

Evaluation of Parks Canada's Through Waterway Management

January 10, 2012

Office of Internal Audit and Evaluation

Report submitted to the Parks Canada Evaluation Committee: February 9, 2012

Approved by the Agency CEO: March 5, 2012

Her Majesty the Queen in Right of Canada, represented by
the Chief Executive Officer of Parks Canada, 2012

Catalogue No.: R62-429/2012E-PDF
ISBN: 978-1-100-20416-1

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EXECUTIVE SUMMARY

The Parks Canada Agency (PCA) manages nine through waterways (historic canals),¹ which collectively account for about 6% of the Agency's annual spending and represent approximately 10% of the estimated \$10.5B in replacement value of the Agency's asset portfolio.² Operation of these waterways contributes to the Agency's mandate objectives of heritage resource conservation and visitor experience. As well, it provides a number of public benefits outside the Agency's core mandate, including management of water levels and/or parts of watersheds to prevent flooding or other adverse consequences related to public safety and protection of property, providing a water source for municipalities, providing municipal infrastructure (e.g. bridges that span waterways and link communities), and providing surplus water for hydro power generation. Failure to adequately manage the public safety risks of the through waterways could have major consequences with respect to loss of life, personal injury, and large socio-economic impacts on populations and infrastructure in close proximity to the waterways. Given the risks inherent in waterway operations, the through waterway management sub-activity of the Program Activity Architecture (PAA) (i.e., the public benefits of waterway operations) was identified as a high priority for evaluation in the *2010-2011 Parks Canada Evaluation Plan*.

At the time the evaluation was conducted, the Agency was also undertaking a visioning exercise on the future of the Agency's historic waterways and a review of its *Historic Canals Policy and Regulations*. The findings from these exercises and the evaluation, among other sources, will be used to inform management decision making with regards to the through waterways.

Evaluation Issues

The evaluation addressed:

- 1) **Relevance:** Is through waterway management aligned with federal roles and responsibilities? Is it consistent with government and Agency priorities? Is there a continued need for through waterway management?
- 2) **Performance:**
 - Effectiveness:* To what extent has the Agency made progress towards its performance expectations with respect to the condition of contemporary assets, and water level management?
 - Efficiency and Economy:* Is through waterway management efficient and economical in producing the expected outputs and outcomes? To what extent is the sub-activity sustainable and are investments being directed to the areas of highest need?
- 3) **Design and Delivery:** To what extent have alternative approaches been considered and used to support program delivery?

Methodology

Data from multiple lines of evidence was collected for the evaluation. These included document and file review (i.e., including analysis of a variety of secondary data in the Agency), site visits

¹ The through waterways include the nine waterways / historic canals administered by Parks Canada: Carillon, Chambly, Lachine, Rideau, St. Peters, Sainte-Anne-de-Bellevue, Saint-Ours and Sault Ste. Marie Canals as well as the Trent-Severn Waterway. Each is a designated National Historic Site of Canada.

² This is based on Asset Management System data, which is known to have limitations. Management estimates waterway assets to be on the order of 35% in replacement value of the Agency's asset portfolio.

to each of the nine waterways managed by the Agency, key informant interviews with 48 PCA employees (i.e., eight in National Office, four within the Office of the Vice-President (VP) Eastern Canada, and 36 field unit personnel), interviews with 18 external stakeholders, a review of canal/waterway operations in eight other jurisdictions, and use of a three member expert panel to provide external input into evaluation questions and to assist in interpreting and validating findings. Given limitations with secondary data, the evaluation relied heavily on the document review and qualitative data obtained from interviews and site visits.

Findings

Federal government involvement in managing these waterways is a long established historic precedent. Ownership and responsibility for the waterways is embedded directly in Agency legislation and recognized in other legislation and regulations specific to the through waterways. The manner the Agency manages the waterways is consistent with and contributes to the Whole of Government Framework objectives related to health and safety, economic development, a vibrant Canadian culture and heritage, and, in a more limited way, environmental protection.

The Agency operates waterways with three objectives: as National Historic Sites of Canada, contributing to the Heritage Resource Conservation Program of the PAA; as places set aside for the enjoyment of Canadians, contributing to the Visitor Experience Program; and as operations, providing a variety of public benefits unrelated to the Agency's core mandate (e.g., flood control, provision of water, the maintenance of municipal and provincial transportation infrastructure in the form of bridges, and the provision of hydro power in Ontario). The latter are captured either as part of the through waterway management sub-activity of the PAA or as part of internal services.

Ensuring public safety and avoidance of damage to property is a widely shared objective in waterway management both within the Agency and among stakeholders and interested parties despite their other often divergent interests. In fact, this is generally acknowledged as the first priority of waterway management ahead even of PCA's mandate objectives (i.e. protecting the historic aspects of waterways and specific cultural resources in addition to providing a satisfying and meaningful visitor experience).

Short of full divestiture of the waterway program, the Agency has little alternative but to engage in activities contributing to non-mandate public benefits of waterway operations and would face significant opposition if it tried to limit or cease allowing the various activities. The option of divestiture of waterway operations has been examined but never formally pursued not least because of the practicalities involved in finding a willing partner/organization able to manage the waterways in a manner that respects both the Agency's mandate and the various non-mandate obligations.

Although the conceptual distinction between conservation, visitor experience and public benefits is well established in the Agency, efforts to align inputs and results with these categories have not been successful to date. Expenditure data aligned to the various results is not captured consistently across the Agency. Efforts to specify and track potentially relevant dimensions of the outputs (e.g., asset condition) have floundered due to uncertainty regarding the meaning of "contemporary" assets, lack of up to date asset condition ratings over time and uncertainty about

what was implied by the target that the condition of 70% of the assets would be maintained over time. Similar issues exist with efforts to track the potentially relevant immediate outcome, maintaining water levels. There is confusion and uncertainty on where the target applies, how it should be measured, and the significance of deviations from targeted levels for drawing conclusions about the achievement of either mandate or non-mandate objectives.

Other indicators for capturing the public benefit aspects of waterway operations were suggested during the evaluation including the number of dam failures and the extent of reductions in the number of high risk dams over time, the frequency of flooding, and the frequency of closures of waterway bridges, durations of closure and extent to traffic disruptions.

The lack of consistent alignment of waterway expenditures to the three types of waterway objectives and problems with public benefit metrics limited our ability to conduct a rigorous quantitative analysis of the efficiency and economy of the through waterway management sub-activity. At the level of waterway operations as a whole, it is clear that the Agency retains and uses various flexibilities which contribute to efficient and economical operations (e.g., seasonality of operations, hours of operation within season, size of vessels within waterways). Use of these flexibilities constitutes much of our evidence that managers take into account questions of economy and efficiency in the design and delivery of the waterway program as a whole.

In terms of the sustainability of the waterways, real expenditures over the 15 year period we reviewed were at best stable and more likely decreasing. Whether the Agency's existing capital budget could support all requirements for waterway maintenance and capitalization depends on the standard applied and the RV used. The Agency could not maintain waterway assets if management reports of a \$4B CRV is accurate and 2% + 2% standards were to be applied. Assuming a \$4B CRV, requirements would range from \$60M to \$160M, depending on the standard used. The Agency had a capital budget in the range of approximately \$97M and \$130M between 2007-2008 and 2010-2011, exclusive of EAP funding. Furthermore, the Agency has reported an estimated \$1B in deferred maintenance and capital investment for dams.

With respect to program design and delivery, the key concern was the sustainability of the current waterway operating model for achieving the diverse objectives: ensuring through navigation, conserving and presenting cultural resources, fulfilling natural resources objectives, and providing public benefits.

In summary, while the evidence from the various lines of inquiry provides strong support for the continued relevance of through waterway management, evidence of the performance (i.e., effectiveness, efficiency and economy) of through waterway management—particularly the public-benefit aspects of Agency operations—is weaker. The evidence is largely based on the avoidance of specific events (e.g., major flooding, major bridge collapse), the provision of water for municipal purposes and generating hydro power at a few waterways. As a result of our observations we made the following recommendations:

Recommendation 1:

The Chief Administrative Officer (CAO) should coordinate as soon as possible, in conjunction with VP Eastern Canada and the Chief Financial Officer (CFO), a review of the representation of waterways in the Agency's PAA (i.e., the need for a canals or waterways "program" similar to other system-based programs, and/or the specific definition of the through waterway management sub-activity in the context of the overall Throughway and Townsite Infrastructure Program), and propose changes, if necessary, to clarify the scope and intent of the activities, to Executive Management Committee for approval.

Response

Agree. The CAO will work with the VP Eastern Canada and the CFO to propose changes, to review the representation of waterways in the Agency's PAA, and propose any necessary changes to Executive Management Committee for approval. This will be part of the annual MRRS update to be provided to TBS by September 2012. Target date: September 30, 2012

Recommendation 2:

The CAO and CFO should formally agree on and articulate their respective roles in defining what expenditures are to be coded to the Agency's general classes of results (e.g., heritage resource conservation, visitor experience, townsite and throughway infrastructure) and provide within this framework, consistent direction for business units in how to code relevant expenditures.

Response

Agree. The CAO and CFO will require the active participation of the VP Eastern Canada to define appropriate and consistent coding of waterway expenditures, and reinforce that direction.

The CAO and CFO will agree on and articulate their respective roles regarding determining and communicating direction on coding of expenditures to the Agency's general classes of results. The CAO and CFO will work with the VP Eastern Canada to confirm a consistent framework for coding canal expenditures, and direction will be issued to all implicated business units to ensure that the expenditures on canals are coded in such a way as to be aligned with the Agency's general classes of results. Target date: September 30, 2012

Recommendation 3:

The VP Eastern Canada should follow-up periodically to ensure waterway management is complying with direction to consistently code expenditures.

Response

Agree. VP Operations, Eastern Canada, will reconfirm the coding intent with the field units concerned particularly as it applies to through waterways, provide prescriptive use of PA coding in allocation of supplemental funding, and institute quarterly monitoring each year to reconfirm compliance. Monitoring may be reduced, once it is confirmed that the process is being followed appropriately and in accordance with direction. Target date: TBD

Recommendation 4:

The CAO should coordinate, in conjunction with VP Eastern Canada, a review of the corporate performance targets with respect to maintaining condition of contemporary assets and maintain water levels on waterways, and ensure that they are clear, measurable and monitored, or alternatively, propose new metrics and targets that will be clear, measurable and monitored.

Response

Agree. The CAO will work with the VP Eastern Canada to ensure that the corporate performance targets with respect to maintaining condition of contemporary assets and maintain water levels on canals are clear, measurable and monitored, or alternatively, propose new metrics and targets that will be clear, measurable and monitored. This will be part of the annual MRRS update to be provided to TBS by September 2012. Target date: September 30, 2012

1. INTRODUCTION

The Parks Canada Agency's (PCA) mandate is to:

“Protect and present nationally significant examples of Canada's natural and cultural heritage, and foster public understanding, appreciation and enjoyment in ways that ensure the ecological and commemorative integrity of these places for present and future generations.”

