

Final Project Reporting Template

EC Finance ID #: 1108383

Recipient Name: Bay of Fundy Ecosystem Partnership

Project Title: Utilizing a Comprehensive Approach for Addressing Toxic Chemical Concerns Affecting Sustainable Use of the Bay of Fundy

Effective Date: Sept 2011

End Date: March 31st, 2012

1. Project Activities and Accomplishments

Please provide a description of the final results of the activities listed in the Contribution Agreement.

Activity (per Contribution Agreement)	Activity Status	Description of Final Results
ERA of selected sewage constituents (P1)	Completed as Planned	please see Project Report, Section 5, Part 1.
Two talking circles on conservation (P2)	Partially Completed	Please see Project Report, Section 5, Part 2.
Two forums, public information sessions, high school session, youth forum focussed on municipal effluents (P2)	Partially Completed	Please see Project Report, Section 5, Part 3
Examination of how to control pharmaceuticals in municipal effluents, and discussion with municipal planners (P3)	Completed as Planned	Please see Project Report, Section 5, Parts 1 and 3.

2. Changes / Challenges / Results

If there were significant changes to the work plan in your contribution agreement, please describe those changes and indicate why they were required. If any expected results of your project were not achieved, please indicate why they were not achieved.

There were no changes in the proposed work plan. The content of the proposal was as planned with the exception of the schedule. The contribution agreement was signed in late summer (Sept. 8th 2011) and it



took several more months both to receive the funds and to put the sub-contracts into place. Therefore, most of the work was conducted in the last quarter of the fiscal year, and some of it is continuing into the new FY e.g. Sub-Project 2, the Talking Circles are behind schedule due to other commitments by the people working on organizing them. Also, lining up a filmmaker appropriate for the project took more time than anticipated. The first Talking Circle was on March 15th 2012 (see report, Section 5) and the second event will be on May 19th, 2012.

The ERA sub-project was completed as planned.

Two forums with municipal planners were held; there was insufficient time to organize the other planned meetings but these are under discussion, for fall 2012.

What challenges did your group face, what options were considered, and what solutions were implemented during the life of the project? Consider obstacles, delays, impacts on work plan, timeline, budget, and resources levered. Describe how your organization adjusted accordingly.

The primary challenge was for the sub-contractors to conduct the work in a much shorter time than was required or planned. The entire project with its three sub-projects was therefore conducted under a huge time crunch. BoFEP adjusted by having key individuals within the organization dedicating a significant amount of time within a short time frame in preparing RFPs, selecting appropriate contractors to do the work, preparing contracts, participating in teleconference meetings to provide advice/assistance to contractors as needed, and attending Municipal Planners workshops.

Provide any other information in regards to results obtained from this project, positive or negative, expected or otherwise.

For sub-project One, a very good working relationship has been established with the Rivers Institute at UNBSJ and the research team in ecotoxicology interested in the fate and effects of persistent toxic substances in the watersheds and coastal waters of the Bay of Fundy. The second phase of the ERA study has been successfully completed.

The Municipal Planners sub-project Three as planned is also complete. The final report will be posted on the BoFEP website and the article on pharmaceuticals in the marine environment will be published in the Fundy Tidings online newsletter. The high number of workshop participants was a clear indication that the topics covered in the workshops are of great interest to municipalities, businesses, community, and NGOs around the Bay of Fundy. Positive feedback was received by workshop presenters and participants on workshop organization, content, scenario exercises, and usefulness/relevancy of information provided.

