mission, terms of operation, membership requirements).</p> <p>A funding and self-sustainability strategy to leverage available resources for the network and its members.</p>	
Expected results, performance measures	<ul style="list-style-type: none"> - A network is created and a framework and strategy are in place to support innovation hub members wanting to expand sustainability. - Network's scope of work is informed by current status of efforts in the three countries and ideal innovation hub model. - A Charter for Innovation Hubs and the Network (to be approved by Council) on the definition and required capacities of an innovation hub, network's mission, vision, role, terms of operation, services and goals. - Institutions use the funding strategy and partner with other network members to leverage resources. 	
Baseline (current status), if known	N/A	
Target (by Dec. 2020)	<ul style="list-style-type: none"> - The report is used to inform network decisions and enhance network capacity and impact. - Presentation and endorsement by Council of the Charter for the Innovation Hubs and network at the 2019 CEC Council Meeting. - All institutions that need resources are able to use the funding strategy. 	
Subtask 1.1	Develop a report identifying the services, organizational arrangements, strategies and expertise of existing innovation hubs; and develop a model to enhance hub services and capacity to accelerate sustainable innovation. It will include a glossary of terms to inform the development of a toolkit to support the creation of sustainable	When: March–May 2019

	innovation hubs.	
Subtask 1.2	Based on the report (activity 1.1), develop the network's vision, mission, terms of operation, and membership requirements.	When: March–May 2019
Subtask 1.3	Develop a funding and self-sustainability strategy to leverage available resources for the network and its members (e.g., in-kind contributions, partners, funding schemes), during and post-project.	When: July 2019–Dec 2020
OBJECTIVE 2	Disseminate information about the network and recruit members.	
Activity 2, budget year 1 and year 2	Recruit innovation hubs from academic institutions in North America into the network, and promote its work. Budget: Year 1: C\$50,000; Year 2: C\$30,000	
Output(s)	A marketing strategy, website, and outreach materials and efforts to recruit members, leverage resources and promote the network.	
Expected results, performance measures	<ul style="list-style-type: none"> - The network has been promoted effectively in the three countries and membership has expanded. - A strategy is created to guide the network's marketing efforts, with information about the network shared. - Partnerships and collaborations are created to strengthen network capacity and impact, and increase membership. 	
Baseline (current status), if known	N/A	
Target (by Dec. 2020)	Launch of network at the 2019 CEC Council session (e.g., logo, key messages, website and members). Partnerships or collaborations with at least one organization per country.	
Subtask 2.1	Develop a marketing strategy to promote the network (e.g., branding, logo, key messages, and communication tools and products).	When: March–May 2019
Subtask 2.2	Develop outreach and recruitment materials (including website, videos, social media packages, media articles) to disseminate tools and resources (including project outputs), promote the network and expand its membership.	When: March 2019–Dec 2020
Subtask 2.3	Liaise with other regional or international initiatives to leverage	When: March 2019–Dec 2020

	network resources, efforts.	
OBJECTIVE 3	Enhance network members' capacity in sustainability, innovation, and entrepreneurship for green growth, and strengthen engagement of youth.	
Activity 3, budget year 1 and year 2	Develop and facilitate training and capacity-building tools and resources for members; increase access to exchanges and resources for students, young entrepreneurs and communities. Budget: Year 1: C\$220,000; Year 2: C\$280,000	
Output(s)	<ul style="list-style-type: none"> - Knowledge exchange and training events among members. - Student exchanges in the three countries. - Guidance document to assess/ incorporate sustainability in innovation hubs, and create new hubs. - Provide guidance and mentorship during the Youth Innovation Challenge (YIC). 	
Expected results, performance measures	<p>Members have enhanced their capacity and resources and those of their youth/community relative to sustainable innovation.</p> <p>Network members gained useful information, ability to share tools to enhance their hubs or education programs.</p> <p>Students learned new skills and knowledge to implement their projects.</p> <p>Academic institutions have information to create sustainable innovation hubs.</p> <p>YIC participants received advice and winners receive long-term mentorship from network members.</p>	
Baseline (current status), if known	N/A	
Target (by Dec. 2020)	<p>Three knowledge exchange and training events per year.</p> <p>Three student exchange projects per year.</p> <p>Guidance document integrated into the network's website (activity 1.2).</p> <p>YIC network advisors will be at least one network member per country.</p>	
Subtask 3.1	Facilitate knowledge exchange and training focused on innovation, sustainability and entrepreneurship among network members to enhance hub capability.	When: March 2019–Dec 2020

Subtask 3.2	Develop and implement innovation/sustainability pilot projects and exchanges in each country with students, in partnership with network members and third parties (e.g., industry, NGOs, communities).	When: July 2019–Dec 2020
Subtask 3.3	Develop a toolbox to assess and incorporate sustainability in innovation hubs.	When: June 2019–May 2020
Subtask 3.4	Support the Youth Innovation Challenge (YIC) 2019 and 2020: promote participation; and provide advice during challenge and long-term mentorship to participants and winners.	When: March 2019–Oct 2020

11. Describe post-project expected impacts:

Expected impact	SMART performance measure(s)
By December 2021, increased number of innovation hubs in North America that have enhanced their sustainability and innovation services and programs.	- Number of innovation hubs in North America that have enhanced their sustainability and innovation services and programs as a result of their participation in the network.
By December 2021, network exchanges among academic institutions have continued or increased to support sustainable innovation.	- Number of established long-term education and knowledge exchange programs led by network members. - Number of network members actively participating in network-led education and knowledge exchange programs. - Number of co-hosted events by network members.
By December 2021, youth, students and community skills and knowledge have expanded.	- Number of innovation hub personnel trained to offer expanded services in sustainable innovation. - Number of youth who participated in activities of network.
By January 2021, resources are available to sustain the network after 2020.	- Number of funding or grant proposals by network members.

Project 8. Community Solutions for Reducing Marine Litter

1. Budget: C\$500,000

Year 1 (1 July–31 Dec. 2019): C\$120,000

Year 2 (1 Jan.–31 Dec. 2020): C\$380,000

2. Short statement of the issue/need identified (and known gaps); the project objective(s) and activities to address the issue; and expected outcomes and benefits/beneficiaries (by 31 Dec. 2020):

Marine litter is a global problem that affects economies, ecosystems and potentially human health. This project will build on the implementation and lessons learned through the OP 2017–2018 project in two cross-border watersheds involved in a community-driven, low-cost, and low-technology approach to mitigate sources of marine litter, adapted from the US EPA Trash-Free Waters framework. The objectives of this project are to: 1) build the capacity of decision-makers and organizations by providing a toolkit and training to replicate this multi-stakeholder approach in other communities and watersheds to prevent marine litter, and 2) increase awareness in coastal and inland communities of the connections between consumer behavior and solid waste management practices upstream, and marine litter prevention downstream. Promoting this solutions-focused approach through the provision of resources and training, and engaging with youth, the private sector and communities to increase awareness of land-based marine litter sources, will accelerate marine litter mitigation efforts across North America.

3. Select the strategic priority(ies) from the 2015–2020 Strategic Plan and the 2019–2020 priority areas that the project addresses:

2015–2020 Strategic Priorities	2019–2020 Priority Areas
<input type="checkbox"/> Climate Change Mitigation and Adaptation	<input checked="" type="checkbox"/> Circular Economy – Resource Efficiency
<input checked="" type="checkbox"/> Green Growth	<input type="checkbox"/> Adaptation/Mitigation/Resiliency/Air Quality
<input checked="" type="checkbox"/> Sustainable Communities and Ecosystems	<input type="checkbox"/> Tribal/First Nations/Indigenous Communities, Traditional Ecological Knowledge (TEK)
	<input checked="" type="checkbox"/> Conservation of Species and Protected Areas

4. Explain how the project can achieve more impact through trilateral cooperation, and why the CEC is the most effective vehicle to undertake this work:

Marine litter is a global issue involving many levels of governments and diverse stakeholders, and one that can benefit from improved coordination and action. Each of the three national governments in North America has a goal to reduce marine litter, and can advance its national investments and efforts in marine litter reduction through collaboration, particularly in

transboundary watersheds. The CEC is an effective vehicle to undertake this work because there is no intergovernmental mechanism to address marine litter at the North American scale, nor the movement of litter between the countries and their shared waterways.

5. **Describe how the project may capitalize on, or advance, the relationship between ecosystems, job creation, gender impacts, and income generation:** Marine litter is the result of the direct or indirect deposit of waste in the aquatic environment. Litter pollution in our freshwater and marine ecosystems directly affects the fishing and tourism industries, and threatens livelihoods that are essential to the economy of coastal communities. Waste and littered items also represent a lost value, as these resources have escaped the economy. This project heightens awareness about the relationship between land-based activities and the state of the marine environment. By accelerating marine litter mitigation efforts across North America, it provides opportunities to inform consumer behavior; retain materials in the economy and reintroduce them into the value chain; lessen impacts on the fishing and tourism industries; and improve the health of aquatic and coastal ecosystems.
6. **Describe how the project complements, or avoids duplication with, other national or international work:** This project will complement and strengthen the work that was implemented in the first phase of this project (under OP 2017–2018), as well as existing local, regional, national and international efforts to address this transboundary issue. It will also provide an opportunity for a coordinated effort to adopt a consistent approach across North America. It is the first North American project to use a replicable and consistent community-based approach to find solutions for marine litter in transboundary watersheds.
7. **Describe how the project engages traditional ecological knowledge (TEK) experts or Tribal/First Nations/Indigenous communities, if applicable. If not applicable, explain why:** The stakeholder-driven approach promoted through this project includes the engagement of Indigenous communities and the sharing of TEK in the region where marine litter solutions are being identified and implemented. Specifically, TEK could inform a greater understanding of watershed characteristics (e.g., water flows, flora/fauna, history of pollution) that are part of implementing solutions to the marine litter problem. Indigenous communities could be identified as ambassadors and trained to deliver the CEC marine litter stakeholder engagement process.
8. **Describe how the project engages youth, if applicable. If not applicable, explain why:** North American youth (e.g., schools, Scouts, environmental clubs, etc.) are a key audience for this project, including for citizen-science activities, training for community leaders and project ambassadors, and the awareness campaign. This project recognizes that youth are excellent ambassadors for the environment and a fitting demographic to advocate for upstream source reduction and a shift from "throw-away" to "reduce/reuse" cultures. Effective youth engagement generates creativity and inspires communities. Youth will be

involved throughout the entire project and as a result, will gain awareness of the issue and become empowered to address local and shared border challenges.