The Agency is responsible for three major heritage systems:

- 42 NPs of Canada (NP)
- 167 National Historic Sites of Canada (NHS), administered by the Agency
- 4 National Marine Conservation Areas of Canada

PCA carries out its mandate through five program activities and twenty sub-activities. The major program activities are heritage places establishment, heritage resources conservation, public appreciation and understanding, visitor experience, and townsite and throughway infrastructure.

This evaluation focuses on the through waterway management sub-activity of the townsite and throughway infrastructure program (see Appendix A for the Program Activity Architecture - PAA). PCA conducted the evaluation as part of its commitment under the *Treasury Board Evaluation Policy (2009)* to evaluate all direct program spending over a five-year period.

The PCA Evaluation Committee requested that the evaluation of the through waterway management sub-activity be added to the *2010-2011 Parks Canada Evaluation Plan*. The sub-activity has never been subject to a comprehensive evaluation. However, several reviews of various aspects of waterway operations have been completed since responsibility for the waterways was transferred to the Agency in the 1970's. These include various management-led reviews in 1987, 1993, 1995, and a chapter by the Office of the Auditor General of Canada (1996 Chapter 32 – Parks Canada: Management of Historic Canals). A major review by an independent panel appointed by the Minister of the Environment was also completed in 2008 on the Future of the Trent-Severn Waterway³ (TSW) – the largest of PCA's through waterways. See Appendix B for a summary of these reviews. At the time the evaluation was conducted, the Agency was also undertaking a visioning exercise on the future of the Agency's historic waterways and a review of its *Historic Canals Policy and Regulations*. The findings from these exercises and the evaluation, among other sources, will be used to inform management decision making with regards to the through waterways.

2. DESCRIPTION OF SUB-ACTIVITY

2.1 DEFINITION, INVENTORY AND PURPOSES

PCA administers nine through waterways, which are also called historic canals.⁴ Through waterways range from short (i.e., less than a kilometre in length) constructed channels

³ The report is referred to as the TSW Panel or simply “the Panel” in this document for ease of reference.

⁴ Collectively, we refer to these historic canals as “through waterways” or “waterways” throughout the report, aligning our nomenclature with that of the through waterway management sub-activity, unless referring to

connecting two bodies of water to complex systems of interconnected constructed channels and natural water bodies, up to almost four hundred kilometres in length. Each waterway has one or more locks that serve to raise or lower boats along the length of the waterway.

The ownership and administration of seven waterways was transferred to the Agency from the Department of Transport in 1972. Responsibility for the Lachine Canal was transferred from the Minister of Public Works in 1978 and responsibility for the Sault Ste. Marie Canal from the Minister of Transport (St. Lawrence Seaway) in 1979.

The waterways were all originally constructed and opened for through navigation during the 1800s largely as commercial transportation corridors and in some cases for purposes of national defence. However, by the 1970s, the original purposes were largely lost and navigation in the waterways was mainly or exclusively for the purposes of pleasure boating and recreation.

The waterways have all been designated as NHSs. In the case of waterways, the primary reason for designation is because each “is part of Canada’s national system of canals.”

National Historic Site Designation

A place is designated a National Historic Site by the Minister of the Environment based on recommendations made by the Historic Sites and Monuments Board of Canada. To be designated, a place must represent a nationally significant aspect of Canadian history. Only a fraction of the designated NHSs in Canada are owned and operated by PCA.

Table 1 lists each waterway, the field unit⁵ in which it is located, its length and year of designation as an NHS (i.e., six were designated in the 1920s and three in the 1980s). As NHSs, PCA manages the waterways, consistent with other places it administers, with a view of protecting the cultural resources, presenting these places and their significance to Canada, and for the use and enjoyment of Canadians.

Table 1. Through Waterways Length and Year of Designation

Field Unit	Waterway	Waterway Length	Year of Designation
Northern Ontario	Sault Ste. Marie	2.22 km	1987
Central Ontario	Trent-Severn Waterway	386 km	1929
Eastern Ontario	Rideau	202 km	1924
Western Quebec	Carillon	0.8 km	1929
	Ste-Anne-de-Bellevue	0.2 km	1987
	St-Ours	0.2 km	1987
	Chambly	18.96 km	1929
	Lachine	12.8 km	1929
Cape Breton	St. Peters	0.8 km	1929

The waterways are, however, distinguished from other NHSs. For one, they are **working assets** which retain their original function as through waterways connecting other water bodies, although the type of traffic that uses them is different.⁶ Other NHSs, including either those owned and administered by the

Agency or those owned by others, also have in some cases contemporary functions (e.g., as a

specific canals/waterways (e.g. the Rideau Canal, the TSW), canals from other jurisdictions, specific references to document titles, or in direct quotations. The through waterways include the nine waterways / historic canals PCA administers: Carillon, Chambly, Lachine, Rideau, St. Peters, Sainte-Anne-de-Bellevue, Saint-Ours and Sault Ste. Marie Canals as well as the TSW.

⁵ A field unit is a geographic collection of NPs and/or NHSs that is managed as one unit. The Agency has 32 field units.

⁶ In one case, the Agency took over a canal that was not a working through waterway (i.e., Lachine Canal) but has over time returned it to operational status.

commercial or administrative building), although frequently the contemporary use is not the original function of the place.

By managing water levels and flows within waterways or watersheds, there is a significant **public safety** aspect to waterway management (i.e., from flooding should a dam fail or if in-flows or out-flows are not anticipated and managed). Waterways also provide a range of **public goods**, other than those directly serving the Agency's mandate (i.e. heritage resource conservation and visitor experience). These additional public goods include the provision of water intake or discharge for municipalities and/or by private or commercial interests and for irrigation of farm land close to waterways, and have management of infrastructure such as waterway bridges, which support general transportation needs and in some cases connect communities. Surplus water in waterways also supports hydro power generation. These public goods may also entail public safety obligations as is the case with the management of waterway bridges. The waterways have a significant role in the generation of taxes, particularly at the municipal level.⁷

The creation of the through waterway management sub-activity in the PAA was intended to isolate and highlight the non-mandate public good functions of waterways. As structured, the sub-activity does not include all of the public benefits of waterway operations. For example, costs and activities associated with water intake and hydro power generation are not included in the definition of the sub-activity and are instead treated as part of the internal services sub-activities in the PAA. The evaluation's scope included all the public good aspects of waterway operations.

2.2 OUTCOMES/CORPORATE GOALS

The management and operation of waterways contributes directly to three of the Agency's program activities.

- As NHSs, the conservation of the historic fabric of the waterways is an important end in itself (PA2 Heritage Resource Conservation). Along with other NHSs the waterways share the objective of maintaining or improving the condition of certain cultural resources and to improve resource condition and management practices for a targeted percentage where these have been rated as poor. Protection of natural resources, species at risk and specific habitats along waterways is also a factor in waterway management.⁸

⁷ *The Report of the Panel on the Future of the TSW* (2008) found that waterfront homeowners and cottagers have the biggest economic influence, and by a large margin. The almost 50,000 residences along the TSW and 16,500 more on the Haliburton reservoir lakes generate from \$650 million to \$900 million each year in economic activity and contribute close to \$300 million in municipal property taxes. The report indicated that tens of millions of dollars are paid in provincial and federal sales and other taxes.

⁸ The Historic Canals Regulations identify natural resource protection as well as cultural resources as objectives of canal management. Several of the waterways are home to Schedule 1 federally identified species at risk, with associated requirements for species recovery plans and the identification and protection of critical habitat (as of December 21, 2009): Chambly Canal 1, Trent-Severn Waterway 19, Rideau Canal 13, and St. Ours Canal 2. http://www.pc.gc.ca/apps/bos/BOSQ7_E.asp. Waterways also have species at risk assessed by the Committee on the Status of Endangered Wildlife in Canada: Chambly Canal 1, Trent-Severn Waterway 26, Rideau Canal 14, and St. Ours Canal 4. http://www.pc.gc.ca/apps/bos/BOSQ6_E.asp. Management at the TSW indicated there are additional species on the waterway not yet reflected in these databases.

- Like other Parks Canada administered places, the waterways are operated for the use and enjoyment of Canadians (PA4 Visitor Experience). Users of waterways are expected to learn from their experience; participate, enjoy, and be satisfied with their visit; and consider the place meaningful to them.

The public good/public safety aspects of waterway management are captured in the PA5 sub-activity. The expected results and performance targets for the sub-activity are shown in Table 2.

Table 2. Through Waterway Management Sub-Activity Expected Results and Performance Expectations

Expected Result:	Performance Expectation(s):
Condition of contemporary infrastructure for waterways is maintained or improved.	The condition of 75% of waterway contemporary assets is maintained by March 2013.
	The condition of 25% of waterway contemporary assets rated as poor or fair is improved by March 2013.
Effective water level management.	90% of water level gauge measurements are within the prescribed range established to meet legal and/or operational obligations.

The first expected result focuses on the condition of “contemporary” assets and infrastructure as opposed to the condition of cultural resources or infrastructure on waterways. In principle, the latter is included under the expectations for the Heritage Resource Conservation Program Activity.

The second expected result is focused on meeting legal and operational requirements related to water levels. Water levels are maintained and adjusted to meet a variety of requirements both within waterways and within watersheds. In practice, this includes contributing to core aspects of the Agency’s mandate such as the protection of cultural or natural resources, contributing to visitor experience, managing public safety concerns, and facilitating other appropriate uses. As written, the expectation does not distinguish between the purposes of water level management.

There are no specific corporate expectations/targets with respect to “other” appropriate uses of water. However, as reviewed below, there is a framework of legislation, regulations and internal Agency policy that governs what is appropriate and when and where these activities will be permitted.

2.3 RESOURCES (INPUTS)

2.3.1 Expenditures

Expenditures on through waterways have been supported by budget appropriations as well as new funding received by the Agency to support asset investments in general.

Table 3 shows the total expenditures on waterways for a four year period.

In addition, the habitat protection provisions of the Fisheries Act outline powers and authorities to protect the unobstructed passage of fish, provide sufficient flow for fish, prevent fish mortality and prohibit the harmful alteration, disruption or destruction of fish habitat. PCA recognizes its obligation to protect fish habitat on historic canals.