Benefits of this continuing sub-project Three are fourfold:

- 1) The Ecology Action Centre (EAC) partnered with Bay of Fundy Ecosystem Partnership (BoFEP) and the Climate Change Adaptation Fund to combine the topics of pharmaceuticals as an emerging wastewater management issue, with storm water management. As such, the BoFEP workshops originally intended to focus on pharmaceuticals reached a broader audience than was potentially possible in addressing pharmaceuticals alone;
- 2) Networking and interaction with municipal planners, government agencies, NGOs and interested stakeholders on chemical issues in the Bay of Fundy. The workshops continue to build on previous BoFEP Municipal Planners workshops held in 2010 and 2011 and support the broader BoFEP ERA project entitled 'Utilizing a Comprehensive Approach for Addressing Toxic Chemical Concerns Affecting Sustainable Use of the Bay of Fundy' (see last year's report to EC, posted on the BoFEP website);

- 3) The two Municipal Planners Workshops provided an updated listing of municipal planners interested in land-based activities and their impact on the coastal/marine environment (again following from the work of the past FY, see BoFEP FY 10-11 report on the website); and
- 4) Overall, the project enabled BoFEP to continue to establish good working relationships with coastal communities, the Ecology Action Centre, provincial and federal government agencies, and businesses and to engage a range of stakeholders and partners in discussions to improve the health and the sustainability of Bay of Fundy.

Elaborate on whether or not the activities launched through this project will be continued in the future; will the project or part of the project's activities be sustained after Environment Canada's funding ends? If yes, describe how the project or its activities will continue.

Without adequate continued funding, the sub-projects with the Rivers Institute (ERAs on priority toxic substances, especially pharmaceuticals) and with First Nations (talking circles on conservation) will likely cease.

BoFEP plans to continue its work with municipal planners as indicated in its submission to EC for the 2012-13 fiscal year. The EC funding is crucial to the continuation of this project. If EC funding stops, considerable effort will have to be spent finding replacement funding, without guarantee of success. Replacement funding is being sought.

There has been much interest among the municipal planners community in continuing their participation in workshops on topics/issues of common/mutual interest and benefit. The ERA component of the FY 2012-13 proposal will develop an ecosystem health index building on existing data bases on chemical contaminants for the Bay of Fundy region. This project facilitates communication and cooperation among individuals and organizations interested in understanding the Bay of Fundy by creating a mechanism that allows residents to track its health. The municipal planners component of the proposal focusses on climate change adaptation in coastal areas. Its objective is to provide information to coastal municipalities on climate change impacts, approaches to assess risk and vulnerability, and potential adaptation options for consideration when preparing a climate change action plan specific to their own area/circumstance, whether it be to protect a natural or built system in a coastal area. Consideration of climate change impacts and appropriate adaptation options will ultimately help managers make informed decisions to reduce risk, improve resiliency, and mitigate vulnerability of coastal ecosystems. Thus, both of these projects continue to build municipal awareness, to create opportunities to share information/exchange ideas, build partnerships, and to provide current information and tools/solutions to address common issues/problems. Information generated through these projects will also continue to provide BOFEP resource material for future fact sheets, newsletters (e.g. Fundy Tidings), and the State of the Gulf theme papers (for DFO and the GOMC).

3. Final Report on Project Budgeting and Financing

Total Project Funding		Expected		Actual		Variance	
Contributor	Contributor Type	Cash	In-Kind	Cash	In-Kind	Cash	In-Kind
P1	Environment Canada	30808	5000	27219	5000	-3589	0
P1 - BoFEP	Other	0	3000	0	3313	0	313
P2	Environment Canada	7140	0	6529	0	-611	0
P2 -BoFEP	Other	0	1450	0	1050	0	-400
P2 - Passamaquody	Other	0	2000	0	1875	0	-125
P2 - Coastal Trust	Other	0	200	0	1125	0	925
P3	Environment Canada	12052	5000	11252	5000	-800	0
P3 - BoFEP	Other	0	1730	0	7850	0	6120
P3 - Municipalities	Other	60	120	60	120	0	0
		0	0	0	0	0	0
		0	0	0	0	0	0
		0	0	0	0	0	0
		0	0	0	0	0	0
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TOTAL		50,060	18,500	45,060	25,333	-5,000	6,833

NOTE: Do not leave any dollar fields blank. Ensure that each field shows a dollar figure or \$0