9. **Identify the designated representatives of agencies committed to developing and implementing this project (the Project Steering Committee); as well as other organizations that could potentially be involved, or benefit from it (e.g., federal agencies; other levels of government; academia; the private sector; civil society):**

Name of Project Steering Committee Member	Affiliation (Country)
Sarah Da Silva	Environment and Climate Change Canada—ECCC
Laura Orzel	ECCC
Salomón Díaz Mondragón	Semarnat
Andrew Horan	US Environmental Protection Agency—US EPA
Janice Sims	US EPA
Krystal Krejcik	US EPA

Other organizations/individuals (if applicable)	Country
N/A	

10. **In the following table, describe: the project objective(s) and the activities and subtasks planned to achieve the objective(s); the corresponding outputs, expected results and how they will be measured (performance measures); baselines (if known), and targets by end of the project; and the timeline and budget (to 31 December 2020).**

OBJECTIVE 1	Build capacity of decision-makers to deliver a stakeholder engagement process and implement low-cost, low-tech solutions that prevent and reduce marine litter in stakeholders' communities and watersheds.
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Activity 1, budget year 1 and year 2	Develop and disseminate a toolkit and training guide, and provide training for decision-makers on the CEC marine litter stakeholder engagement process, to address marine litter sources at the local level. Budget year 1: C\$50,000; Budget year 2: C\$200,000	
Output(s)	A toolkit, training guide and training for decision makers on how to deliver the CEC marine litter stakeholder engagement process.	
Expected results, performance measures	Decision makers have resources to engage their stakeholders to reduce and prevent marine litter in their community.	
Baseline (current status), if known	N/A	
Target (by Dec. 2020)	The toolkit, training guide and training for decision makers are produced and shared in selected communities (upstream from and outside of original pilot areas).	
Subtask 1.1	Develop toolkit/guide in consultation with local decision makers and/or stakeholder associations (in person or virtually). Consult with previous project stakeholders and other decision-makers to validate the toolkit.	When: July 2019–July 2020 (consultations in Feb–May 2020)
Subtask 1.2	Conduct outreach and training events to promote and disseminate the final toolkit in selected communities.	When: Aug–Dec 2020
OBJECTIVE 2	Improve public understanding of and interest in the connection between consumption behavior, sound solid waste management practices, product life cycle, and marine litter reduction and prevention in coastal and inland communities.	
Activity 2, budget year 1 and year 2	Launch a public and/or sector-oriented awareness campaign to educate the public about the link between consumption and solid waste management practices upstream, and marine litter prevention downstream. Budget year 1: C\$70,000; Budget year 2: C\$180,000	
Output(s)	An awareness campaign for the public and/or specific sectors, including events and information materials.	
Expected results, performance	Outreach and educational materials have reached the target audiences, and their interest and knowledge on the issue have increased.	

measures		
Baseline (current status), if known	N/A	
Target (by Dec. 2020)	The awareness campaign for the public and/or specific sectors, including events and information materials, is launched in selected communities (upstream from or outside of original pilot areas).	
Subtask 2.1	Develop educational materials that will be incorporated into the campaign.	When: July 2019–Feb 2020
Subtask 2.2	Organize events (and/or participate in existing ones) to promote the materials and engage communities in selected areas.	When: March–Dec 2020

11. Describe post-project expected impacts:

Expected impact	SMART performance measure(s)
By December 2023, local decision-makers and citizens have a tested approach and resources to continue implementation of low-technology, low-cost solutions in their community.	Number of communities that use the solutions-focused approach developed by the CEC.
By December 2023, communities, including youth, are more engaged on marine litter prevention.	Evidence based on surveys that communities, including youth, have taken concrete actions to reduce their contribution to marine litter.

Project 9. Strengthening regional pollinator conservation to secure local benefits

1. **Budget :** C\$590,000

Year 1 (1 July–31 Dec. 2019): C\$220,000

Year 2 (1 Jan.–31 Dec. 2020): C\$370,000

2. **Short statement of the issue/need identified (and known gaps); the project objective(s) and activities to address the issue; and expected outcomes and benefits/beneficiaries (by 31 Dec. 2020):**

Pollinators support the reproduction of 80% of wild vascular plants and 75% of crop species, and as such are crucial to food security, human well-being and natural ecosystems. Native bees, butterflies, beetles, ants and flies, and non-insect pollinators such as birds and bats are all valuable crop pollinators, complementing managed bees. However, the number of pollinators has declined worldwide due to habitat loss and degradation, intensive agricultural management, pathogens, invasive species, climate change, and excessive use of agrochemicals, including pesticides. Pollinator declines are occurring alongside the decline of many other wildlife species, such as migratory grassland birds, associated with agricultural and grassland landscapes. This rapid decline requires urgent conservation actions and the engagement of stakeholders in different sectors. The objectives of this project are to: 1) develop a North American Pollinator Conservation Framework, including recommendations for improved decision making; 2) highlight the local ecological and socio-economic benefits of pollinators at selected sites; and 3) promote stakeholder engagement through increased awareness of the ecological and socio-economic benefits of pollinators for local communities. This project will foster trilateral cooperation and collaborative actions to leverage pollinator conservation efforts across North America.

3. **Select the strategic priority(ies) from the 2015–2020 Strategic Plan and the 2019–2020 priority areas that the project addresses:**

2015–2020 Strategic Priorities	2019–2020 Priority Areas
<input type="checkbox"/> Climate Change Mitigation and Adaptation <input type="checkbox"/> Green Growth <input checked="" type="checkbox"/> Sustainable Communities and Ecosystems	<input type="checkbox"/> Circular Economy – Resource Efficiency <input type="checkbox"/> Adaptation/Mitigation/Resiliency/Air Quality <input type="checkbox"/> Tribal/First Nations/Indigenous Communities, Traditional Ecological Knowledge (TEK) <input checked="" type="checkbox"/> Conservation of Species and Protected Areas

4. Explain how the project can achieve more impact through trilateral cooperation, and why the CEC is the most effective vehicle to undertake this work:

Each country is experiencing a decline in pollinators, and has various initiatives in place to counter that decline. The three countries will leverage their national investments and support decision-making in pollinator conservation by developing a North American Pollinator Conservation Framework, strengthening the exchange of information and experiences that will foster cooperation. The CEC has demonstrated the value of working trilaterally on species and ecosystem conservation (e.g., monarchs and grasslands) and has proven that regional frameworks (e.g., CITES Action Plans) provide a solid foundation for well-informed decisions. There is a wide range of stakeholders working to conserve pollinators, and the CEC can build on its previous experience facilitating collaborative action across the three countries and engaging local communities into multi-sectoral activities to help accomplish the proposed objectives.

5. Describe how the project may capitalize on, or advance, the relationship between ecosystems, job creation, gender impacts, and income generation:

Pollinators are essential to reproduction in 75% of crop types and help to increase crop yields and quality, directly supporting income generation from farming and providing billions of dollars' worth of products annually (US\$20 billion in the United States alone). Actions taken to conserve pollinators and their habitat will also benefit other species, maintaining the many ecosystem services and economic benefits they bring locally. This project will incorporate a human dimension perspective to the regional framework highlighting the relationship between the conservation of pollinators and their socio-economic benefits for local communities.

6. Describe how the project complements, or avoids duplication with, other national or international work:

Each of the three countries is faced with a decline in pollinators, and strives to reverse this decline through initiatives at all levels. This project will build local support for pollinator conservation by highlighting the ecological and socio-economic benefits for local communities while providing a first North American Pollinator Conservation Framework, including current status of pollinators, threats, and recommendations for improved decision making. Whereas various local and national efforts are in place to support the conservation of pollinators in Canada, Mexico and the United States, there are no concerted trilateral efforts to address knowledge gaps or promote the engagement of stakeholders as a network across the three countries.

7. Describe how the project engages traditional ecological knowledge (TEK) experts or Tribal/First Nations/Indigenous communities, if applicable. If not applicable, explain why:

Across North America, from gardens to crops and from grasslands to forests, pollinators have been a key component of traditional ecological knowledge, particularly as to how they relate to food production. Engagement of Tribal/First Nations/Indigenous communities will inform the North American Pollinator Conservation Framework as applicable under the project's timeline.

8. Describe how the project engages youth, if applicable. If not applicable, explain why:

This project will identify current knowledge on pollinators and initiatives to engage local communities and all sectors of society on the conservation of pollinators, and inform them on their ecological and socio-economic benefits. By developing outreach documents, this project will include youth as a target audience as it has been demonstrated that younger generations can empower changes in behavior and can promote local conservation actions with regional impacts.