The expenditures shown are those made by the waterways directly and do not include significant Economic Action Plan (EAP) supported projects in 2009-2010 and 2010-2011 (i.e., the latter expenditures are shown in the

Table 3. Waterway Expenditures by Year

Field Unit	Waterway	2007-08	2008-09	2009-10	2010-11
Northern Ontario	Sault Ste. Marie	1,104,352	1,460,679	933,212	1,363,789
Central Ontario	Trent-Severn	16,668,501	15,616,253	15,052,722	17,887,145
Eastern Ontario	Rideau	11,092,796	9,849,679	9,326,680	10,139,387
Western Quebec	Carillon	870,295	1,156,277	1,198,675	1,647,009
	Chambly	2,153,859	2,540,087	2,214,547	2,001,592
	Lachine	2,265,530	3,824,409	2,761,994	2,441,835
	Sainte-Anne-de-Bellevue	301,415	311,026	334,794	389,779
	Saint-Ours	566,090	613,049	501,728	624,839
Cape Breton	St. Peters	831,434	249,528	401,022	611,698
Total Waterways		35,854,273	35,620,987	32,725,372	37,107,073
Total Agency		584,996,366	623,124,646	623,457,943	640,710,650
% of Agency		6.1%	5.7%	5.2%	5.8%
Additional EAP				11,953,310	31,321,103

last line of the table).⁹ Over the four years shown in the table, waterway costs have represented approximately 5% to 6% of the Agency's total expenditures.

The Rideau Canal (RC) and TSW in Ontario accounted for 75% on average of all waterway expenditures, with the Lachine and Chambly Canals in Quebec accounting for an additional 14% of all expenditures. Over half of the expenditures (i.e., 56%) are on salaries and wages, with 22% on operations and maintenance, and 21% for capital projects (i.e. not including the EAP projects). It has been estimated that approximately 52% of the total waterway expenditures support boating on the waterways (i.e., staff, operating and capital costs associated with navigation, mooring and docking facilities, navigation aids).

In principle, it should be possible to disaggregate the total expenditures by waterway into amounts allocated to various program activities or sub-activities (i.e., expenditures on the through waterway management sub-activity). However, in practice, waterways have not all coded expenditures to the through waterway management sub-activity.¹⁰ Even in these cases, it was reported that different sectors of the same waterway may code expenditures differently and that coding practices within a field unit managing a waterway can change yearly. As a result, there is no readily available record of the costs associated with the sub-activity as distinct from other aspects of waterway management.

In 2010-2011, when seven of the nine waterways coded some expenditures to the through waterway management sub-activity, the expenditures represented approximately 11% of all waterway expenditures (i.e., expenditures supporting the public benefits of waterway operations). Additional expenditures are coded to internal services (i.e., approximately 10% of all waterway expenditures in 2010-2011) some portion of which is the administration costs of issuing licenses and managing hydro power generation and other public benefits.

⁹ Total expenditures including EAP and various accounting adjustments were reported to be \$37.3M, \$39.8M, \$49M, and \$76.8M for the four years shown in Table 3. These represent approximately 6% to 7% of total adjusted Agency expenditures.

¹⁰ For 2007-2008 through 2009-2010, only three canals coded any expenditure to the sub-activity, while in 2010-2011, seven of the nine canals coded expenditures to the sub-activity.

In summary, while total expenditures on waterways are known with some degree of certainty, lack of consistency in coding has meant that the expenditures on the public good aspects of waterway operations are not readily available. At best we can speculate that at minimum 10% of the Agency waterway costs support public non-mandate objectives of waterways and that the true portion of expenditures supporting public benefits may be up to 20%.

2.3.2 Asset Base

The asset base of waterways includes a variety of public use and administrative buildings, various grounds (e.g., parking, picnic areas), trails, roads, utilities, equipment and docking, mooring and navigation aids linked to waterway operations. A portion of these assets are cultural resources (see text box).

Assets with a specific role in water control include break waters, control dams and weirs, navigation channels and walls. Locks can also be said to serve a water control function as they retain water.¹¹ In addition there are road bridges (i.e., bridges crossing the waterways) which are frequently noted in the Agency documents as a type of waterway asset which may have functions that are not related to either the heritage resource conservation or visitor experience mandate of the Agency. An inventory of the Agency's assets is available in the Agency's Asset Management System (AMS) but this data is widely recognized to be incomplete, and lacking in reliability, validity and timeliness. (See *Evaluation of Parks Canada's Asset Management Program, 2009*, for an extensive discussion of these issues.) Even the number of assets of various kinds is suspect given that there are differences in how an asset is identified between field units (e.g., a waterway bridge may be recorded as one or several assets, a canal wall asset may vary from 1 km to 15 km in length).¹²

The Agency has identified bridges and dams as high risk assets and has conducted several iterations of inventorying and assessment of the condition of these assets rather than rely on the AMS data. As of 2010, as reported in the Departmental Performance Report, 116 road bridges, pedestrian bridges and structural culverts were reported within the waterways.¹³ As of January 2011, the Agency had identified 235 dams and an additional 40 water retaining structures located at through waterways as an initial step in implementing a comprehensive dam safety program.¹⁴ Most of these water control type assets and all the bridges are located in or on the corridors that constitute the navigable waterway. However, some dams for example are located on reservoir lakes that are some distance from the actual navigable portion of a waterway.

Cultural Resources

A cultural resource is any human work or a place that gives evidence of human activity or has spiritual or cultural meaning, and that has been determined to be of historic value. Cultural resources are classified as either level 1 or level 2 resources with the former being of national historic importance and the latter having historic value but not being nationally significant. A NHS may be a cultural resource as well as particular artefacts either in or outside NHSs (Parks Canada's *Cultural Resource Management Policy*)

¹¹ Marine rails are typically also grouped with locks in AMS.

¹² The AMS system lists more than 2,400 canal assets of all types of which about a third are related to water control or are road bridges. The system suggests that perhaps 18% of water control and bridge assets are cultural resources.

¹³ In total, PCA has in excess of 1,000 bridges and structural culverts in its NPs and NHSs.

¹⁴ Dams are defined as structures impounding at least 30,000 m³ of water and at least 2.5 m high, or, any retaining structures if the consequences of operation or failure are unacceptable to the public. A water retaining structure is a barrier constructed for the retention of water, water containing any other substance, fluid waste, or tailings that does not fall under the definition of dam.

Management reports that the current replacement value of waterway assets is significantly higher than what is available in AMS. AMS data shows that waterway assets represent approximately 10% of the estimated \$10.5B in replacement value of the Agency's asset portfolio within the system. Management reports an estimated replacement value for waterway dams and bridges of \$4B, with an unknown additional amount for other waterway assets. The Agency may be able to estimate this based on existing AMS data.

2.3.3 Human Resources, Roles and Responsibilities

Human Resources: Table 4 shows the number of full-time equivalent (FTE) positions allocated to the nine through waterways as identified in the Agency's salary forecasting tool. FTEs represent the aggregate of many positions working both full- and part-time at the sites: seasonal staff, students, and regular employees. It is not possible using the Agency's systems to identify the portion of these FTEs specifically allocated to the through waterway management sub-activity as opposed to other waterway operations and functions. As with the asset data, the validity of this data has been questioned given that field units have different ways of allocating FTEs or portions of FTEs to specific locations. For example, the Western Quebec Field Unit (WQFU) does not allocate a variety of managerial, administrative, financial, human resource, resource conservation and external relations positions to waterway operations while some of the field units in Ontario have allocated some of these positions to the waterways.

Table 4. FTEs by Through Waterway

Field Unit	Waterway	Total FTEs		
		2007-08	2008-09	2009-10
Northern Ontario	Sault Ste. Marie ¹⁵	12.14	11.23	12.75
Central Ontario	Trent-Severn	189.93	192.55	190.83
Eastern Ontario	Rideau	136.47	147.06	129.03
Western Quebec	Carillon	10.09	10.65	11.15
	Ste-Anne-de-Bellevue	3.60	3.62	3.67
	St-Ours	6.25	6.02	6.28
	Chambly	28.05	28.51	28.70
	Lachine	13.85	13.61	17.83
Cape Breton	St. Peters	2.59	2.68	2.90
	Total	402.97	415.93	403.14

Source: Salary Forecasting Tool

Based on the available data it appears that FTEs allocated to through waterways are correlated to the size of the waterway and the number of assets it contains (i.e., waterways with more extensive assets or more substantial water control obligations have more FTEs allocated to the sub-activity).¹⁶ Outside the operational period for the through waterways (i.e., May to October), the number of FTEs at each waterway is on average reduced by at least half although as pointed out by key informants important water management activities continued to be performed year round.

¹⁵ The Sault Ste. Marie Canal is jointly operated by the City of Sault Ste. Marie and PCA. Management reported that the total costs of operation of the lock is split 25% and 75% between the City and the Agency respectively. City employees actually operate the lock. These resources are not reflected in the table.

¹⁶ This does not imply as one reviewer suggested that resources are sufficient for requirements only that resources (inputs) increase with the scale of the operation.

Roles and Responsibilities: As with many PCA programs, responsibilities related to waterway management are shared. Functional direction for the NHSs is provided by the Vice-President (VP), Heritage Conservation and Commemoration. The functional lead for the visitor experience part of waterway operations is the responsibility of the VP, External Relations and Visitor Experience. Development of the PAA defining the sub-activity and the corporate performance targets is the responsibility of the Chief Administrative Officer (CAO). The CAO is also responsible for various realty activities that relate to the public good aspects of waterway operations (e.g., policies and directives and some management related to water intake, hydro power generation, etc).

Operational responsibility for through waterway management rests with Field Unit Superintendents (FUS), who are responsible for the day-to-day operations of waterways in the five field units in which waterways are located. Asset managers and their teams support FUSs in the maintenance of all assets at the sites, not just those required for through waterway management. There is otherwise limited consistency of organizational structures used to support waterway management among field units.

In practice, advice to business units on financial codes related to PAs and sub-activities has been undertaken by staff in the Strategic Planning and Reporting Branch, reporting to the CAO. This branch is responsible for coordinating the development of the program activity/sub-activity descriptions. They have argued that provision of coding advice should be the responsibility of the National Office finance directorate under the responsibility of the CFO. The CFO in turn has argued that the CAO is best positioned to understand the meaning and nuances of the PA and sub-activity descriptions.

2.4 ACTIVITIES/OUTPUTS

Activities and outputs related to the provision of public benefits include planning and reporting, waterway operations, maintenance and repairs, capital investments that can serve the core mandate of the Agency (i.e., conservation, visitor experience and heritage presentation), as well as ensuring public safety and management of other appropriate water uses. In practice it is often difficult to separate out a single purpose or intent of an activity or output (i.e., waterway operations and water management for public benefit vs. recreational purposes).¹⁷ The Agency's through waterway management activities, outlined below, occur year-round, with some activities (i.e. the operation of swing bridges) occurring or increasing in frequency during the navigation season.