Total Project Expenditures		Expected		Actual		Variance	
Cost Detail	Cost Category	Cash	In-Kind	Cash	In-Kind	Cash	In-Kind
P1 Researcher	Management and professional services	12000	0	10417	0	-1583	0
P1 Travel	Travel	500	0	0	0	-500	0
P1 Admin & Research	Material and supplies expenses	3743	0	3614	0	-129	0
P1 Advisory Cmte	Material and supplies expenses	800	0	0	0	-800	0
P1 Report & Communications	Communication and printing	5265	0	3046	0	-2219	0
P1 Coordination	Management and professional services	8500	0	5727	0	-2773	0
P1 Advisory Cmte	Other expenditures	0	5000	0	5000	0	0
P1 BoFEP	Other expenditures	0	3000	0	3313	0	313
P2 Venue	Material and supplies expenses	560	0	150	0	-410	0
P2 Coordination	Management and professional services	4000	0	3389	0	-611	0
P2 Admin	Management and professional services	930	0	930	0	0	0
P2 Video	Communication and printing	1650	0	1200	0	-450	0
P2 BoFEP	Other expenditures	0	1450	0	1050	0	-400
P2 Passamaquoddy	Other expenditures	0	2000	0	2000	0	0
P2 Coastal Livelihood Trust	Other expenditures	0	200	0	1000	0	800
P3 Researcher	Management and professional services	3000	0	3000	0	0	0
P3 Venue	Material and supplies expenses	120	0	800	0	680	0
P3 Materials	Communication and printing	60	0	60	0	0	0
P3 Final Report	Communication and printing	4000	0	4000	0	0	0
P3 Coordinator	Management and professional services	3000	0	1530	0	-1470	0
P3 Research costs	Communication and printing	300	0	300	0	0	0
P3 Admin	Material and supplies expenses	1572	0	1540	0	-32	0
P3 Advisory Cmte	Other expenditures	0	5000	0	5000	0	0
P3 Municipalities	Other expenditures	60	120	60	120	0	0
P3 BoFEP	Other expenditures	0	1730	0	7850	0	6120
TOTAL		50,060	10,500	39,763	25,333	-10,297	6,833

NOTE: Do not leave any dollar fields blank. Ensure that each field shows a dollar figure or \$0

Environment Canada Funding		Expected		Actual		Variance	
Expenditure Detail	Expenditure Type	Cash	In-Kind	Cash	In-Kind	Cash	In-Kind
P1 Researcher	Management and professional services	12000	0	10417	0	-1583	0
P1 Travel	Travel	500	0	0	0	-500	0
P1 Admin & Research Costs	Material and supplies expenses	3743	0	3614	0	-129	0
P1 Advisory Cmte	Material and supplies expenses	800	0	0	0	-800	0
P1 Report & Communications	Communication and printing	5265	0	3046	0	-2219	0
P1 Coordination	Management and professional services	8500	0	5727	0	-2773	0
P2 Venue	Material and supplies expenses	560	0	150	0	-410	0
P2 Coordination	Management and professional services	4000	0	3389	0	-611	0
P2 Admin	Management and professional services	930	0	930	0	0	0
P2 Video	Communication and printing	1650	0	1200	0	-450	0
P3 Researcher	Management and professional services	3000	0	3000	0	0	0
P3 Venue	Material and supplies expenses	120	0	800	0	680	0
P3 Materials	Communication and printing	60	0	60	0	0	0
P3 Final Report	Communication and printing	4000	0	4000	0	0	0
P3 Coordinator	Management and professional services	3000	0	1530	0	-1470	0
P3 Research Costs	Communication and printing	300	0	300	0	0	0
P3 Admin	Material and supplies expenses	1572	0	1540	0	-32	0
		0	0	0	0	0	0
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		0	0	0	0	0	0
		0	0	0	0	0	0

Environment Canada Funding		Expected		Actual		Variance	
Expenditure Detail	Expenditure Type	Cash	In-Kind	Cash	In-Kind	Cash	In-Kind
		0	0	0	0	0	0
		0	0	0	0	0	0
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		0	0	0	0	0	0
TOTAL		50,000	0	39,703	0	-10,297	0

NOTE: Do not leave any dollar fields blank. Ensure that each field shows a dollar figure or \$0

NOTE: All "Expected" amounts shown in the tables above are based on the amounts shown in the Agreement, and any related appendices or attachments, and adjusted to reflect any amendments to the agreement agreed upon by both Environment Canada and the Recipient.