9. Identify the designated representatives of agencies committed to developing and implementing this project (the Project Steering Committee); as well as other organizations that could potentially be involved, or benefit from it (e.g., federal agencies, other levels of government, academia, the private sector, civil society):

Name of Project Steering Committee Member (Leads only)	Affiliation (Country)
Ilona Naujokaitis-Lewis, Research Scientist, Science and Technology Branch	Environment and Climate Change Canada—ECCC (Canada)
Greg Mitchell, Research Scientist / Wildlife Research Division Science and Technology Branch	
Ryan Drum, Wildlife Biologist/ Monarch Conservation Science Lead	US Fish and Wildlife Service—US FWS (United States)
Michael Gale, Special Assistant	
Esther Quintero, Subcoordinadora de Especies Prioritarias	<i>Comisión Nacional para el Conocimiento y Uso de la Biodiversidad—Conabio</i> (Mexico) (Mexico)
Humberto Berlanga, Coordinador del Programa NABCI y Temas de Vida Silvestre	

Jose Eduardo Ponce Guevara, Encargado del despacho de los asuntos competencia de la Dirección de Especies Prioritarias para la Conservación	<i>Comisión Nacional de Áreas Naturales Protegidas—Conanp (Mexico)</i>
Carlos Alvarez Echegaray, Jefe de departamento de Biodiversidad	<i>Dirección General del Sector Primario y Recursos Naturales Renovables—DGSPNR-Semarnat (Mexico)</i>
Jorge Alberto Duque Sanchez, Director de Conservación de la Vida Silvestre	<i>Dirección General de Vida Silvestre (DGVs)-Semarnat (Mexico)</i>
Isabel Maria Hernandez Toro, Directora de Conservación de Ecosistemas y Adaptación al Cambio Climático	INECC (Mexico)

Other organizations/individuals (if applicable)	Country
Pollinator Partnership	United States, Canada and Mexico
Xerces Society	United States
Monarch Joint Venture	United States
Montreal Insectarium/ Space for Life	Canada
David Suzuki Foundation	Canada
Correo Real	Mexico
UNAM	Mexico
Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES)	International
UN Environment	International

10. In the following table, describe: the project objective(s) and the activities and subtasks planned to achieve the objective(s); the corresponding outputs, expected results and how they will be measured (performance measures); baselines (if known), and targets by end of the project; and the timeline and budget (to 31 December 2020).

OBJECTIVE 1	Support the development of the North America Pollinator Conservation Framework	
Activity 1 and Budget (Year 1, Year 2)	Develop a North American Pollinator Conservation Framework for the conservation of pollinators including key taxonomic groups and regions, and recommendations to support improved decision making for pollinator conservation in the three countries. Budget: Year 1: \$C160,000; Year 2: \$C230,000.	
Output(s)	<ul style="list-style-type: none"> - State of knowledge on pollinators in North America - North American Pollinator Conservation Framework (including state of knowledge on pollinators and recommendations to support decision making) - Outreach products to promote the North American Pollinator Conservation Framework 	
Expected results, performance measures	<ul style="list-style-type: none"> - Published (digital or printed) state of knowledge on pollinators in North America - Published (digital or printed) North American Pollinator Conservation Framework - Disseminated outreach products (digital or printed) 	
Baseline (current status), if known	No overarching pollinator conservation framework exists for North America	
Target (by Dec. 2020)	State of knowledge and framework are published and outreach materials are disseminated	
Subtask 1.1	Compile and summarize available information on the state of knowledge of pollinators in North America including key taxonomic groups and regions.	When: July 2019–June 2020
Subtask 1.2	Develop a North America Pollinator Conservation Framework, including data gaps, key stakeholders and recommendations to inform improved decision making for pollinator conservation in the three countries and informed by two multi-stakeholder workshops with NGOs, academia,	When: July 2019–Aug. 2020

	agricultural sector, government, and Indigenous communities.	
Subtask 1.3	Develop outreach materials and communication strategy to disseminate the North American Pollinator Conservation Framework.	When: Aug.–Nov. 2020
OBJECTIVE 2	Support the development of case studies to highlight the ecological and socio-economic benefits of pollinators for the sustainable livelihood of communities	
Activity 2 and Budget (Year 1, Year 2)	Develop and disseminate case studies on the ecological and socio-economic benefits of pollinators to inform stakeholder engagement and increase awareness in selected sites. Budget: Year 1: \$C60,000; Year 2: \$C140,000.	
Output(s)	<ul style="list-style-type: none"> - Case studies to highlight ecological and socio-economic benefits of pollinators in selected sites (at least one per country) - Recommendations to engage key sectors and regions on pollinator conservation - Outreach products for target audiences and key sectors 	
Expected results, performance measures	<ul style="list-style-type: none"> - Published (digital or printed) case studies to highlight ecological and socio-economic benefits of pollinators for local communities - Disseminated outreach products for target audiences incorporating recommendations to engage key sectors on pollinator conservation 	
Baseline (current status), if known	N/A	
Target (by Dec. 2020)	Case studies are published and targeted outreach materials are disseminated.	
Subtask 2.1	Develop case studies presenting the ecological and local socio-economic benefits of pollinators in selected sites (at least one per country).	When: July 2019–Sept. 2020
Subtask 2.2	Identify, in collaboration with social scientists and through a multi-stakeholder workshop, best practices for engagement of local communities and key stakeholders to promote pollinator conservation.	When: Jan. 2019–Oct. 2020

Subtask 2.3	Develop outreach materials (based on socio-economic case studies and informed by multi-stakeholder workshop) to disseminate information on the ecological and socio-economic benefits of pollinators for communities or for particular sectors (e.g., agricultural sector in the US grassland region).	When: Aug.–Nov. 2020
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11. Describe post-project expected impacts:

Expected impact	SMART performance measure(s)
By July 2022, the North American Pollinator Framework has helped stakeholders act to effectively support pollinator conservation.	Knowledge gaps have been identified and recommendations have been implemented by stakeholders (governments, producers, etc.) to support pollinator conservation.
By July 2022, there is increased public knowledge of threats to pollinators and of the ecological and socio-economic benefits they provide.	Public awareness and knowledge are increased through the dissemination of outreach products.
By July 2022, social scientists and communication specialists have been engaged to promote pollinator conservation to key audiences.	Evidence that knowledge on the human dimensions of pollinator conservation is integrated into decision-making and outreach.

Project 10. Strengthening adaptation capacity in Marine Protected Areas

1. Budget : C\$325,000

Year 1 (1 July–31 Dec. 2019): C\$170,000

Year 2 (1 Jan.–31 Dec. 2020): C\$155,000

2. Short statement of the issue/need identified (and known gaps); the project objective(s) and activities to address the issue; and expected outcomes and benefits/beneficiaries (by 31 Dec. 2020):

Marine Protected Areas (MPAs) are key to maintaining ocean resilience, when they are adaptively managed to respond to threats such as ocean warming, species shifts, and disastrous events. Over two projects, the CEC worked with Pacific coast MPA practitioners to develop tools to help identify vulnerabilities in coastal ecosystems and communities (the Rapid Vulnerability Assessment Tool), and provide options of adaptation measures that can be implemented to respond to these vulnerabilities (the Coastal Impact Mitigation and Adaption Toolkit). Building on this past work, the current project will increase capacity to apply these tools in new seascapes (the Atlantic, Gulf and Caribbean coasts), by training trainers and MPA practitioners from these areas. It will also address a key need of MPA practitioners by providing guidance on addressing the challenges that disastrous events present and integrating natural solutions in coastal management in order to mitigate and respond to these events. The project will also strengthen MPA capacity for adaptation planning through increasing collaboration across MPAs, and using the resulting informal networks and the North American Marine Protected Area Network (NAMPAN) to disseminate knowledge and experiences. As a result of the project, MPA practitioners will have a stronger capacity to manage the impacts of global and regional changes, allowing MPAs to contribute to healthier, more resilient marine ecosystems.

3. Select the strategic priority(ies) from the 2015–2020 Strategic Plan and the 2019–2020 priority areas that the project addresses:

2015–2020 Strategic Priorities	2019–2020 Priority Areas
<input checked="" type="checkbox"/> Climate Change Mitigation and Adaptation <input type="checkbox"/> Green Growth <input checked="" type="checkbox"/> Sustainable Communities and Ecosystems	<input type="checkbox"/> Circular Economy – Resource Efficiency <input checked="" type="checkbox"/> Adaptation/Mitigation/Resiliency/Air Quality <input type="checkbox"/> Tribal/First Nations/Indigenous Communities, Traditional Ecological Knowledge (TEK) <input checked="" type="checkbox"/> Conservation of Species and Protected Areas

4. Explain how the project can achieve more impact through trinational cooperation, and why the CEC is the most effective vehicle to undertake this work:

The marine environment is inherently connected, and threats to biodiversity conservation are experienced at the regional scale, since species distributions and migrations extend over seascapes. Additionally, climate impacts have increased the need for collaboration, as they affect the distribution and movement of species and cause habitat shifts. As a result, there is an urgent need to compile, create and disseminate knowledge more widely to effectively manage our changing MPAs as elements of larger marine and coastal systems, and minimize negative impacts on communities. The CEC is a unique channel for this seascape-level work, as it provides the framework to gather and share knowledge concerning MPA adaptation strategies and strengthen capacity across the network of North American MPAs, building on previous projects and collaborations.

5. Describe how the project may capitalize on, or advance, the relationship between ecosystems, job creation, gender impacts, and income generation:

Coastal ecosystems and communities are among those most affected by climate change, and require proactive planning to minimize negative impacts of change. Adaptation planning builds the resilience of marine and coastal ecosystems, helping maintain the economic activities and uses that depend on the marine ecosystem (e.g., sustainable marine tourism, natural infrastructure), and contribute to the social, cultural and economic well-being of coastal communities. As a result of the project, coastal and marine managers and practitioners will work with coastal Indigenous and local communities in the three countries to share practices for coastal habitat adaptation, setting priorities and applying solutions. By supporting healthy, productive marine ecosystems, the project helps maintain sustainable livelihoods and resilient communities.