Planning and Reporting: Field units with waterway management responsibilities must identify risks and threats to performance; identify the cost and the priority of interventions, seeking funding external to the field unit if required; and plan maintenance and major repair or recapitalization activities. They are also responsible for maintaining data on the condition of the assets and inputting this and other relevant information on waterways into the AMS and/or financial system. Liaison with partners and stakeholders who support or depend on these assets is a critical part of the planning process.

¹⁷ Various activities not covered in the description include management of contaminated sites, programs and services related directly to visitors or heritage presentation.

Waterway Operations: Operating activities are performed in the normal course of business at all through waterways. For example, staff operate manual and hydraulic locks and dams that are co-located at lock stations and swing bridges and conduct routine inspections and maintenance. The activities contribute to continued through navigation during the operating season and, in some cases, contribute to wider goals related to water level management, public safety, and cultural or ecological resource management.

Maintenance and Repairs: Maintenance includes inspections to meet legal requirements, inspections to ensure public and employee health and safety, work to determine the condition of the asset, preventative maintenance, and small repairs. Agency employees also repair, install, and/or maintain canal cuts, locks, dikes, weirs, dams, pedestrian and roadway bridges, and related operational equipment.

Capital Investments: Capital investments serve to acquire a new asset or add to the life or functionality of an existing asset (i.e., recapitalization). Capital projects associated with the sub-activity include the rehabilitation and modernization of dams and the construction or reconstruction of bridges.

Water Management: There are three historic waterways that have some function in overall water management outside of the waterway channel. The RC in Eastern Ontario has watershed management responsibilities for much of the Cataraqui and Rideau watersheds, either directly or through agreements with other organizations.¹⁸ The system drains an area of 4,640 km².

The TSW has three key components: the Trent River watershed, the Reservoir Lakes, and the Severn River watershed.¹⁹ The **Trent River** basin has an area of 12,200 square kilometres (i.e., including some 218 lakes in the Haliburton Highlands region, 37 of which are directly controlled by waterway dams). The river basin drains into Lake Ontario. **The Reservoir Lakes**, a sub-area of the Trent River basin, is located in the north of the region and consists of forty-four lakes in the Haliburton Highlands area that are dammed to collect spring runoff water. Water from the Reservoir Lakes is released over the summer to supply the Trent component of the Waterway. The drainage area of the Haliburton tributaries (Gull and Burnt River) is in the order of 3,200 square kilometres. **The Severn River watershed** lies immediately west of the Trent River watershed and drains a 6,160 square kilometre area into Georgian Bay.

The St. Ours Canal in Quebec includes a dam to regulate water levels in the Richelieu River from above the dam to the Chambly Basin (approx. 50 km). Water levels within this reach are maintained at 6.85 m to facilitate navigation between the St-Ours and Chambly Canals. Water levels below the dam are not controlled by PCA.

¹⁸ More information on water management at the RC is available online. See, for example, Behind the Scenes: Water Management on the Rideau Canal, PCA. This was originally published in the Fall 1999 issue of the Friends of the Rideau newsletter, The Rideau Ripple. <http://www.rideau-info.com/canal/water-manage2.html>

¹⁹ See <http://www.pc.gc.ca/eng/lhn-nhs/on/trentsevern/plan/plan8/plan8a.aspx>, for more detail on the TSW system.

Public Good Services: These activities include dealing with power generating entities that operate on the waterways, and the administration of municipal water intakes and sewer discharges, as well as numerous individually owned water intakes and sewer discharges in areas not served by the municipal grid (e.g., cottages).

PCA also owns and administers bridge infrastructure crossing waterways. In the case of swing bridges, operation of the asset continues to play a role in ensuring through navigation.

The shorelines of the through waterways attract a high level of development. Where in-water and shoreline works clearly impact on the Agency's interests, each work requires a permit to be issued by the Agency and each permit requires an environmental assessment. This can include but is not limited to all work taking place and all structures built on or over the beds of PCA's waterways (i.e., the installation, repair, replacement, modification or maintenance of structures such as docks, boathouses, mooring basins, waterlines, buoys or rafts, and beaches). Shoreline stabilization, dredging, and works in narrow channels or wetlands are also included. The Canadian Environmental Assessment Registry lists more than 1000 environmental assessments by the Agency since 1995 related to in-water and shoreline works permits.

2.5 REACH

Given the location of most of these sites near urban or otherwise well populated areas, through waterway management involves a large number of partners, stakeholders and interested parties. Agency employees equated the reach of the largest of the waterways to that of a large national park.

In addition to direct clients (i.e., land- and boat-based visitors to the NHSs), stakeholders and interested parties include municipalities, First Nations, private business owners, and thousands of private landowners. Through various past consultation processes, associations representing the interests of property owners, cottagers, boaters, anglers and hunters, marine operators, private campground operators, heritage and environmental stewardship organizations, the tourism industry, and waterpower generators have all been determined to have a stake in the operation of the through waterways.

Residents living close to through waterways are particularly impacted by the Agency's activities. It is safe to say that millions live in proximity to one of the nine through waterways and thus derive direct and indirect benefits from these sites.²⁰ Management describes these residents as being akin to townsite residents in a national park, who are directly impacted day-to-day by the Agency's through waterway management activities. These would include, for example, changing water levels, transportation access (i.e. bridges), and various regulations and requirements for permits.

Waterpower production and development at through waterways dates back more than a century. Waterpower facilities derive both a direct commercial benefit from the through waterways by accessing their water flows for power production and provide revenue to PCA through licensed

²⁰ We do not have a precise definition of "living close to the waterway" although the order of magnitude is certainly reasonable.

tenure for the occupation of federal lands. They also play a role in water level management at various sites through the control of related infrastructure such as hydro dams and reservoirs.

Federal, provincial, and municipal government entities as well as Aboriginal partners exercise some form of jurisdiction over waterways, collaborating to varying extents in their management (e.g., Transport Canada, Fisheries and Oceans Canada, Public Works and Government Services Canada, Conservation Authorities, etc.).

2.6 THROUGH WATERWAY LOGIC MODEL

A model showing the logical relationships between inputs (i.e., the assets, human resources, expenditures), activities/outputs and reach, and intermediate and long-term outcomes is shown in Table 5. This logic model provides a visual summary of the program description.

This evaluation is focused on those through waterway activities that relate to the performance expectations for the Program Activity (PA) 5 sub-activity (i.e., water level and contemporary asset management). As previously noted, there is a strong interconnection between activities related to PA5 and other program activities (i.e. PA2 and PA4). In some cases, the intermediate and long-term outcomes listed in the logic model will therefore overlap with expected results of these program activities. The activities, outputs and outcomes related to these other program activities and various internal services (e.g., waterpower licenses) are discussed throughout this report and are reflected in the logic model under “other uses.”

Table 5. Logic Model of Through Waterways Operations

Long Term Outcomes	<ul style="list-style-type: none"> • Canadians have a strong sense of connection, through meaningful experiences, to their national parks, national historic sites, and national marine conservation areas • Protected places are enjoyed in ways that leave them unimpaired for present and future generations • Socio-economic benefits derived from through waterway management are sustained 					
Short Term Outcomes	<ul style="list-style-type: none"> • Through waterways remain open to and safe for navigation and other visitor experiences • Condition of waterway contemporary assets is maintained or improved • Condition of waterway cultural resources required for water level management is maintained • Water level gauge measurements are within the prescribed range to meet legal/operational needs • Appropriate uses of water (e.g., power generation, municipal intake, etc.) are maintained 					
Reach	<p>Clients – NHS Visitors, users of assets (e.g., bridges), waterpower generators. Partners – Aboriginal Communities, PWGSC, municipalities, provinces. Stakeholders/Interested Parties – Municipalities, private citizens, landowners and businesses, industry, stakeholder associations, provinces, conservation authorities, other Federal departments, other service providers.</p>					
Outputs	<ul style="list-style-type: none"> • production of risk assessments • production of project proposals, plans, and budgets 	<ul style="list-style-type: none"> • continued through navigation • municipal services maintained (e.g., bridges) 	<ul style="list-style-type: none"> • water levels maintained as prescribed • flooding and other negative impacts abated • user needs met 	<ul style="list-style-type: none"> • condition of assets determined • assets repaired / maintained 	<ul style="list-style-type: none"> • assets added, replaced or their life and/or function substantively improved 	<ul style="list-style-type: none"> • approved and/or compliant power generation facilities, water intakes, sewer discharges, in-water and shoreline works
Activities	<p>Planning & Reporting:</p> <ul style="list-style-type: none"> • conduct risk assessments • identify and prioritize future projects • liaise with partners and stakeholders • contract support where needed 	<p>Waterway Operations:</p> <ul style="list-style-type: none"> • routine inspection and safe operation of waterway assets 	<p>Water Level Management:</p> <ul style="list-style-type: none"> • forecast, record, monitor water levels • operate assets for water control • communicate water conditions • respond to emergencies 	<p>Maintenance and Repairs:</p> <ul style="list-style-type: none"> • inspect assets • complete preventive and ongoing (custodial) maintenance and small repairs 	<p>Capital Investments:</p> <ul style="list-style-type: none"> • design and construct or oversee the design and construction of new assets or substantive asset repairs 	<p>Other uses:</p> <ul style="list-style-type: none"> • liaise with partners and stakeholders • issue permits • monitor works and agreements
Inputs	<p>PCA Staff: +/- 400 FTEs at field units with some role in through waterway management. Expenditures: \$6M to \$9M per year over the past five years coded to PA5; \$32M to \$37M total expenditures on the nine waterways. See section 2.3.1 for a discussion of some of the limitations of this data. Assets: 624 km of waterway with associated assets including bridges, dams, weirs, dikes, etc. (estimated replacement value of approx. \$3.5-4B).</p>					

3. EVALUATION DESIGN

3.1 EVALUATION PURPOSE AND SCOPE

The evaluation examined the relevance, performance (i.e., effectiveness, efficiency, and economy) and the program design of the through waterway management sub-activity and other associated “public good” aspects of waterway operations, consistent with the requirements of the Treasury Board *Policy on Evaluation* (2009). The scope of the evaluation focused on asset and water level management where they are relevant to the sub-activity as well as other appropriate uses of the waterways and water managed by the Agency.

As the underlying activities and processes involved in the sub-activity also contribute to other Agency mandate results and expectations, we include additional descriptive information where necessary to develop the full context for the evaluation’s findings. However, the evaluation does not address the relevance or performance of waterways with respect to activities and objectives under PA2 Heritage Resources Conservation and PA4 Visitor Experience.

PCA evaluation staff conducted the evaluation between July 2010 and May 2011.