Please explain any significant discrepancies between the expected and actual amounts in your cash flow statement.

P1 unspent monies are committed for completion of Final Project Report and communications during May 2012.

P2 unspent monies are committed for Talking Circle on 19 May 2012 and completion of video.

P3 unspent monies are committed for communication of project results through BoFEP Web site; work is underway.

4. Project Summary

Environment Canada would like to share your project experiences and successes as inspiration for other groups and Canadians across the country. Please provide a summary outlining the importance, the objectives and major results for this project. (This summary will/could be used in EC's communications plan)

Subproject One - Ecology and Environment - ERAs of Chemicals of Emerging Concern (summarized by PGW)

Importance It is critically important for maintaining aquatic ecosystem health to know the levels and risks associated with trace toxic chemicals entering water bodies. In this project, attention was paid to the levels and risks associated with a range of pharmaceuticals known to pass into and through wastewater plants and enter the Bay of Fundy.

Objectives. The objectives were to survey the range of pharmaceuticals known to enter wastewater plants, find data on the exposure concentrations, find data on toxicity levels, especially sublethal, and calculate risks for the individual chemicals where data permit.

Major results. The primary result was a preliminary description of the pharmaceuticals entering the Bay, the levels that occur, the toxicities they exhibit (where studied, as data are very sparse), and the risks imposed on the Bay of Fundy ecosystem and its various species. The primary conclusion is that, considered individually, the risks of pharmaceuticals to marine organisms appears to be very low. However, data are sparse, and cumulative toxic effects are not accounted for (even if they are only additive), so this conclusion should be considered tentative until examined further. This study is a first of its kind for the Bay of Fundy, and points to the need for more intensive, low-level chemical monitoring, combined with sensitive toxicity testing, with a range of pharmaceuticals and their breakdown products, to facilitate definitive ecological risk assessments.

Sub-Project 2 - Society and Communities - Talking Circles on Conservation (Summarized by MAJ): Those involved in the talking circles are starting to understand the value of story telling to the Native culture-- that stories are the way to express and share ideas and culture. Since this is our fourth BoFEP sponsored talking circle and the message is slowly being understood, we realize this is an experience and a way of communicating that needs a lot of time and understanding, practice and patience on the part of non-Natives to understand. Only when this is more universally understood will there be the opportunities for the two cultures to work together on the challenges of conservation of habitats and species and living resources, in Canada and globally. We look forward to submitting the video of the March 2012 talking circle to EC when it is completed. The video can be used as a record of the project experiences and inspiration, at future talking circles and other conservation-oriented events.

Sub-Project 3 - Coastal Economy, Planning and Management - Municipal Planners and Wastewater Management (summarized by PH)

The goal of the Municipal Planners project was to assist planners, municipal officials and other interested stakeholders to better manage stormwater and pharmaceuticals in sewage effluent (as an emerging wastewater contaminant issue). The purpose was to increase the capacity of municipalities to: a) select and implement appropriate tools from a range of innovative, cost effective best management practices to mitigate the impacts of stormwater runoff, improve water quality in the Bay of Fundy and reduce infrastructure and property damage caused by heavy rainfall events; b) raise awareness of the potential impacts of selected pharmaceuticals in municipal effluent on marine ecosystem health and any known measures or treatment options to remove these substances from the effluent stream and/or to reduce/control their effects on the receiving environment and biota. This sub-project is very important because it enabled municipal planners to meet, discuss, and exchange information on current research and available tools/approaches for the treatment/control of land-based sources of pollution (Canada is committed to reducing land based pollution through UN agreements since the 1980s). The sub-project also provided opportunity for participants to obtain expert advice on issues that relate specifically to their own situation/location. The overall results are described in the project report (Section 5). In brief, key findings are:



Stormwater management

- 1) Stormwater, which is often untreated, can enter the natural environment directly through storm drains. In areas serviced by combined systems, both stormwater and wastewater are treated in sewage treatment plants before being released into the environment. In times of heavy rain fall events, combined sewage overflows can be overwhelmed resulting in the direct release of untreated stormwater and wastewater into the environment.
- 2) The impacts of stormwater runoff resulting from more severe and more frequent storm events are felt primarily in urban landscapes where the high area of impervious surface cover (roofs, roads, parking lots) prevents precipitation from being retained in the ground.
- 3) Changes in the amounts and intensity of precipitation associated with changing patterns of weather and climate, along with problems associated with aging infrastructure and an ever expanding area of impervious surfaces in most municipalities, make managing stormwater a critical issue.
- 4) Innovative stormwater management approaches aim to look for simple, passive, low energy, natural solutions rather than large costly engineered solutions.
- 5) Reducing runoff volume commonly looks for opportunities to increase infiltration, increase storage and slow peak flows (i.e., slow it, spread it, sink it). Enhancing runoff quality commonly uses settling, filtration, vegetation measures, or a combination of practices where possible.
- 6) There are three tiers of stormwater management -- on-site, neighborhood level, and watershed level:
 - a) On-site measures: aim to reduce directly connected impervious areas, divert runoff from impervious to pervious areas, and increase water storage and reuse.
 - b) Neighbourhood measures: aim to reduce impervious surfaces, avoid curb & gutter street design. Types of neighbourhood measures include: compact stormwater treatment devices, stormwater ponds and wetlands, parking lots with pervious pavement, and source controls (street sweeping, reduce road salting, contaminants retention, restoration of contaminated areas).
 - c) Watershed measures: aim to establish riparian buffer zones and provide passive or active treatment for all stormwater; designate and maintain temporal flood waters storage areas; and maintain natural stream channels.
- 7) Overall, best management practice options include: detention (dry ponds), retention (wet ponds), constructed wetlands, filtration, infiltration (infiltration trenches, basins), swales (bioswales, dry swales, grass swales), rain garden, green roofs, rain barrel, cisterns, stormwater planters, permeable pavers, and French drains (dry wells).

Pharmaceuticals in the marine environment - a summary (also see Sub-Project 1)

- 1) Many pharmaceuticals, along with other personal care products such as shampoos and cosmetics, have been detected in municipal wastewater, and most are only partially removed using current sewage treatment processes, leading to their presence in wastewater effluents entering rivers, lakes and coastal waters.
- 2) The study of the environmental impacts of pharmaceutical and personal care products (PPCPs) found in municipal effluent is a relatively new line of research. Pharmaceuticals, e.g., drugs, are designed to be biologically active; this means that they have the potential to affect aquatic organisms once they are released into the environment, even at very low concentrations, if exposures occur and the compounds are bioaccumulated.
- 3) Studies have linked pharmaceutical exposure to effects on reproduction, stress, bioenergetics and other endocrine system functions in fish, as well as growth of invertebrates and algae. Of particular concern is the synthetic estrogen, ethinylestradiol, used in oral contraceptive medications, which has been found to cause a decrease in egg production and changes in hormone levels in minnows. Anti-depressants and beta-blockers have the potential to reduce fertility or affect spawning in certain aquatic organisms, as well as affect other parameters that may impact long-term health and survival.
- 4) Little research has studied the impacts of these compounds to marine environments, as most research has been conducted on freshwater systems. What is not yet known are the effects of pharmaceuticals on



the ecosystem, the effect of long term exposure under natural conditions, i.e. continual exposure to low concentrations, or the possibility of combined effects of multiple exposures to different compounds.

5) The most important action for municipalities to do to reduce the amount of drugs in the environment is to raise awareness on proper chemical disposal and to discourage people from flushing unused medications down the drain. The best option is to return unused pharmaceuticals to a pharmacy for proper disposal.

6) Although sewage treatment plants (STP) are not designed to remove pharmaceuticals, in general, tertiary treatment will have higher removal efficiencies than secondary or primary treatment.

7) Treatment only works for certain chemicals, ie. Estrogens are broken down 60% by secondary sewer treatments, while other drugs are unchanged or may be converted into something different. Upgrades to STPs, such as incorporating biological or UV treatment, may be required to completely remove active pharmaceutical compounds. However, this is an expensive option for municipalities, and research is still underway to determine the best available treatment techniques.