6. Describe how the project complements, or avoids duplication with, other national or international work:

This work builds on previous work by the CEC, published in *Scientific Guidelines for Designing Resilient Marine Protected Area Networks in a Changing Climate* (CEC 2012), the Rapid Vulnerability Assessment Tool (CEC 2017), the Coastal Impact Mitigation and Adaption Toolkit (to be released in 2019), and the Blue Carbon work (2013–2017). Together, this body of work provided new tools, knowledge and data developed with and for MPA practitioners in the three countries; the current project provides a unique opportunity to broaden the impact and scope of this work. Pacific coast pilot MPAs engaged in the previous projects have had the opportunity to build on their experience in advancing their adaptation work, and their experience will be shared with new audiences through this project. Training of trainers will build capacity to manage shared resources and provide opportunities for expanded managerial collaboration among the network of North American MPAs. The project offers a new opportunity to include planning for disastrous events and incorporating nature-based solutions in MPA adaptation strategies, and to disseminate the existing and proposed work to international audiences to whom coastal and marine adaptation is a

significant priority, continuing the important contribution of the NAMPAN to this conversation with other international MPA networks.

7. Describe how the project engages traditional ecological knowledge (TEK) experts or Tribal/First Nations/Indigenous communities, if applicable. If not applicable, explain why:

Indigenous people have inhabited coastal areas in North America for thousands of years, and have a long history of adapting to changes in the marine and coastal environment. This project will build on existing Indigenous engagement structures and processes (where applicable) and previous engagement in CEC work to involve the communities in a participatory relationship to gather and synthesize knowledge on adaptation options for MPA management, particularly as it relates to disastrous events and nature-based solutions, and share results with the communities. The project also provides an opportunity for collaboration among Indigenous peoples involved in coastal management and adaptation across the three countries.

8. Describe how the project engages youth, if applicable. If not applicable, explain why:

Youth are key stakeholders in MPA management, and are the focus of many education and citizen-science efforts at MPAs. The project will identify opportunities for youth engagement in adaptation strategies, including through volunteer work and community engagement, and may directly engage graduate students in some of the work, if applicable; however, the project is aimed mainly at MPA practitioners.

9. Identify the designated representatives of agencies committed to developing and implementing this project (the Project Steering Committee); as well as other organizations that could potentially be involved, or benefit from it (e.g., federal agencies, other levels of government, academia, the private sector, civil society):

Name of Project Steering Committee Member	Affiliation (Country)
Chantal Vis, Marine Ecosystem Specialist	Parks Canada (Canada)
Marlow Pellatt, Ecosystem Scientist	Parks Canada (Canada)
Fernando Camacho Rico	Conanp (Mexico)
Pilar Jacobo Enciso	Conanp (Mexico)

Lauren Wenzel, Director, National Marine Protected Areas Center	NOAA (United States)
Gonzalo Cid, International Coordinator, National Marine Protected Areas Center	NOAA (United States)

Other organizations/individuals (if applicable)	Country
EcoAdapt	United States (NGO working internationally)
UN Environment – North America Region	International
IUCN World Commission on Protected Areas (Marine)	International
MPA networks and partnerships, particularly those adjacent to North America	International
Stakeholder groups engaged in the previous projects (e.g., MPA advisory councils, Indigenous governments and organizations, universities and NGOs)	Canada, Mexico and United States

10. In the following table, describe: the project objective(s) and the activities and subtasks planned to achieve the objective(s); the corresponding outputs, expected results and how they will be measured (performance measures); baselines (if known), and targets by end of the project; and the timeline and budget (to 31 December 2020).

OBJECTIVE 1	Support communities' and MPA practitioners' learning of adaptation strategies to address coastal vulnerabilities.
Activity 1, budget year 1 and year 2	Provide training to strengthen the capacity of MPA practitioners working in the Atlantic, Gulf and/or Caribbean region to manage MPAs for adaptation. Budget: Year 1: C\$30,000; Year 2: C\$60,000
Output(s)	<ul style="list-style-type: none"> - Training module - Trainers trained in teaching tool application - Atlantic, Gulf and/or Caribbean Coastal MPA teams trained
Expected results, performance measures	Coastal MPA practitioners (Atlantic, Gulf and/or Caribbean) trained to use tools to plan for adaptation

Baseline (current status), if known	<ul style="list-style-type: none"> - No training module - No trainers trained - 1 US Atlantic MPA has been trained to use the Rapid Vulnerability Assessment Tool 	
Target (by Dec. 2020)	<ul style="list-style-type: none"> - A training module is available - At least 2 trainers per country (from different MPAs) have been trained - At least 1 coastal Atlantic, Gulf and/or Caribbean MPA team per country has been trained 	
Subtask 1.1	Develop a training module on the Rapid Vulnerability Assessment Toolkit (RVAT) and the Coastal Impact Mitigation and Adaption Toolkit	When: Aug.–Dec. 2019
Subtask 1.2	Deliver training on the RVAT and climate adaptation toolkit to trainers, who can reach new audiences (Atlantic, Gulf, Caribbean seascapes)	When: Jan.–Feb. 2020
Subtask 1.3	Deliver training to local practitioners, adapted to local needs and context, based in Atlantic, Gulf and/or Caribbean	When: Sept.–Nov. 2020
OBJECTIVE 2	Strengthen collaboration between MPAs and international MPA partnerships (e.g., NAMPAN and the Trans-Atlantic MPA Partnership) to address transboundary issues	
Activity 2, budget year 1 and year 2	Develop a collaborative plan for the North American MPA Network (NAMPAN). Budget: Year 1: C\$30,000; Year 2: C\$25,000	
Output(s)	<ul style="list-style-type: none"> - Report identifying priorities of NA MPA practitioners - Workshop report including collaborative action plan - International webinar report 	
Expected results, performance measures	MPA practitioners have priorities, action list for collaboration across their networks/ shared seascapes.	
Baseline (current status), if known	The outputs described do not currently exist.	
Target (by Dec. 2020)	A North American MPA priority list, action list for collaboration across MPAs and a first-steps plan for expanded collaboration across seascapes shared with MPA practitioners.	
Subtask 2.1	Work with NAMPAN partners, including UN Environment, to conduct a needs assessment of MPA practitioners to identify priority issues and opportunities to connect with other networks.	When: July–Sept. 2019

Subtask 2.2	Hold network-level capacity building workshop for North American MPA managers on a priority issue identified.	When: Oct. 2019–Jan. 2020 (one date)
Subtask 2.3	Hold information-sharing webinar with MPA managers from international MPA networks and partnerships to share CEC climate-related and other management tools.	When: Apr.–Sept. 2020 (one date)
OBJECTIVE 3	Strengthen the capacity of coastal and marine practitioners to integrate disaster risk reduction (DRR) in coastal ecosystem planning and management.	
Activity 3, budget year 1 and year 2	Identify and share best practices for integrating DRR with coastal ecosystem planning and management. Budget: Year 1: C\$40,000; Year 2: C\$30,000	
Output(s)	<ul style="list-style-type: none"> - A best practices guide on integrating DRR. - Workshop report. 	
Expected results, performance measures	MPA practitioners have information to integrate DRR in coastal ecosystem planning and management.	
Baseline (current status), if known	Some of the information exists, but has not been synthesized nor assembled in an accessible format for the MPA community.	
Target (by Dec. 2020)	Best practices guide disseminated.	
Subtask 3.1	Identify best practices in ecosystem-based DRR.	When: Aug.–Dec. 2019
Subtask 3.2	Hold workshop to share lessons learned and best practices on DRR across the MPA and DRR professional communities, to improve integration of coastal resilience concepts with DRR.	When: Jan.–Oct. 2020
OBJECTIVE 4	Strengthen the capacity of coastal and marine practitioners to integrate blue carbon in coastal ecosystems planning and management, to support national and regional carbon mitigation strategies, disaster risk reduction and coastal restoration	
Activity 4, budget year 1 and year 2	Identify and share best practices for integrating blue carbon in coastal ecosystems planning and management. Budget: Year 1: C\$70,000; Year 2: C\$40,000	
Output(s)	<ul style="list-style-type: none"> - A synthesis report of blue carbon information with geographic location and overlays of existing MPAs. - A best practices guide on integrating blue carbon. 	

	- An outreach product to inform potential users.	
Expected results, performance measures	MPA practitioners have information (data synthesis, maps and geomatic tools) to identify important blue carbon areas, and to know how to integrate this information into planning and management decisions.	
Baseline (current status), if known	Some of the information exists, but has not been synthesized nor assembled in an accessible format for the MPA community.	
Target (by Dec. 2020)	Map, best practice guide, and outreach material on blue carbon integration in coastal planning and management disseminated.	
Subtask 4.1	Synthesize existing blue carbon information on geographic location and overlays with existing MPAs.	When: Aug.–Dec2019
Subtask 4.2	Identify restoration best practices and develop decision support tools for MPA practitioners to better integrate blue carbon information into MPA planning and management for climate change mitigation, coastal restoration strategies and DRR.	When: Aug. 2019–Feb. 2020
Subtask 4.3	Develop and disseminate communication tools for coastal and MPA practitioners and partners.	When: Apr.–Oct. 2020

11. Describe post-project expected impacts:

Expected impact	SMART performance measure(s)
By December 2022, MPAs have incorporated mitigation and adaptation strategies into their management plans/activities.	Evidence that toolkits have been used by participating MPAs, and shared with MPA programs widely in the three countries.
By December 2022, newly-developed MPA adaptation strategies incorporate a disaster risk reduction perspective.	Evidence of DRR integration in newly-developed adaptation strategies of MPAs.
By December 2022, maps and best practice guide are being used to develop planning and adaptation strategies for blue carbon ecosystems.	Evidence of blue carbon integration in newly-developed adaptation strategies of MPAs.