3.2 APPROACH AND QUESTIONS

The evaluation employed a cross-sectional multiple mixed methods approach to address the evaluation questions. The questions were originally set out in the *Through Waterways Evaluation Plan* and revised according to the direction of the Agency’s Evaluation Committee (November 10, 2010). This revised plan included seven evaluation questions and 13 associated expectations related to the three overall issues of relevance, performance and program design. The key questions are shown in Table 6. A more detailed matrix of questions, expectations, indicators and relevant data sources is found in Appendix E.

Table 6. Evaluation Questions

Relevance	
1.	Is through waterway management aligned with federal roles and responsibilities?
2.	Is through waterway management consistent with government and Agency priorities?
3.	Is there a continued need for through waterway management?
Performance	
4.	To what extent has the Agency made progress towards its performance expectations with respect to the condition of contemporary assets?
5.	To what extent has the Agency met its performance expectations with respect to water level management?
6.	Is the program economical in producing the expected results and efficient at producing the expected outputs relative to the resources it consumes?
Program Design	
7.	Are there any alternative approaches that could be used to achieve the expected results?

3.2.1 Methods

Data collection methods are summarized below:

Document and Literature Review	A wide variety of documents, including legislation, policy, plans, reports, and published literature were reviewed for the evaluation (see Appendix F for a list). These documents provided both contextual information to further the evaluation's understanding of issues such as the relevance of through waterway management and secondary source data used to assess effectiveness, efficiency, economy and alternatives.
Analysis of Secondary Data	We relied on the Agency's financial system, asset management system (AMS), and managers' site-specific data on expenditures, water control and asset condition in order to describe the sub-activity and address specific evaluation questions and indicators related to effectiveness, efficiency and economy. The accuracy of this data was discussed with relevant Agency staff during interviews and site visits.
Key Informant Interviews	<p>Key informant interviews were conducted with 48 PCA employees, i.e., 8 in National Office, 4 within the office of the VP Operations, East, and 36 field unit personnel.</p> <p>Nearly all of these interviews were conducted in person, often connected with site visits. These interviews were used to clarify our description of the sub-activity, explore staff perspectives on the evaluation questions, and obtain context on site operations and efforts to improve effectiveness and efficiency.</p>
Stakeholder Interviews	A limited number of stakeholder interviews were conducted for the majority of through waterways, including with representatives from federal and provincial governments, conservation authorities, and the hydropower industry. In total, 18 stakeholders participated in these interviews. Stakeholders were asked to provide their input regarding the relevance and effectiveness of through waterway management. They also raised additional issues related to other descriptive areas addressed by the evaluation.
Site Visits and Direct Observation	We visited each of the nine through waterways between October 2010 and January 2011, enabling direct observation of key assets such as locks and dams. The purpose of these site visits was to develop an on-the-ground appreciation for issues faced by the waterways. A site visit protocol was used to guide data collection at these sites. Photographic evidence of asset condition issues was also collected where possible.
Comparison Study	Comparison against similar service providers allowed for an exploration of alternative approaches to program design and service delivery as well as a comparison for questions of efficiency and economy. Specific benchmarks

included the New York State Canal System, British Waterways, Waterways Ireland, the Göta Canal (Sweden), Tennessee Valley Authority, Okeechobee Waterways, the Ottawa River Regulating Committee and Lake of the Woods Control Board.

Expert Panel The purpose of the expert panel was to provide expert external input into evaluation questions, to assist in interpreting and validating findings, and to provide advice on the draft evaluation report. Three experts with a strong knowledge of through waterway management participated in these panel discussions.

3.2.2 Strengths and Limitations

Through the document and file review, interviews, site visits and case studies, we gained an extensive understanding of through waterway operations and the nature of the issues and challenges faced by managers. We were also able to collect some quantitative information not available in national systems. Our key informant interviews within PCA were extensive and can be considered representative of current opinions and perceptions within the Agency. Similarly, we were able to interview representatives from provincial governments and other key external key informant groups and their views of the Agency's waterway operations are well represented.

Partners and stakeholders that participated in stakeholder interviews were largely identified by PCA managers. As such, they are a sample of convenience rather than a random sample of the general population and thus do not necessarily provide a comprehensive or representative view of these groups. In addition, the number of stakeholders interviewed at some waterways was limited. Information from stakeholders was supplemented by a review of existing extensive public consultation documentation to achieve a more comprehensive understanding of stakeholder perspectives relative to the waterway operations.

In general, secondary data available in the Agency related to program inputs was of limited use in addressing the core evaluation questions and indicators. As noted expenditures, asset and human resources data is incomplete and not collected consistently across all sites. In some cases we compensated for these problems by drawing on locally available data provided by management. However, it was well beyond the scope of the evaluation to develop new primary data or conduct the kind of detailed transaction analysis that would be required to mitigate the impacts of the missing or inconsistent secondary data. Therefore, the evaluation relies heavily on the analysis of literature, documents and records, and qualitative data obtained from key informant interviews and site visits.

4. EVALUATION FINDINGS

4.1 RELEVANCE

Question 1	Indicators
Is through waterway management aligned with federal roles and responsibilities?	<ul style="list-style-type: none"> Extent to which through waterway management is constitutionally and legally aligned with federal roles and responsibilities and defines a role for PCA for waterway management.

Expectation: The federal government and PCA have a constitutional and legislative mandate for through waterway management.

The *Constitution Act* (1867) places “canals” and “rivers and lake improvements” under the jurisdiction of the federal government.²¹ Federal government ownership and operations of many waterways dates from this time. For instance, the ownership of the RC and the control of its water system were transferred from the Government of Great Britain to the Government of Canada under the *British North America Act* (1867). The originally provincially-owned bridges, dams, and locks in the TSW were transferred to the federal government by federal and provincial Orders-in-Council in 1905 and 1906 along with legal responsibility in the Trent and Severn watershed basins.²² We did not identify when the federal government assumed ownership and operation of the other waterways.

Federal management of waterways passed through several departments beginning in 1879 with the Department of Railways and Canals. In 1936, this Department was amalgamated into the newly formed Department of Transport. As noted, most of the PCA waterways were transferred to the Agency in the 1970’s. Decisions leading up to the transfer to PCA of the TSW and the RC were done with the clear understanding that the canal systems be maintained and operated with special regard to their important historical value, and that administration of the waterways would shift in emphasis from transportation to historic preservation, restoration and interpretation, natural environment preservation and interpretation, and the development of facilities to enhance outdoor recreational enjoyment. The *Parks Canada Agency Act* (1998), which established the Agency, specifically includes management of historic canals (i.e., listed under other protected areas) as an Agency responsibility.

The federal government continues to own and operate a few other waterways including: the St. Lawrence Seaway, through the St. Lawrence Seaway Management Corporation; the Canso Canal in Nova Scotia, managed by the Canadian Coast Guard; and the St. Andrew’s Lock and Dam in Manitoba, managed by Public Works and Government Services Canada (PWGSC). These waterways are primarily used by commercial rather than recreational traffic.

Under the *Constitution Act*, provinces have authority over the natural resources within their borders. While not specifically referenced in the Act, this is understood to include water resources. The provinces are thus “owners” of the water resources and have primary responsibility over most areas of water management, including wide responsibilities in their day-

²¹ s. 92.10(a) and Schedule III

²² The TSW Panel report noted that: “There is no clear, concise single document that delineates the jurisdictional boundaries of the TSW. There are several Acts, Orders-in-Council, correspondence, and actions by both the federal and provincial governments that have been used to define the administrative margins and limits of the Waterway.”(<http://www.tswpanel.ca/english/downloads/Legislative-Review.pdf>)

to-day management. However, the federal government retains jurisdiction related to fisheries, navigation, federal lands (e.g., NPs), and international relations.

In practice federal involvement in watershed management is rare outside of the few waterways managed by the Agency. For example, PWGSC is responsible for managing water levels for Lake Nipissing and the French River in northern Ontario, where the government owns and operates three dams, which are important for effective water management.

Question 2	Indicators
Is through waterway management consistent with government and Agency priorities?	<ul style="list-style-type: none"> • Extent to which through waterway management is consistent with the Agency's mandate and priorities. • Extent to which through waterway management is consistent with the Whole of Government Framework.

Expectation: Through waterway management is consistent with the Agency's mandate and strategic outcomes.

As noted, the *Parks Canada Agency Act* 1998, includes the management of historic canals (i.e., listed under other protected areas) as an Agency responsibility.

The operation of waterways as NHSs creates clear links to the Agency's core mandate and strategic objective of protection of natural and cultural resources, presentation and promotion of these to the public, and providing visitor experiences so that the places are enjoyed by Canadians. However, there are additional roles and responsibilities inherent in owning and operating the waterways such as ensuring public safety, managing other uses of water, and supporting through transportation corridors, that are not part of the Agency's core mandate.

The extent to which particular activities and outputs of the operations of waterways contribute to mandate versus non-mandate objectives was the subject of much discussion and debate throughout the course of the evaluation, and in our view contributes to some of the differences between waterways in coding of expenditures to various purposes. For example, management of water levels in waterways contributes both to public safety (e.g., preventing flooding), and to through navigation of the waterways (i.e., the ability to navigate by boat from one end of the waterway to the other). Preservation of through navigation is viewed as both an important component of the historic character of some waterways, and as a key contribution to the visitor experience, both of which are core to the Agency's mandate. Management of water levels also contributes to various environmental objectives, such as the protection of species at risk and fish habitats, which are also closely aligned with the Agency's core mandate.

Expectation: Through waterway management is consistent with the Whole of Government Framework.

Collectively, the activities and outputs of waterway operations contribute to a variety of wider federal government priorities as expressed in the Whole of Government Framework.²³ Management of the

waterways from the core mandate perspective contributes to the Vibrant Canadian Culture and Heritage and A Clean and Healthy Environment outcomes (i.e., the national significance of the sites; the number of cultural resources within the sites; and the large number of environmental impacts inherent in waterway management, such as water quality, fisheries and fish habitat,

²³ <http://www.tbs-sct.gc.ca/ppg-cpr/frame-cadre-eng.aspx>

species at risk, wetlands, and migratory birds). The Agency's focus on the condition of critical waterway assets, such as dams and bridges, as well as water level control for flood mitigation, contributes to the government's priority of a Safe and Secure Canada (i.e., maintain the safety and security of Canada and its citizens). Maintaining and controlling water levels and flows contributes, although less directly, to Canada's Strong Economic Growth outcome. The following section describes some of the public benefits of through waterways.

Question 3	Indicators
Is there a continued need for through waterway management?	<ul style="list-style-type: none"> • Level of use (trends in navigation and other appropriate uses). • Extent that through waterway management provides important social and economic benefits. • Public support/demand for through waterway management.

Expectation: There is a strong public benefit derived from through waterway management.

In this section we review evidence on the extent of four types of public benefits inherent in waterway operations, as well as public support for management of waterways for public benefits.