8) Until more is known about removal of pharmaceuticals from municipal effluents, it is recommended that extensive infrastructure investment not be made on the rationale of removing these compounds. Education, information and more research are key to understanding the risks associated with pharmaceuticals in the environment.

What have you learned from this project experience that could serve as advice to other organizations looking to undertake a similar initiative?

It is vitally important, given the short timeframe of this project contract and the necessary sub-contracts, that there be a careful selection of skilled contractors capable of meeting tight schedules and timelines. It is also important to establish a project advisory committee that is flexible and available to the contractor at all times for assistance/advice.

When planning an AEI project proposal, it may be worthwhile for applicants to consider (as this project did) the practicality of combining two or more projects into one (i.e., AEI projects or one AEI plus another federally funded project) for those that focus on similar topics, are operating within the same schedule/timeframe, and involve the same target group. In this case, the combination of three subprojects, under the theme of sustainable use/development, engaged a wider public audience than would otherwise have been realized and provided the added benefits of extended content, presentations, a wide range of expertise, and excellent networking opportunities for all participants.

5. Supporting Documents

Please list any other information you are including with this report such as news articles, reports, photos etc. (optional)

Please see attached the full BoFEP Project Report "Sustainable Use of the Bay of Fundy" (multiple authors, compiled by PGWells, April 2012).

6. Feedback

Was the information and materials received in regards to EC's projects helpful? Please elaborate.

The staff of Environment Canada were terrific to work with; they provided all the direction required for the project in a timely fashion, and were encouraging at all phases of the study.

One major point - the overall project was significant in that it furthered our efforts to protect the health of the Bay of Fundy. While pharmaceuticals are not high on the agenda of citizens, municipalities, or responsible federal departments, bringing these compounds to the attention of people means that there



is a chance that the impacts from them will be mitigated earlier rather than later in the future of the Bay. As people and municipal authorities become more aware, the demand for technologies and ways to mitigate their impact, e.g., changes in human behaviour and priorities, will be more likely to be a priority for governments and researchers. Shortening the cultural divide between Native and non-Native stakeholders in the Bay of Fundy region can, in the future, be one of the most noteworthy ways to maintain the health of the Bay as we come together to seek a truly sustainable ecosystem, by understanding the damage to Canada and its aquatic ecosystems, and indeed to the globe ("Mother Earth") that some proposed economic/industrial projects can cause.

In addition, guideline materials for project submissions were helpful to BoFEP in preparing RFPs, sub-contracts, and the project budget and in knowing the requirements for final reporting.

Was the service you received during the delivery of this project beneficial to the success of this project? Please elaborate.

EC staff were extremely helpful, highly professional, understanding, and available as needed for assistance.

Are there any further comments you would like to make in regards to EC's program funding that could be used in the future?

BoFEP is very grateful for the support and courtesy provided by EC staff members. Such cooperation and consideration contributes greatly to BoFEP's ability to deliver projects and continue our overall program. We would like to re-emphasize two points expressed in our report in FY 2011-12: Project funding in recent years has tended to arrive late in the fiscal year. It is recommended that later receipt must be considered in the reporting phase to allow for submission of preliminary reports followed by final ones. Also, AEI program participants would benefit from having an opportunity to meet with AEI managers and other program participants during the project proposal stage to discuss EC priorities/focus for the coming year and opportunities for collaboration among projects.

Acknowledgements: BoFEP thanks the project advisory team members from Environment Canada, NB Environment, and the BoFEP Management Committee who assisted in this project and those municipalities, university, business, and NGO representatives who participated in the workshops.

Prepared and Certified Accurate by:

Name: Peter G. Wells, Marianne Janowicz, Patricia Hinch and Susan Rolston.

Organization: BoFEP.

Date: April 30th, 2012.

Reviewed by Environment Canada

Name:

Date:

This report is required per Section 8 of the Agreement between the above-noted Recipient and Environment Canada