Project 11. Indigenous network for Traditional Ecological Knowledge (TEK) [In development]

12. Budget: C\$300,000

Year 1 (1 July–31 Dec. 2019): C\$35,000

Year 2 (1 Jan.–31 Dec. 2020): C\$254,000

Appendix II – Other Initiatives and Mechanisms

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Submissions on Enforcement Matters (SEM)

1. Budget: C\$300,000

Year 1 (1 Jan.–31 Dec. 2019): C\$150,000

Year 2 (1 Jan.–31 Dec. 2020): C\$150,000

2. Short statement of the rationale for this work, its objective(s) and activities; and expected outcomes and benefits/beneficiaries (by 31 Dec. 2020):

The SEM process is a mechanism established under the NAAEC that allows residents and nongovernmental organizations of North America to file a submission asserting the alleged failure of any of the three Parties to effectively enforce its environmental law. The process is aimed at promoting transparency and public participation by enhancing the effective enforcement of environmental law. For 2019, the Secretariat will continue to process the active submissions (as of May 2019 there are seven submissions), including the preparation of one factual record authorized by Council in 2018. For one Mexican submission, the Council is currently considering whether to authorize a factual record; if it directs the Secretariat to do so, work on a second factual record will begin. The Secretariat will process any new submission filed during the period of this Operational Plan, and will also continue to conduct outreach activities regarding the SEM process and how residents in North America can participate. Expected outcomes include information about the environmental issues raised in the submissions, and how the Parties may have already addressed the issues. The public, the submitters, and local stakeholders are the beneficiaries of the SEM process.

3. Explain how the work can achieve more impact through trilateral cooperation, and why the CEC is the most effective vehicle to undertake this work (if applicable):

Not applicable, since the SEM process is a requirement under Articles 14 and 15 of the NAAEC.

4. Describe how this work may capitalize on, or advance, the relationship between ecosystems, job creation, gender impacts, and income generation (if applicable):

Not applicable.

5. Describe how the work complements, or avoids duplication with, other national or international work:

The SEM process is unique in North America. No other public participation process exists to raise concerns, in a trilateral forum, regarding the effective enforcement of environmental law in North America.

6. Describe how the work engages traditional ecological knowledge (TEK) experts or Tribal/First Nations/Indigenous communities, if applicable. If not applicable, explain why:

The public decides which issues to raise through the SEM process. If a factual record is ultimately authorized by Council, TEK is information that can be collected by the Secretariat for incorporation into a factual record. During the period of this Operational Plan, the Secretariat will broaden its outreach to include TEK experts and Tribal/First Nations/Indigenous communities, and will address unique issues these communities may face in using the SEM process.

7. Describe how the work engages youth, if applicable. If not applicable, explain why:

The SEM process does not engage youth per se, but the Secretariat does engage youth in its various activities, through law school internships, and through its outreach to the law school communities in the three countries.

8. Identify the designated representatives of agencies committed to this work ; as well as other organizations that could potentially be involved, or benefit from it (e.g., federal agencies, other levels of government, academia, the private sector, civil society):

Names of designated representatives	Affiliation (Country)
None other than SEM POCs	

Other organizations/individuals (if applicable)	Country
Certain law faculty and law schools in North America	All three countries
Environmental NGOs in North America	All three countries
CAFTA-DR SEM	SEM Process related to Central American/Dominican Republic Free

	Trade Agreement
Peru FTA SEM	SEM Process related to US/Peru FTA

9. In the following table, describe: the objective(s) and the activities and subtasks planned to achieve the objective(s); the corresponding outputs, expected results and how they will be measured (performance measures); baselines (if known) and targets, as well as the timeline and budget (to 31 December 2020).

OBJECTIVE 1	Increase understanding and use of the SEM process by timely processing submissions, preparing authorized factual records, and conducting outreach activities to share how the SEM process can be used and have a positive impact on communities' understanding of environmental enforcement activities.	
Activity 1, budget year 1 and year 2	Process submissions, both existing and new, and complete authorized factual records. Budget Year 1: C\$130,000, Budget Year 2: C\$120,000	
Output(s)	Secretariat determinations on active submissions and publication of factual records.	
Expected results, performance measures	All stakeholders have a better understanding of the impacts of filed submissions on the effective enforcement of environment law in North America	
Baseline (current status), if known	Currently 7 active submission, including 1 authorized factual record	
Target (by Dec. 2020)	Possibly 5 new submissions and 2 factual records (1 new)	
Subtask 1.1	Issue timely Secretariat determinations	When: ongoing
Subtask 1.2	Issue 2 final factual records	When: December 2020
Activity 2, budget year 1 and year 2	Conduct SEM outreach program. Budget Year 1: C\$20,000, Budget Year 2: C\$30,000	

Output(s)	Participation in SEM and third-party events where discussion of SEM and its impacts can be featured.
Expected results, performance measures	Increased understanding of the SEM process, impacts of filing a submission, and how the process can be used to catalyze government action to address environmental issues. Increased collaboration with nongovernmental, private sector, academic, and community organizations to enhance and leverage the SEM process and its outputs.
Baseline (current status)	0
Target (by Dec. 2020)	Participate in 4 events

10. Describe expected impacts post December 2020:

Expected impact	SMART performance measure(s)
By December 2021, the SEM process has helped ensure the Parties' commitment under the NAAEC to effectively enforce environmental laws is fulfilled.	<ul style="list-style-type: none"> -Timely processing of submissions consistent with the SEM guidelines -Evidence of effective outreach of the SEM process (continued use and interest from the public) -Follow-up actions by the Parties pursuant to published factual records.

Communications and Outreach

1. **Budget :** C\$385,000
Year 1 (1 Jan.–31 Dec. 2019): C\$160,000
Year 2 (1 Jan.–31 Dec. 2020): C\$225,000
2. **Short statement of the rationale for this work, its objective(s) and activities; and expected outcomes and benefits/beneficiaries (by 31 Dec. 2020) :**
To increase stakeholder engagement with the CEC's work, and provide critical support to the institution in its efforts to engage, educate and drive action among relevant target audiences or segments of the population. In addition, to communicate the CEC's role, value and purpose as well as raise general awareness of the CEC as an important and trusted agent in protecting the North American environment and supporting sustainable development over the last quarter century.
3. **Explain how the work can achieve more impact through trinational cooperation, and why the CEC is the most effective vehicle to undertake this work (if applicable):**
N/A – communications is a support function for all CEC work
4. **Describe how this work may capitalize on, or advance, the relationship between ecosystems, job creation, gender impacts, and income generation (if applicable):**
N/A
5. **Describe how the work complements, or avoids duplication with, other national or international work:**
CEC communications messaging is unique in that it represents the voice of three nations coming together with a shared vision for conservation, enhancement and protection of the North American environment. The CEC is the only intergovernmental organization working in this space in North America.
6. **Describe how the work engages traditional ecological knowledge (TEK) experts or Tribal/First Nations/Indigenous communities, if applicable. If not applicable, explain why:**
Under the current Operational Plan, CEC Communications will make a concerted effort to include TEK experts and indigenous voices in our materials and among those we invite to participate in our events.

7. Describe how the work engages youth, if applicable. If not applicable, explain why:

Youth engagement is a key component of several outreach campaigns, notably the CEC Youth Innovation Challenge.

8. Identify the designated representatives of agencies committed to this work ; as well as other organizations that could potentially be involved, or benefit from it (e.g., federal agencies; other levels of government; academia; the private sector; civil society):

Names of designated representatives	Affiliation (Country)
Martin Dieu, Nadya Hong, Luis Troche	US Environmental Protection Agency
Terri Green, Wendy Bontinen, Agusti Bordas	Environment and Climate Change Canada
Isabel Montserrat Cid, Iris Jimenez	Semarnat

Other organizations/individuals (if applicable)	Country

9. In the following table, describe: the objective(s) and the activities and subtasks planned to achieve the objective(s); the corresponding outputs, expected results and how they will be measured (performance measures); baselines (if known) and targets, as well as the timeline and budget (to 31 December 2020).

OBJECTIVE 1	Increase stakeholder engagement with the CEC's work.
Activity 1, budget year 1 and year 2	Target and liaise with relevant stakeholders and members of the public for each area of work Budget Year 1: C\$10,000 Budget Year 2: C\$15,000
Output(s)	

	N/A	
Expected results, performance measures	<ul style="list-style-type: none"> - Event attendance increases - Additional partnerships with external organizations are forged 	
Baseline (current status), if known	As of May 2019 and since July 1, 2017: 1,103 webcast participants; 173 in person participants; Click-thru rate of 19%	
Target (by Dec. 2020)	<ul style="list-style-type: none"> - Increase attendance numbers at events (including webinars, focus groups) by 10% - Research and target at least 10 new and influential stakeholders and per CEC project - Increase webcast participation by 15% - Increase newsletter open & click-thru rates by 5% 	
Subtask 1.1	<ul style="list-style-type: none"> - Research and target at least 10 new and influential stakeholders and per CEC project - Look at cross-promotional opportunities via newsletters, media, websites, social media 	When: By September 2019
Subtask 1.2	<ul style="list-style-type: none"> - Attend events and participate in joint media interviews 	When: Throughout OP
Subtask 1.3	<ul style="list-style-type: none"> - Optimize online partner presence - Share brand guides with the understanding of promoting partners via promo materials 	When: Throughout OP
OBJECTIVE 2	Communicate the CEC's role, value and purpose	
Activity 1, budget year 1 and year 2	Use storytelling and visuals around project successes, to be disseminated using a variety of popular and effective digital tools, mediums and platforms. Budget Year 1: C\$120,000 Budget Year 2: C\$130,000	
Output(s)	Promotional videos, infographics, blog posts and other media	
Expected results, performance	A greater number of stakeholders and citizens engaging with CEC content	

measures		
Baseline (current status), if known	<p>As of March 31, 2019: 18, 144 followers on Facebook; 3, 901 followers on Twitter</p> <p>As of May 2019 and since July 1, 2017: 157,010 video views on Facebook; 24, 421 video views on YouTube</p>	
Target (by Dec. 2020)	<ul style="list-style-type: none"> - Increase the number of unique visitors to CEC website by 5% - Increase number of Facebook and Twitter followers by 15% - Increase webcast participation by 15% - Increase newsletter open & click-thru rates by 5% - Increase the number of video views by 10% 	
Subtask 2.1	Produce compelling content and post via our established channels daily	When: Throughout OP
OBJECTIVE 3	Raise general awareness of the CEC	
Activity 1, Budget year 1 and year 2	<p>Conduct targeted media relations campaigns and speak at high profile events</p> <p>Budget Year 1: C\$30,000 Budget Year 2: C\$80,000</p>	
Output(s)	News media coverage in high-level outlets, social media content, and activity surrounding high-level event participation.	
Expected results, performance measures	Strengthen the CEC's relevance and reputation among influencers and opinion leaders in Canada, Mexico, the United States, and globally.	
Baseline (current status), if known	As of May 2019 and since July 1, 2017: 2, 472 news articles covering CEC work; cumulative potential reach of 713,559,492	
Target (by Dec. 2020)	Increase the number of media hits, circulation, and reach of media by 20%	
Subtask 3.1	Review projects and identify those with greatest media potential; hire external media relations support for one or two high-profile campaigns.	When: By March 2020