Protection of Public Safety and Property: Waterway operations contain inherent risks for public safety and destruction of property from flooding should a dam fail or if in-flows or out-flows are not anticipated and managed. The extent of risk will depend on two factors: the location of the assets (i.e. some are located in or near larger communities such as Montreal, Ottawa, Peterborough and Smith Falls, which puts larger populations at risk) and the condition of

Table 7. Waterway Dam Risk Ratings²⁴

Field Unit Classification	Western Québec	Eastern Ontario	Central Ontario	Others	Total PCA
Very Low	0	0	4	2	6
Low	7	7	17	2	33
Significant	10	14	23	8	55
High	3	7	13	1	24
High _{ABC}	13	9	66	1	89
TOTAL	39	40	154	27	260

Source: Office of the VP Operations, Eastern Canada

Ratings are generally based on experience and professional judgement supported by reviews conducted by consultants (i.e., one field unit). In others, the review is described as more of a preliminary "table top" exercise. Table 7 shows the classification of the dams from very low to very high risk by field unit based on the preliminary assessment.

Dams in the High_{ABC} category all have some potential for loss of life should they fail (i.e., A=1-10 people affected, B=11-100 people, and C=100 or more people). Potential property damage was rated on a scale from very low (i.e., less than \$122K in damage) to high (i.e., losses in excess of \$12.2M including destruction or extensive damage to large residential, institutional, commercial and industrial areas, and/or damage to major infrastructure such as highways,

the assets. Recently, the Agency has begun to quantify the extent of the risks associated with dams and water retaining structures on the waterways (i.e., based on criteria such as potential loss of life, damages to third party property, to potential damage to the environment and cultural or heritage assets).

²⁴ These are defined as structures impounding at least 30,000 m³ of water and at least 2.5 m high, or, any retaining structures if the consequences of operation or failure are unacceptable to the public.

railway lines, municipal water and wastewater treatment facilities, hospitals, schools, police and fire stations, and publicly owned utilities).

Based on this preliminary assessment, across the whole system there is a minimal risk of 600 lives lost and an estimated minimum of \$1.4 B in property damage. It should be noted that these numbers represent the potential impacts (consequences) of dam failure and do not take into account the probability or likelihood of the event happening (i.e. the condition of the structures). It should also be noted that these numbers are very preliminary and are likely to change over time as better information becomes available.

Socio-Economic Benefits of Waterways: Waterways provide general socio-economic benefits in the form of direct and indirect employment and by contributing to the country's GDP. All the waterways have conducted this kind of analysis at some point in time and all show various positive contributions as shown in Table 8.

The studies do not consider indirect benefits, such as impacts on property values for residences along the waterways²⁵ or benefits from other appropriate uses of waterway resources such as hydro-power generation.

Table 8. Socio-Economic Benefits of Waterways

Waterway	Year of Last Study	Total Employment	Total Contribution to GDP (\$)
Sault Ste. Marie	1992	56	1,931,453
Trent-Severn Waterway	2000	1,600	49,700,000
Rideau	2011	641.5	42,777,618
Carillon	2008	37	2,135,496
Ste-Anne-de-Bellevue	2008	24	1,405,419
St-Ours	2008	29	1,461,079
Chambly	2008	165	8,746,315
Lachine	2008	178	9,827,141
St. Peters	2007	6	208,180
Total		2,737	118,192,701

Directly or indirectly much of these benefits have been attributed to water management. Without water control there would be less shoreline and lake area, limited or no access to adjacent lakes, and a greater risk from fluctuating water levels and flooding. The attractiveness of the area for boating and residential activity would be significantly reduced. For

example, the area surrounding the Lachine Canal was virtually abandoned during the period that the waterway was closed to through navigation, but has become revitalized since it reopened in 2002, reportedly generating more than \$1 billion in private investment to date.²⁶

Power Generation: According to an inventory in National Office, 24 hydro power generation sites are located on the RC (n=6) and the TSW (n=18) with an estimated total power generation

²⁵ For example, the *TSW Panel* estimated that waterfront residential property at this waterway alone is worth \$23.6 billion, seasonal and permanent waterfront residents generate more than \$1 billion in economic activity and \$240 million in municipal property taxes each year, the waterway supports a \$300 million recreational fishery (Ontario's largest), and water-based tourism generates tens of millions more dollars.

²⁶ A 1987 study of the economic benefits of the Lachine Canal estimated its contribution to GDP to be close to \$4M. Since the canal reopened in 2002, the estimate of its benefits has almost doubled.

capacity of more than 100 MW.²⁷ Actual power generation is less than total capacity since water for power generation is only available when it is surplus of other requirements (e.g., navigation, resource protection, etc.). The exact amount of power generated is not readily available in the Agency (i.e., determining this would require detailed analysis of invoicing of license holders). The total power generation capacity of the facilities associated with the RC and TSW is a small fraction of the power generation capacity of the province of Ontario.

The Agency is currently pursuing the establishment of another power generation site on the TSW and has estimated that there is the potential to increase hydroelectric generation capacity on the TSW by more than 50% (i.e., as of February 2010, the TSW had identified 11 potential hydro generation projects that could be brought into operation before 2020). By contrast, opportunities for new power generation at the RC are considered to be limited.

Water Intake: Many residential, commercial, and/or government organizations draw water from the waterways for industrial applications or as a source of water for treatment to make it potable. In principle, drawing water from a waterway requires a licence issued by PCA. Water intake licences do not take into account the waterfront residences that use water directly from the lakes and rivers of the waterways. We identified 100 water intake licences for four waterways managed by the Agency, with the majority of these on the RC and TSW (i.e., 93 of the hundred were for these two waterways with five additional on the Lachine Canal and two on the Chambly Canal). Table 9 shows the number of organizations of various types with a licence to draw water from the RC and the TSW.

Table 9. Number of Water Intake Licences by Holder for RC and TSW

Licence Holder Entity	RC	TSW	Total
Commercial	3	9	12
Company		3	3
Federal Government Department	1	1	2
Municipality	6	9	15
Non-profit Organization		1	1
Public Institution		3	3
Residential	3	41	44
Utility		3	3
Grand Total	13	70	83

Source: National Office, Strategy and Plans Directorate, Real Property

Note: Some municipalities have more than one licence. Data was not reconciled with Field Unit data.

Table 10. Municipalities with Water Intake Licences

Waterway	Municipality	Population
Rideau Canal	Smith Falls	8,777
	Perth	5,907
Trent-Severn Waterway	Township of Smith-Ennismore-Lakefield	17,413
	Kawartha Lakes (includes Bobcaygeon-Verulam)	74,561
	Quinte West	42,697
	District Municipality of Muskoka	6,467
	Municipality of Trent Hills	12,247

Source for population figures: Statistics Canada Community Profiles for the 2006 Census. **Source for water intake licences:** National Office Realty Services

²⁷ According to the TSW, there are 18 hydro sites on the TSW proper, one more dam at Nassau, and three more on the Otonabee River, all of which are impacted by TSW water level management. There are also four more in the reservoir lakes system. Other sources report a smaller number of power generation stations (e.g., the Ontario Waterpower Association submission to TSW Panel). We were unable to reconcile the various lists.

Additional information on the municipalities licensed to draw water from the RC and TSW is shown in Table 10.²⁸ Some of the municipalities have more than one licence. Based on this information, at a minimum, an estimated 106,000 Ontarians rely on the RC and TSW for their water supply. Management reported that an additional estimated 50,000 persons rely on water from the Richelieu River where PCA manages one dam at the St. Ours Canal, in Quebec.

Transportation Routes: The extent to which bridges over waterways serve primarily PCA mandate purposes (i.e., facilitating visitor experience, or in the case of bridges that are designated cultural resources being an end in themselves)²⁹ versus public transportation purposes as part of municipal or provincial transportation infrastructure was much debated during the course of the evaluation. We heard views ranging from treating only a small minority of bridges as essentially public infrastructure to treating all bridges as primary public infrastructure. In the latter case, the analogy is made to the way the Agency treats numbered federal or provincial numbered highways that pass through NPs or NHSs (i.e., the through highway management sub-activity in the PAA). Through highways are treated in their entirety as public goods.³⁰

We know that the TSW and RC as well as the Lachine, Chambly and St. Peter's Canals all have bridges crossing them. It is widely acknowledged that closure of a bridge, either permanently³¹ or on a temporary basis, for repair or recapitalization, can have significant impacts on communities and residents. For example, emergency closure of a swing bridge on provincial Highway 45 in Hastings, Ontario, was reported to have resulted in a detour of approximately 40 km while work was completed.³² Other bridge closures were also reported (e.g., Abbott Street Bridge in Smith Falls for six months, and the Perth Swing Bridge for 18 months) although the impact on the communities along the RC is not known. As the Agency does not systematically track either the number of bridge closures (or the duration) and traffic volumes on bridges, it is impossible to quantify the public impacts of these events.

Finally, it is useful to note that the Agency's approach when replacing or renovating bridges is to ensure the new or modified structures meet present day code and load requirements, which may exceed what the Agency requires for the purposes of its mandate (e.g., a heritage bridge originally built for horse and buggy traffic which is replaced or upgraded with a bridge suitable for modern truck traffic).³³ Upgrading bridges to accomplish non-mandate objectives is essentially a contribution to the public good. We were unable to determine the extent to which this occurs during the evaluation.

²⁸ The table does not include the data for Ottawa that has a licence to draw water but as the canal is not the major source of water it is not included.

²⁹ The Agency's AMS identifies 17 bridges as designated cultural resources. Management of the canals on the other hand reports 35 bridges as cultural resources (i.e., 1 at St-Peter's, 4 at Lachine, 4 at Chambly, 12 at Rideau, and 14 on the TSW).

³⁰ Non-highway roads in contrast are all treated as assets supporting the Visitor Experience program activity.

³¹ Five of the nine original bridges on the Chambly Canal were reported to be permanently closed.

³² <http://www.trenthills.ca/en/resourcesGeneral/hastingsbridge.pdf> Distance was calculated using Google maps, following the detour route identified.

³³ For example, the *Standards and Guidelines for the Conservation of Historic Places in Canada*, second edition states that "in the case of a historic bridge that is unable to support current traffic loads, minimal intervention might well mean significant intervention to assure public safety." Management at the TSW for example reported that, as a result, bridge repairs and maintenance are undertaken to meet current highway standards.

Expectation: There is evidence of continued support/demand for through waterway management among Canadians and user groups.

It is reasonable to presume that Canadians, including user groups, support the Agency's management of waterways for activities contributing to the public good (e.g. investing in assets, such as bridges, to support the safe use by the public). However, we found no direct

evidence to support this presumption.

Public opinion polling (2009) has shown that only a small minority of Canadians are aware of the Agency's role in managing NHSs in general. With respect to waterways in particular, most site managers and several stakeholders interviewed for the evaluation agreed that while some direct stakeholders are likely highly informed and involved, the majority of Canadians and even many local or regional stakeholders are likely unaware of the extent to which PCA plays a role in asset or water management on its through waterways. Where evidence does exist, for example from a study of water management benchmarks completed for the TSW Panel, it was widely agreed that ensuring public safety should be the paramount issue in waterway management.

OVERALL FINDING: RELEVANCE

Through waterway management continues to be relevant. There is a clear constitutional, legal and long standing historic basis for federal government ownership and operation of these particular waterways. The Agency's authority for managing waterways is clearly identified in the *Parks Canada Agency Act* and other relevant legislation or regulations. The manner waterways are managed within the Agency is consistent with and contributes to the Whole of Government Framework outcomes, particularly health and safety, economic development, and a vibrant Canadian culture and heritage.

By definition the through waterway management sub-activity of the PAA was designed to isolate and highlight public benefits of waterway management as distinct from activities serving the Agency's core mandate. The extent to which the mandate-related aspects of waterway operations can be separated from the non-mandate-related aspects has been the subject of much discussion and debate within the Agency. It was often noted that the same activities or outputs on the ground (i.e., maintaining water levels within set ranges and predicting and managing flows of water over time) contribute simultaneously to the achievement of multiple objectives (i.e., navigation for purposes of commemorative integrity and visitor experience, conservation of resources, and public safety and other appropriate water uses).

Although there is debate on the extent to which particular infrastructure and/or activities serve mandate as opposed to public good objectives, there is little debate about the fact that operations of waterways provide various public goods beyond the mandate. These include ensuring public safety and preventing the destruction of property (i.e., largely through flood control), as well as other ancillary benefits such as the production of hydro power, the provision of water for municipalities, and the provision of waterway bridges which have a role in supporting municipal and provincial transportation systems.

The Agency has taken steps to quantify the extent of public benefits through risk assessments of waterway dams and the potential for loss of life and property damage and has some information

available on the general socio-economic benefits of waterways, the extent to which they support water demands in surrounding communities, and the extent of potential hydro power generated on two waterways. It lacks quantitative information on the extent to which the waterway bridge infrastructure supports general transportation needs and the impacts of closures of this kind of infrastructure on the transportation system.

4.2 EFFECTIVENESS

Findings related to effectiveness are divided into two parts: effectiveness of asset management and effectiveness of water level management, corresponding to the two major performance expectations for the sub-activity.

4.2.1 Effectiveness of Asset Management

Question 4	Indicators
To what extent has the Agency made progress towards its performance expectations with respect to the condition of contemporary assets?	<ul style="list-style-type: none"> • Meaningfulness and clarity of indicators, baselines and targets. • Extent to which asset condition has been assessed and progress is being made to achieve targets.

Expectation: Performance targets are clear, meaningful, and progress towards intended levels of performance is being achieved.

Since 2008-2009 the Agency has set two performance expectations for the management of assets on through waterways:

- 1) The condition of 75% of waterway contemporary assets is maintained by March 2013; and
- 2) The condition of 25% of waterway contemporary assets rated as poor or fair is improved by March 2013.

These are not direct measures of outcomes but rather were deliberately designed to measure outputs (i.e., both targets focus on the condition of the waterway assets which, barring budget limitations, is directly under the Agency's control).³⁴

Indicator: Meaningfulness and clarity of indicators, baselines and target.

The condition of waterway assets appears to be logically related to a variety of outcomes relevant for both mandate and non-mandate objectives. Assets are required to be in reasonable condition for continued use and enjoyment of places, ensuring continuity in service delivery. For designated cultural resources, maintaining the asset in reasonable condition is an end in itself. The condition of water control/management assets (e.g., dams, water retaining structures) as well as waterway bridges also has obvious relevance to the non-mandate objectives of ensuring public safety and supporting general transportation objectives.

Although on the face of it asset condition is relevant to various outcomes, some exceptions were identified during the evaluation. In particular, it was noted that a dam which may be rated in good condition, may have serious limitations related to its initial design, so that condition does not provide a good basis for assessing the true risk associated with the asset.

The current targets set out in the Corporate Performance Framework have a number of problems.

- The expectations and targets refer to “contemporary” waterway assets. However, there is no consensus on the definition of contemporary in this context. It is sometime taken to mean

³⁴ An *output* is a product or service stemming from the activities of an organization, policy, program or initiative, and usually within the control of the organization itself. An *outcome*, which represents an external consequence attributed, in part, to an organization, policy, program or initiative and not within the control of a single organization, policy, program or initiative, but within the area of the organization's influence.

assets that are **not** designated as cultural resources and sometimes taken to mean assets with a contemporary function whether or not the asset is a cultural resource.³⁵

- The confusion is compounded by the fact that the Agency's chart of accounts, at least for the through waterway management sub-activity, focuses on the purpose of an investment in an asset rather than the type of asset. Expenditures whose primary purpose is for water level management or flood abatement (e.g., repairs to a dam whether or not it is a cultural resource) are to be coded to the through waterway management sub-activity, as are expenditures on a waterway bridge when the purpose of the investment is to address public safety concerns or to facilitate the flow of through land transportation. In other words, there is no distinction between contemporary and other assets however they are defined.³⁶
- In addition to the problems of identifying the relevant assets for the purposes of the performance expectation, there are problems with the way the target is worded. The Agency typically categorizes asset condition into four levels—good, fair, poor or closure—based on the time required before a major repair will be needed. The target as written does not specify the baseline condition profile of the relevant assets and it is not clear what is implied by setting a target specifying that the condition of 75 % of the assets will be “maintained” given the profile will have some percentage of assets in each condition level.³⁷

As a result, we concluded that while asset condition is generally conceptually relevant to the outcomes of interest, the performance expectation and targets as written do not provide a meaningful basis for measuring the Agency's performance. In addition, in some cases, condition itself may not be the most relevant indicator, as, for example, when an asset is not appropriately designed to the role it plays in the system.

Indicator: Extent to which asset condition has been assessed and progress is being made to achieve targets. The Agency has a system in place for assessing the condition of assets and condition ratings for waterway assets are available in the AMS. However, the data on condition, as with many elements of the AMS data, has not been systematically reviewed and updated for many years, so it does not provide a reasonable basis for tracking the condition profile over time.

There is some reasonably good recent data for selected groups of assets that are identified as high risk. A March 2010 report on 116 waterway bridges (road, pedestrian bridges along with structural culverts) found that the condition of 73% of these had been assessed in the previous five years and the resulting profile showed 24% in good condition, 42% in fair condition, 28% in poor condition, and 7% were closed.³⁸ Preliminary results from the review of the safety of dams and water retaining structures found that approximately 33% of dams and water-retaining structures at the RC, 42% at the TSW, and 38% in the WQFU were in poor condition. These are

³⁵ Contemporary can also be seen as meaning “new”. A cultural resource is not new in this view but neither is a hundred year old bridge that is not a designated cultural resource. Thus new means constructed in the relatively recent past without any precise definition of the age limits of the new asset.

²⁵ In practice, however, only some waterway assets (i.e., breakwaters, dams, weirs, locks, channel walls and bridges as shown in Table 4) are likely to provide public as opposed to private benefits, so that only a subset of canal assets would be relevant to the through waterway management sub-activity.

³⁷ This issue also applied to how the Agency set its performance target for condition of highway assets (see *Evaluation of Through Highway Management*, 2010).

³⁸ PCA Performance Report 2008-09, p. 56.

considered to be conservative estimates where reliable data is lacking. In both cases, the results provide a baseline at best for tracking progress in the future.

Agency staff we interviewed generally shared the perception that assets are deteriorating. Stakeholders providing input to the TSW Panel also noted deficiencies in condition (i.e., in some areas leaking dams have resulted in additional water losses compounding issues related to low lake levels during dry periods). During site visits, we observed numerous examples of leaking dams, deteriorating concrete, canal walls that were crumbling or slipping into the waterways, major sinkholes in grounds surrounding structures and many other examples of assets in poor condition (see photographs). In short, while there are various sources of qualitative evidence of deteriorating assets there is no systematic data on the condition of the complete relevant asset portfolio overtime. What effect deteriorating assets has had, or will have, on the overall ability to achieve objectives is also not known with certainty although management at least at some waterways did report that it is impacting on their ability to manage water.³⁹



4.2.2 Effectiveness of Water Management

Question 5	Indicators
To what extent has the Agency met its performance expectations with respect to water level management?	<ul style="list-style-type: none"> • Extent to which systems have been developed to obtain accurate and timely water level gauge measurements. • Extent to which water level gauge measurements meet legal and/or operational requirements. • Unintended (negative) results as a result of water management are minimized or avoided where possible.

The Agency has a varying degree of control over water levels within specific waterways. Relative to other waterways, the RC and the TSW, which manage parts of watersheds including important reservoir lakes, have more control over water intake, levels and flows, although they do not control all of the relevant watersheds. The St. Ours Canal in Quebec also has some control of the water management of the Richelieu River. Other waterways may exercise more limited control over levels within the waterway channel by allowing water in or out of various segments (i.e., when more than one lock or a dam is present) or through water intake and discharge outlets within the waterway channel as is the case, for example, with the Lachine and Chambly Canals. Lack of control over water level implies that these are immediate results of waterway operations rather than outputs as is the case for the condition of assets. Water level control serves a variety

³⁹ Management at the TSW reported for example operational changes to two dams (e.g., Dam 37 and Lock 23) as well as various emergency bridge closures lasting from a very few days to two years as evidence that deteriorating assets were impacting on its ability to effectively manage water levels or serve larger public interests.

of intermediate or longer-term outcomes related to both the mandate and non-mandate objectives.

Lack of control may, for most waterways, be mitigated by working in cooperation with other stakeholders and partners to ensure respective needs are met (i.e. communicating surges of water from hydro power generation). In some cases, however, competing interests for water may impact on the Agency's ability to manage levels. For example, on the RC, water rights for some reservoir lakes that supply flows to the canal's southern sector are currently owned by a third party who is interested in divesting these rights. If the rights are sold to another party interested in maintaining levels in the lakes (e.g., local cottage owners), the outflow from these lakes could be reduced or curtailed entirely with consequent impacts on the Agency's ability to maintain water flows in the waterway. In short, many users benefit from the water managed by the Agency for relevant waterways. Users' interests sometimes coincide with the mandate of maintaining navigation and are sometimes in conflict with that mandate or with each other's interests.

Expectation: Legal and operational requirements for water levels are understood.

Up to 2007-2008, the Agency's performance expectation was to "develop an inventory of water control obligations, targets, and protocols for measuring compliance by March 2007."