Subtask 3.2	Use Meltwater to continue developing targeted media lists of journalists in the three countries who cover a spectrum of environmental issues, including conservation, climate change, energy, consumer behavior and policy.	When: Throughout OP
Subtask 3.3	Conduct media training for new Executive Director in Fall 2019	When: Fall 2019

10. Describe expected impacts post December 2020:

Expected impact (by when: month, year)	SMART performance measure(s)
By December 2022, a greater number of stakeholders and citizens are engaging with CEC content	<ul style="list-style-type: none"> - The number of unique visitors to CEC website is averaging over 40K for four consecutive quarters - Over 120,000 Facebook video views year/year
By December 2022, the CEC's relevance and reputation among influencers and opinion leaders in Canada, Mexico, the United States, and globally, is strengthened	<ul style="list-style-type: none"> - From December 2020 to December 2022, the cumulative potential reach of CEC media coverage is over 850,000,000
By December 2022, a greater number of stakeholders are reading our newsletter.	<ul style="list-style-type: none"> - The average newsletter click-thru rate is over 20% for four consecutive quarters

The North American PRTR Initiative

1. Budget: C\$165,000

Year 1 (1 Jan.–31 Dec. 2019): C\$ 65,000

Year 2 (1 Jan.–31 Dec. 2020): C\$100,000

2. Short statement of the rationale for this work, its objective(s) and activities; and expected outcomes and benefits/beneficiaries (by 31 Dec. 2020):

The North American Pollutant Release and Transfer Register (NA PRTR) Initiative provides enhanced access to comparable data and information on the sources, amounts and management of industrial pollutants across the region. This initiative is the result of ongoing collaboration with national PRTR Programs and stakeholders from industry, NGOs, academia and civil society to improve the completeness, comparability and quality of (PRTR) data in order to effectively track releases of industrial pollutants across North America, and promote the use of this information to develop sound pollution prevention and reduction initiatives. To this end, North American PRTR data are integrated, analyzed and disseminated via the *Taking Stock* report series, Taking Stock Online website and searchable database, and stakeholder engagement activities. These activities add value to national PRTR data through analyses and added context that enhance stakeholder understanding of the data. Additionally, integration and analyses of data on cross- border pollutant transfers assist the national PRTR programs in improving reporting compliance and environmental management relative to North American shared watersheds and ecosystems.

3. Explain how the work can achieve more impact through trilateral cooperation, and why the CEC is the most effective vehicle to undertake this work (if applicable):

This work adds value and relevance to the goals of the national PRTR efforts, and provides information and analysis beyond that available through individual PRTR programs. The analysis of pollutant releases and transfers over time at the North American level, through the *Taking Stock* report series, is a unique contribution to public understanding of pollution sources, and supports the community's right to know. Through published analyses and online mapping of reporting facilities across the region, the NA PRTR Initiative offers enhanced access to important information to industry, governments, and other stakeholders, for use in addressing environmental issues of concern at local, regional, national, and trilateral levels.

4. Describe how this work may capitalize on, or advance, the relationship between ecosystems, job creation, gender impacts, and income generation (if applicable):

By promoting and enhancing access to trilateral PRTR data, this initiative supports pollution mitigation efforts by governments, industry and NGOs in all three countries, thus supporting ecosystems management, public health protection, and industrial sustainability. The *Taking Stock Online* dataset can be combined with other community-specific demographic, socio-economic, public health, and environmental data to assist regional efforts to support environmental health improvements in communities that may be disproportionately impacted by environmental degradation or exposure to pollution. Through data analyses and trilateral exchanges of information relative to sector-specific pollutant releases, the NA PRTR Initiative supports industry sustainability and job creation efforts.

5. Describe how the work complements, or avoids duplication with, other national or international work:

The NA PRTR Initiative compiles, integrates, analyzes and publicly disseminates PRTR data at the regional scale, thereby making it possible to understand and compare releases and transfers at that level—something that no national program does. This work adds value and relevance to the goals of the national PRTR efforts, and provides information and analysis beyond that available through individual PRTR programs. The NA PRTR Initiative’s cooperative work on enhancing data comparability is considered a model by international organizations such as the OECD, UNITAR and UNECC.

6. Describe how the work engages traditional ecological knowledge (TEK) experts or Tribal/First Nations/Indigenous communities, if applicable. If not applicable, explain why:

Representatives from Indigenous communities and organizations are actively engaged in the NA PRTR Initiative. In addition to regular participation in the Initiative’s public meetings and consultative process, Indigenous communities participated in the development of two CEC case studies exploring how PRTR data can better serve their communities.

7. Describe how the work engages youth, if applicable. If not applicable, explain why:

University students participate in the public meetings of the NA PRTR Initiative (especially students in the fields of environmental engineering and sustainability). The integrated North American PRTR database and tools available through the Taking Stock Online website are accessible to students engaged in the University Challenge efforts undertaken by the US TRI and Canadian NPRI.

8. Identify the designated representatives of agencies committed to this work ; as well as other organizations that could potentially be involved, or benefit from it (e.g., federal agencies, other levels of government, academia, the private sector, civil society):

Names of designated representatives	Affiliation (Country)
Pascal Roberge	Environment and Climate Change Canada
Jody Rosenberger	Environment and Climate Change Canada
Joliane Lavigne	Environment and Climate Change Canada
Derick Poirier	Environment and Climate Change Canada
Ramiro Barrios Castrejón	Semarnat
José Ernesto Navarro	Semarnat
Stephen DeVito	US EPA
Sandra Gaona	US EPA

Other organizations/individuals (if applicable)	Country
The NA PRTR Initiative involves the active participation of hundreds of stakeholders, including national and subnational governments, NGOs, industry, academia and civil society.	Canada, Mexico and United States

9. In the following table, describe: the objective(s) and the activities and subtasks planned to achieve the objective(s); the corresponding outputs, expected results and how they will be measured (performance measures); baselines (if known) and targets, as well as the timeline and budget (to 31 December 2020):

OBJECTIVE 1	Enhance the quality, completeness, and comparability North American PRTR data, and access to the data, through ongoing collaboration with national PRTR programs and stakeholders, to improve reporting and promote the use of this information to develop sound pollution prevention and reduction initiatives.	
Activity 1, budget year 1 and year 2	Coordinate and communicate with the National PRTR Programs and other stakeholders relative to enhancing North American PRTR data reporting, quality and comparability. Budget Year 1: C\$12,000; Year 2: C\$15,000	
Output(s)	<ul style="list-style-type: none"> - Enhanced collaboration and information exchanges among North American PRTR programs - An agreed-upon strategy to incorporate additional information collected by the Parties to supplement NA PRTR data - Improved accounting of facilities receiving cross-border pollutant transfers 	
Expected results, performance measures	Increased quality, completeness and comparability of North American PRTR data and information.	
Baseline (current status), if known	Current status as documented in the <i>Action Plan to Enhance the Comparability of Pollutant Release and Transfer Registers (PRTRs) in North America</i> .	
Target (by Dec. 2020)	Additional recommendations/specific actions from the <i>Action Plan</i> have been addressed.	
Subtask 1.1	Collaborate with national PRTR officials and other stakeholders, including industry, to identify data outliers, gaps in program coverage, and accessibility issues.	When: (Ongoing) 2019–2020
Subtask 1.2	Exchange information about national efforts involving the use of PRTR data to promote pollution prevention and reductions, improved chemicals management, and environmental sustainability.	When: (Ongoing) 2019–2020
Subtask 1.3	Ensure specific engagement of industry sectors relative to assessing PRTR reporting levels and gaps, and promoting environmental sustainability efforts within industry.	When: (Ongoing) 2019–2020
Activity 2, budget year 1 and year 2	Promote increased access to, and use and understanding of, North American PRTR data via the <i>Taking Stock</i> report and Taking Stock Online searchable database. Budget Year 1: C\$50,000; Year 2: C\$65,000	

Output(s)	<ul style="list-style-type: none"> - Updated Taking Stock Online integrated database with 2016 through 2019 data - Updated Taking Stock Online data visualization tools - Next edition of the <i>Taking Stock</i> report (Vol. 16), addressing stakeholder interests - Development of plan to incorporate additional information and data into Taking Stock. 	
Expected results, performance measures	Increased use of North American PRTR data, tools and information (Taking Stock Online and <i>Taking Stock</i> report) by stakeholders.	
Baseline (current status), if known	Taking Stock Online database (2005–2015); <i>Taking Stock</i> report series	
Target (by Dec. 2020)	5% increase in the access and use of the online integrated dataset and the <i>Taking Stock</i> report (web statistics, downloads, citations)	
Subtask 2.1	Integrate and harmonize data and related information for Taking Stock Online in a format suitable for web and mapping applications; develop the data management infrastructure to improve the compilation and accessing of PRTR data to increase their usefulness in various applications (e.g., Atlas mapping) and to accommodate changes in national PRTR database structures.	When: January–June 2019 (Updates for data years 2016–2017); January–June 2020 (updates for 2018–2019 data years)
Subtask 2.2	Collaborate with national PRTR and other emissions reporting programs, in the integration of complementary information to enhance stakeholder understanding of industrial pollution.	When: (Ongoing) 2019–2020
Subtask 2.3	Develop new Taking Stock Online landing page with information to help guide users; integrate data for the 2016–2017 and 2018–2019 reporting years; and add new features to support the visualization and understanding of PRTR data.	When: June 2019 (2016–2017 data); December 2020 (2018–2019 data)
Subtask 2.4	Compile and analyze North American PRTR data in preparation for the publication of the <i>Taking Stock</i> report.	When: March–July 2020
Subtask 2.5	Web publication of <i>Taking Stock</i> report.	When: December 2020
Activity 3. Budget year 1 and year 2	Stakeholder Engagement and Outreach. Budget Year 1: C\$3,000; Year 2: C\$20,000	

Output(s)	Selection of topic for the <i>Taking Stock</i> report	
Expected results, performance measures	Enhanced understanding of pollution data and related industrial activities, including pollution prevention and sustainability efforts.	
Baseline (current status), if known	Public meeting to discuss PRTR data from the mining sector held in October 2016; meeting with mining industry representatives.	
Target (by Dec. 2020)	Increase in stakeholders involved in the public meeting and other outreach activities (such as an industry sustainability challenge).	
Subtask 3.1	Conduct consultations of stakeholders (governments, industry, NGOs, academia, media and the public) on project activities, including analyses for the next edition of the <i>Taking Stock</i> report.	When: (Ongoing) 2019–2020
Subtask 3.2	Increase outreach via enhanced access to the <i>Taking Stock Online</i> website and tools, workshops and webinars with stakeholders and potential users of the information (e.g., media, NGOs, industry), and participation in national and international PRTR efforts (e.g., OECD PRTR Task Force; partnership with the US TRI and NPRI University Challenge, to increase awareness and use of PRTR data).	When: (Ongoing) 2019–2020

10. Describe expected impacts post December 2020:

Expected impact	SMART performance measure(s)
<p>By December 2021, governments, industry and all stakeholders have access to a North American PRTR dataset that is more complete, comparable and reliable.</p> <p>All stakeholders have a better understanding of North American industrial pollutant releases and transfers.</p>	<ul style="list-style-type: none"> - More complete data fields (at least 10% decrease in outliers in general, and particularly in relation to cross-border transfer data) - Increased use of the data by the national PRTRs to enforce reporting compliance and inform decisions about reporting requirements, etc. (as per trilateral information exchanges, modified national reporting requirements, and chemicals management decisions) - Increased use of Taking Stock Online website by stakeholders (including enhanced information and context via landing page, the trilateral

	database, and the new mapping interface)—in conjunction with other data and indicators to address environmental issues.
By December 2021, increased engagement of specific stakeholder groups in NA PRTR Initiative and national PRTR activities aimed at promoting sustainability within industry.	- Increased number of participants (in NA PRTR Initiative meetings and other outreach activities) from sectors involved in pollution prevention, green chemistry, and other efforts (e.g., industry/sustainability challenge; and academia/University Challenge student participants).

North American Environmental Atlas and North American Land Change Monitoring System

1. Budget: C\$150,000

Year 1 (1 Jan.–31 Dec. 2019): C\$75,000

Year 2 (1 Jan.–31 Dec. 2020): C\$75,000

2. Short statement of the rationale for this work, its objective(s) and activities; and expected outcomes and benefits/beneficiaries (by 31 Dec. 2020):

The North American Environmental Atlas (the Atlas) is an interactive mapping tool that supports research, analyses and management of environmental information in Canada, Mexico and the United States. It assembles seamless and accurate cartographic data and maps, documentation, and interactive map layers at a scale of 1:10,000,000 or greater. Thematic map layers allow for the visualization of various environmental topics, such as impacts on ecosystems and communities of a variety of economic activities. The 2019–2020 update to the online map viewer will make usability enhancements based on user feedback, and improve in-browser interaction with individual datasets.

The North American Land Change Monitoring System (NALCMS) is an integral part of the Atlas and involves ongoing collaboration among agencies in the three countries to monitor land cover and its change over time. The NALCMS depicts information about land cover and land cover change in a seamless, consistent and automated way across North America. It provides valuable indicators to help the three countries better understand the dynamics of land cover and its change over time, and can be used in analyses for decision making with regard to issues such as ecosystem management and conservation, climate change mitigation and adaptation, and urban sprawl.

3. Explain how the work can achieve more impact through trilateral cooperation, and why the CEC is the most effective vehicle to undertake this work (if applicable):

The NALCMS and Atlas are unique in that these tools, and the entire system, were developed to meet the collective needs of the three countries, including regular users of North American data. This initiative has been recognized for its accuracy and quality, resulting from the use of a common strategy and framework to generate consistent data and results across North America, thereby facilitating continental applications and monitoring.

- 4. Describe how this work may capitalize on, or advance, the relationship between ecosystems, job creation, gender impacts, and income generation (if applicable):**

Not applicable

- 5. Describe how the work complements, or avoids duplication with, other national or international work:**

This project and its main products, the North American Environmental Atlas and NALCMS, support the visualization of the North American environment through maps based on information that is harmonized and seamless across the continent, which distinguishes this effort from national, and even binational, mapping activities. Bringing together information in this manner requires coordination among experts in the three countries to harmonize and reconcile existing data to produce a seamless North American view allowing the Parties to more effectively visualize the shared North American environment and identify opportunities for collective work.

- 6. Describe how the work engages traditional ecological knowledge (TEK) experts or Tribal/First Nations/Indigenous communities, if applicable. If not applicable, explain why:**

The main goal of the Atlas and NALCMS work is to provide continental data to the general public, which includes Indigenous communities.

- 7. Describe how the work engages youth, if applicable. If not applicable, explain why:**

Researchers, academia and university students are among the core user base and audience of the Atlas and NALCMS products. Youth therefore play an important role in this project by being a key beneficiary of its outputs.

- 8. Identify the designated representatives of agencies committed to this work ; as well as other organizations that could potentially be involved, or benefit from it (e.g., federal agencies, other levels of government, academia, the private sector, civil society):**

Names of designated representatives	Affiliation (Country)
Rasim Latifovic	National Resources Canada (NRCan) - Canadian Centre for Mapping and Earth Observation—CCMEO (Canada)
Darren Pouliot	Environment and Climate Change Canada—ECCC (Canada)
Collin Homer	United States Geological Survey—USGS (United States)
Patrick Danielson	United States Geological Survey—USGS (United States)
Rainer Ressler	<i>Comisión Nacional para el Conocimiento y Uso de la Biodiversidad—Conabio (Mexico)</i>
Isabel Cruz	<i>Comisión Nacional para el Conocimiento y Uso de la Biodiversidad—Conabio (Mexico)</i>
Daniela Jurado	<i>Comisión Nacional para el Conocimiento y Uso de la Biodiversidad—Conabio (Mexico)</i>
Carmen Lourdes Meneses Tovar	<i>Comisión Nacional Forestal—Conafor (Mexico)</i>
Johny Romero Correa	<i>Comisión Nacional Forestal—Conafor (Mexico)</i>
Jorge Gibran Velasco Olvera	<i>Instituto Nacional de Estadística y Geografía—INEGI (Mexico)</i>
Arturo Victoria Hernández	<i>Instituto Nacional de Estadística y Geografía—INEGI (Mexico)</i>
Jesús Abad Argumedo Espinoza	<i>Instituto Nacional de Estadística y Geografía—INEGI (Mexico)</i>
Jose Ornelas	<i>Instituto Nacional de Estadística y Geografía—INEGI (Mexico)</i>

Other organizations/individuals (if applicable)	Country
Canadian Council on Ecological Areas	Canada
<i>Ministère du développement durable et de la lutte contre le changement climatique</i>	<i>Canada (Province du Québec)</i>

<i>Comisión Nacional de Áreas Naturales Protegidas—Conanp</i>	Mexico
United States Forest Service—USFS	United States
Environmental Protection Agency—EPA	United States
The Nature Conservancy—TNC	International
North American Forest Commission—NAFC	International

9. In the following table, describe: the objective(s) and the activities and subtasks planned to achieve the objective(s); the corresponding outputs, expected results and how they will be measured (performance measures); baselines (if known) and targets, as well as the timeline and budget (to 31 December 2020).

OBJECTIVE 1	Produce improved and updated land cover and land cover change maps and data sets.
Activity 1, budget year 1 and year 2	Produce continental 2015 land cover and 2010–2015 land cover change maps at 30 m resolution Budget Year 1: \$15,000, Budget Year 2: \$15,000
Output(s)	<ul style="list-style-type: none"> - Land cover map of North America using Landsat 2015 data at 30 m resolution, with 19 land cover classes - Land Cover change map (2010–2015) using Landsat data at 30 m resolution
Expected results, performance measures	The 30 m 2015 land cover and 2010–2015 land cover change maps are published and easily accessible online
Baseline (current status), if known	A Land Cover 2010 product at 30 m resolution was previously published by the NALCMS group in 2017
Target (by Dec. 2020)	The 30 m 2015 land cover and 2010–2015 land cover change maps are accessed by the NALCMS audience and are referenced in scientific publications.
Activity 2, budget year 1 and year 2	Strengthen and facilitate collaboration among partner agencies on an ongoing basis, to produce harmonized North American data for decision-makers and researchers. Budget Year 1: C\$20,000, Budget Year 2: C\$10,000

Output(s)	<ul style="list-style-type: none"> - Presentations at relevant events to promote NALCMS products - Face-to-face meeting of the project Steering Committee
Expected results, performance measures	<ul style="list-style-type: none"> - Expanded user base and knowledge of the NALCMS group and its products, measured by number of events at which the NALCMS products are promoted - All partner agencies participate in conference calls and face-to-face meetings.
Baseline (current status), if known	<ul style="list-style-type: none"> - One event per year - Conference calls as needed and one face-to-face meeting with trilateral participation every two years (at least one agency per country)
Target (by Dec. 2020)	<ul style="list-style-type: none"> - One event per year - Conference calls as needed and one face-to-face meeting with trilateral participation every two years (at least one agency per country)
OBJECTIVE 2	Produce and update thematic map layers to show environmental information at the continental scale, including information stemming from CEC projects.
Activity 3, budget year 1 and year 2	Update or complete map layers and geospatial datasets and integrate them into the Atlas. Budget Year 1: C\$15,000, Budget Year 2: C\$25,000
Output(s)	<ul style="list-style-type: none"> - New/updated thematic maps, datasets and interactive mapping tools to support CEC projects and activities and stakeholder feedback - Updates of existing datasets, such as protected areas in North America - Ensured maintenance of geospatial data, map layers and metadata on the CEC website
Expected results, performance measures	Map products are completed and made available online
Baseline (current status), if known	To date, 56 map layers have been made available on the CEC Atlas webpage
Target (by Dec. 2020)	All map products are up-to-date, available and easily accessible online
Activity 4, budget year 1 and year 2	Update the Atlas viewer tool to enhance user interaction with Atlas datasets directly within the online platform. Budget: Year 1: C\$25,000, Year 2: C\$25,000
Output(s)	A new interactive Atlas viewer with enhanced features is available on the CEC website

Expected results, performance measures	<ul style="list-style-type: none"> - The new interactive viewer, published and available online, allow enhanced user interaction with datasets - An increase in user traffic on the Atlas interactive viewer
Baseline (current status), if known	<ul style="list-style-type: none"> - The Atlas viewer currently on the webpage was published in 2010 - 2,160 users accessed the tool in 2018
Target (by Dec. 2020)	<ul style="list-style-type: none"> - A new interactive Atlas viewer with enhanced features is available on the CEC website - 5% increase in traffic on the viewer

10. Describe expected impacts post December 2020:

Expected impact	SMART performance measure(s)
By July 2021, the Atlas and NALCMS suite of products continue to be a go-to resource for their audience (ongoing)	<ul style="list-style-type: none"> - Increase in the number of Atlas viewer visits - Increase in the number of unique downloads (per updated dataset) - Increase in the number of known citations in published documents - Increase in the number of known references of Atlas/NALCMS products in other online materials

Joint Public Advisory Committee (JPAC)

1. Budget: C\$540,000

Year 1 (1 Jan.–31 Dec. 2019): C\$270,000

Year 2 (1 Jan.–31 Dec. 2020): C\$270,000

2. Short statement of the rationale for this work, its objective(s) and activities; and expected outcomes and benefits/beneficiaries (by 31 Dec. 2020)

The Joint Public Advisory Committee (JPAC) is one of the three constituent bodies of the Commission for Environmental Cooperation (CEC). It is composed of fifteen volunteer citizens (five from each country) whose mandate is to provide advice to the Council on any matter within the scope of the North American Agreement on Environmental Cooperation (NAAEC), and to serve as a source of information for the CEC Secretariat. Composed of representatives of civil society (including academia, the private sector, nongovernmental organizations, etc.), JPAC provides a forum for North American stakeholders to engage with the CEC through its public sessions and JPAC-led consultations. For 2019–2020, JPAC members will continue to provide meaningful recommendations to the Council through their Advices/official letters, increase the participation of JPAC members in CEC projects and initiatives, enhance dissemination of CEC work throughout their networks, and increase the number of stakeholders engaged in JPAC and CEC activities.

3. Explain how the work can achieve more impact through trilateral cooperation, and why the CEC is the most effective vehicle to undertake this work (if applicable):

The members are fully committed to the CEC's mission, and their related efforts center entirely on enhancing trilateral cooperation for the organization.

4. Describe how this work may capitalize on, or advance, the relationship between ecosystems, job creation, gender impacts, and income generation (if applicable):

Members of the Joint Public Advisory Committee represent different sectors of society and therefore have a keen interest in capitalizing on and/or advancing the relationship between ecosystems, job creation, gender impacts and income generation.

5. Describe how the work complements, or avoids duplication with, other national or international work:

JPAC is a unique, trilateral environmental advisory body in North America composed of representatives of civil society. The committee has been successful at providing a substantive open forum for public engagement and information sharing among citizens in North America. Their letters of Advice to the Council are based on feedback from participants and invited experts,

which in many instances have enhanced CEC initiatives and forecast emerging issues facing our region. Their extensive knowledge and networks have proven to be an asset for the organization.

6. Describe how the work engages traditional ecological knowledge (TEK) experts or Tribal/First Nations/Indigenous communities, if applicable. If not applicable, explain why:

JPAC has consistently been at the forefront of highlighting the importance of increased engagement of Indigenous peoples in CEC activities. As part of their outreach strategy for every meeting JPAC members, through the Secretariat, invite representatives of Indigenous communities in the three countries to attend their meetings as invited experts and/or participants. Additionally, the three countries regularly endeavour to appoint Indigenous representatives to the committee, and JPAC members collaborate closely with representatives of the TEK Expert Group.

7. Describe how the work engages youth, if applicable. If not applicable, explain why:

JPAC public forums are open to the public and efforts are made to ensure that youth representatives participate either in-person or online. Moreover, certain JPAC members represent academia and promote the CEC's work through their institutions, encouraging close collaboration, including partnerships for specific events. As is the case with Indigenous representatives, the Parties have in recent years made an effort to appoint a youth representative to JPAC.

8. Identify the designated representatives of agencies committed to this work ; as well as other organizations that could potentially be involved, or benefit from it (e.g., federal agencies, other levels of government, academia, the private sector, civil society):

Names of designated representatives	Affiliation (Country)
Sabaa Khan (JPAC Chair)	Canada
Dean Jacobs	Canada
<i>Vacant</i>	Canada
<i>Vacant</i>	Canada
<i>Vacant</i>	Canada

Gustavo Alanís-Ortega	México
Adriana Nelly Correa Sandoval	México
Bárbara Hernández Ramírez	México
Paola Hernández Villalvazo	México
Adrián Lozano Garza	México
Jerilyn López Mendoza	United States
Felicia Marcus	United States
Octaviana V. Trujillo	United States
Robert W. Varney	United States
<i>Vacant</i>	United States

Other organizations/individuals (if applicable)	Country
N/A	

9. In the following table, describe: the objective(s) and the activities and subtasks planned to achieve the objective(s); the corresponding outputs, expected results and how they will be measured (performance measures); baselines (if known) and targets, as well as the timeline and budget (to 31 December 2020).

OBJECTIVE 1	Increase: the number of meaningful recommendations to the Council; provision of information to the Secretariat; participation of JPAC in CEC projects and initiatives; and dissemination/awareness of CEC work.	
Activity 1, budget year 1 and year 2	Organize 2-3 JPAC meetings per year to discuss emerging environmental issues and gather public comments. Budget year 1: C\$250,000, Budget year 2: C\$250,000	
Output(s)	Formal Advice and official letters to the Council	
Expected results, performance measures	Increased number of meaningful recommendations to the Council and information to the Secretariat; and increased number of relevant stakeholders participating in meetings	
Baseline (current status), if known	3 letters of Advice and 2 official letters per year	
Target (by Dec. 2020)	At least 5 letters of Advice and 3 official letters	
Subtask 1.1	Not applicable	When: Not applicable
Activity 2, budget year 1 and year 2	Facilitate the participation of the JPAC members in CEC initiatives. Budget year 1: C\$5,000, Budget year 2: C\$5,000	
Output(s)	Participation of JPAC members in CEC initiatives and greater dissemination of CEC work	
Expected results, performance measures	Increased number of JPAC member participation in CEC initiatives and promotion/dissemination of CEC work	
Baseline (current status), if known	Participation of JPAC members in 2 CEC projects or initiatives (level of dissemination throughout their networks is unknown)	
Target (by Dec. 2020)	Participation, at minimum, of JPAC members in 5 projects or initiatives per year (JPAC members double their current dissemination efforts)	
Subtask 2.1	Not applicable	When: Not applicable

Activity 3. Budget year 1 and year 2	Communicate JPAC activities to the Council and other constituents. Budget year 1: C\$15,000, Budget year 2: C\$15,000	
Output(s)	Communication of JPAC activities outside of JPAC meetings	
Expected results, performance measures	Increased number of times the JPAC Chair presents the activities of JPAC	
Baseline (current status), if known	3 times per year	
Target (by Dec. 2020)	Increased participation/outreach of JPAC Chair (or designee) (increase of 33%)	
Subtask 3.1	Not applicable	When: Not applicable

10. Describe expected impacts post December 2020:

Expected impact	SMART performance measure(s)
By December 2021, JPAC's 2019-2020 advices and recommendations have proven meaningful to the Council and to CEC's initiatives.	<ul style="list-style-type: none"> - All letters of Advice, letters and reports sent to Council continue to incorporate information on relevant and emerging issues/state of knowledge - Number of JPAC members participating in CEC projects and initiatives under the 2019–2020 Operational Plan to support project work and gather insights - Number of emerging issues included in CEC work, following JPAC recommendations
By December 2021, public participation in CEC activities has increased overall and JPAC has contributed to a greater dissemination of North American environmental information and CEC work through direct outreach efforts	<ul style="list-style-type: none"> - Increased numbers of participants attending JPAC public sessions and other public meetings/activities (in-person or online) - Increased numbers of questions from the public sent via social media during meetings - Increased instances of tracking/reporting of CEC-related outreach activities by JPAC members, outside of JPAC meetings
By December 2021, JPAC's contribution to the implementation of the CEC's 2019–	<ul style="list-style-type: none"> - Overall reach of distinct JPAC press releases and social media announcements - Increased dissemination of CEC work by JPAC members through their networks

<p>2020 Communications Plan through the direct communications efforts of JPAC has been effective in increasing CEC visibility</p>	<ul style="list-style-type: none"> - Increased social media posts related to CEC activities by JPAC members
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