The Agency's Performance Report for 2007-2008 noted that inventories of water control obligations had been completed for all "major" waterway systems managed by PCA (i.e., for the RC, TSW, and Lachine Canal as set out in 53 agreements with industries, commercial and recreational businesses). However, management was not able to locate this inventory of water control obligations during the course of the evaluation.

The focus on obligations to, or agreements with, "industries, commercial and recreational businesses" implies there are commitments to maintain specific water levels to support these third parties. However, the Agency's *Historic Canals Policy* is clear that use of water by third parties is only allowed when there are levels and flows that are surplus to requirements for navigation (i.e., navigation as a primary objective of water management is discussed below) and then only if the use is consistent with, or does not threaten, other Agency cultural or ecological protection objectives, or pose public safety issues. As a result, licenses to draw water for purposes of power generation, or which allow communities to use waterways for water intake, do not contain any reference to a guaranteed supply of water.⁴⁰

Within the Agency, three kinds of obligations to maintain water at certain levels are typically identified:

⁴⁰ In the case of power generation, lack of guaranteed water supplies likely accounts for the fact that power generation is below the estimated capacity of the generating stations. Municipalities are not guaranteed a specific water level either. This has little impact because water intake pipes are located at a sufficient depth so water intake is not affected by fluctuating levels. Also, outflows of treated water are put back into a canal, effectively balancing inflows, so the activity has no or little net effect on overall water levels.

- Maintaining water levels sufficient for the purposes of “through” navigation on the waterways with the sometimes corollary sense that navigation is part of the commemorative integrity of the site or important to the overall visitor experience;
- Protecting or supporting various environmental objectives such as providing habitat for species at risk or maintaining wet lands or fish habitats; and
- Ensuring public safety and safe guarding assets.

Commemorative Integrity

Commemorative integrity of an NHS refers to the health or wholeness of a site. It is assessed based on the condition of the site resource, effectiveness of communicating the reasons for commemoration of the site, and on the extent to which selected management practices support the preservation of the site.

The obligation to maintain water levels for the purpose of through navigation stems from an inherent public right to navigation in Canadian waters.⁴¹ Support for and restrictions on the public right to through navigation are contained in the *Navigable Waters Protection Act* (1985) which prohibits the building, placing or maintaining of any work whatsoever in, on, over, under, through, or across any such navigable water (i.e., expressly including waterways), without the authorization of the Minister of Transport Canada. The Act is supported by the *Historic Canals Regulations*, which apply only to the nine waterways managed by the Agency. The regulations set out a variety of provisions for PCA superintendents to control and authorize various activities, events, or practices in waterways to protect resources (e.g. cultural, including historic character, and natural, including wildlife, eggs, habitat); protect structures, equipment, and other objects in the waterway; ensure the safety of vessels and persons; and ensure the safe operation of locks, dams, and bridges.

Advice provided to the Agency has concluded that the right to through navigation requires the Agency to operate its waterways so as to allow navigation of the entire length of a waterway by boat traffic, although the *Historic Canal Regulations* provide authorities for restricting navigation for various purposes. It was also suggested that restrictions to navigation must be temporary and reasonable and cannot be long-term or permanent changes affecting the ability to navigate from end to end.

The maintenance of through navigation in some waterways has also been linked to the reasons the place was designated as a NHS and/or as part of maintaining the commemorative integrity of the site. For example, the commemorative integrity statement (CIS) for the RC states that the designated place will be unimpaired or not under threat when “through navigation of the canal is maintained.” Even where its importance is not specifically recognized in the CIS, site managers often noted during interviews that continued operation as a through navigation route is

Commemorative Integrity Statement

A Commemorative Integrity Statement (CIS) is a document which identifies what is meant by commemorative integrity at a particular national historic site. It provides a baseline for planning, managing, operating, reporting and taking remedial action.

⁴¹ In general, navigable waters include all bodies of water that are capable of being navigated by any type of floating vessel for transportation, recreation or commerce. The public right of navigation is not written anywhere – it is a right that has developed over time through Common Law. If the waters are navigable, then the public has the right to navigate. Gaining approval to restrict the public's right to navigate can only be done a few ways, including an Act of Parliament. (see <http://www.tc.gc.ca/eng/pacific/marine-nwpp-applicationguide-1328.htm>).

critical to presenting the historical messages of the site as this animates the waterway for visitors to create a sort of living history.

In addition, the Agency's *Historic Canals Policy* (1994) states that the objective of waterways is "to foster appreciation, enjoyment and understanding of Canada's historic canals **by providing for navigation**; by managing cultural and natural resources for purposes of protection and presentation; and by encouraging appropriate uses." A waterway that for some reason is no longer navigable is no longer subject to the policy (i.e., the Agency does not consider it a historic canal). Where navigation is maintained, the policy states that PCA objectives will be to maintain adequate water depths, structures and navigation aids to provide for navigation.

The obligation to provide through navigation is independent of obligations to maintain or manage water levels and flows for other purposes, such as ensuring public safety, preventing property damage, contributing to the commemorative integrity of an NHS, supporting visitor experience objectives, and furthering environmental objectives (e.g., maintaining habitat for species at risk or fish populations). In particular, the right to through navigation is not relevant to managing water for public benefit purposes. However, as noted many times during the evaluation, it is the same assets and activities that contribute to the various outcomes so that, for example, limiting through navigation (if it were possible) would not impact on the need for the infrastructure and assets required for ensuring public safety (i.e., the dams and water retaining structures would still be required), although it might have implications for how these were operated.

<p>Expectation: Systems are developed (or exist) to obtain accurate and timely water level measures.</p>	<p>The Agency has a variety of systems for measuring water levels across the waterways. These range from simple visual inspections of the water level against depth markers along the canal walls to complex networks of manual and automated gauges providing hundreds of readings throughout a waterway.</p>
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The measurement systems on the RC and TSW are the most complex. There are a reported 17 automated gauges in use on the RC, as well as continued in-person measurement based on wooden stick gauges. On the TSW, there are an estimated 100 automated gauge stations, 11 rainfall stations, and 100 manual gauges. The St. Ours Canal also has automated probes for measuring water levels that relay the information directly to the automated dam system. The other six waterways rely generally on visual rulers usually located on or in close proximity to lock stations to assess water levels.

In the RC and TSW systems, water level management involves not only knowing the current water depth/level but predicting future levels and anticipating how much water to retain in reservoirs and when to release it. This requires information on water flows and climate (e.g., rain fall, snow pack) and modelling future scenarios to support decision-making year round.

The Agency has gradually been investing in new equipment to support water management in these waterways. For example, between 2009 and 2011, the TSW spent close to \$500,000 to upgrade its water management gauge network. The RC spent an estimated \$110,000 to purchase

new equipment to replace old gauges and add three new measurement sites. It is generally agreed that additional improvements are required to improve data quality.

Water Level Targets: All the waterways have desired water depths/levels to support permitted boat traffic. Table 11 shows the maximum draught (i.e., the amount of vertical distance from a boat's water line to the bottom of its keel or the depth of water required to float a vessel), for each of the waterways with a range of approximately 1.5M to 5M. Some of these levels are set in regulations.

Table 11. Navigational Dimensions (in meters)

Waterway	Length	Width	Draught	Clearance
Sault Ste. Marie	77.00	15.40	3.00	n/a
Trent-Severn Waterway*	25.40	7.00	1.80	6.70
Rideau*	27.30	8.50	1.50	6.70
Carillon	54.86	12.19	2.74	12.80
Ste-Anne-de-Bellevue	54.68	12.19	2.74	12.62
St-Ours	99.06	12.04	3.66	8.84
Chambly*	33.52	7.00	1.98	8.84
Lachine*	49.00	12.20	2.00	2.43
St. Peters	91.44	14.45	4.88	**6.00
* For these, the size of the smallest locks / portions.				
** Swing Bridge				
Source: PCA Waterway Internet Sites				

Water level targets sufficient for vessel traffic are often lower than the actual water depth in waterways. For example, the St. Ours Canal has a draught of 3.66M but maintains water levels at a constant depth of 6.85 m throughout the 0.2Km of the canal.⁴² In the RC and TSW, target levels vary for different portions of the waterway (often by lock station) and for the reservoir lakes which feed the system. Target water levels at lock stations are expressed as an acceptable range of the height of the water in meters above sea level (see Appendix H for target levels for various lock stations). The desired range of the target is often very narrow (i.e., less than a meter).

The Agency manages the levels of some water bodies with its waterways according to “rule curves,” or “operational guidelines,” which specify the desirable water level of the water body for each day of the year (i.e., again expressed as meters above sea level) along with an upper and lower water conservation level. The guidelines themselves are based on historic water levels for the water body.⁴³

Expectation: Performance targets are clear and meaningful.

The corporate performance expectation is that 90% of water level gauge measurements are within the prescribed range established to meet legal and/or operational obligations. It has been in place since 2008-2009.

Logically, maintenance of water levels is related to a variety of outcomes of interest such as public safety, protection of property, protection of cultural resources and ecosystems, continuity of service delivery, continued use and enjoyment of the places, and continued good reputation and effective partner relations. However, as with the asset condition metric, there are a number of practical problems with the water level target. These include:

⁴² Manuel des opérations pour le barrage de Saint-Ours, 1993.

⁴³ The RC guidelines, ranges, and targets were based on studies in 1977, updated in 1994. The TSW has until recently based its operational targets on studies from the late 1960's and early 1970. A new study of water level obligations and targets on the TSW was being completed as the evaluation was concluding.

- Lack of clarity on the existence and specifics of targeted water levels at some waterways beyond minimal levels required for the draught of vessels using the waterways.
- Lack of understanding of the rationale behind setting the compliance rate to 90%. Some deviations are expected so the compliance target was not set at 100%. However, as was noted at several points during the evaluation, the frequency of deviations from targets is less important than the ultimate impact of the deviations (i.e., targeted water level ranges where they exist are often small so that many small deviations from the targeted range may have little or no impact on objectives, while a single significant deviation due to extensive flooding would have very significant impacts). In this view, a more meaningful metric would be how effectively a site anticipates and mitigates sudden inflows that could cause flooding.
- Lack of clarity on whether the target applied to all, or only some of the waterways, and if only to some, which ones. In business planning (2010), only the Rideau, Lachine and Chambly Canals and the TSW were required to report performance against the target. These four waterways are the longest, with the most assets and the largest expenditures. Presumably, maintaining water levels at these through waterways has the most consequences for ensuring public safety and contributing to the achievement of the Agency's other objectives. This rationale was not clear to managers in the field, particularly in the WQFU where it was assumed that the target should (only) apply to waterways that had some control over water outside the waterway channel (i.e., not to the Lachine and Chambly Canals but at the St. Ours Canal, along with the RC and TSW).

Expectation: Evidence of progress toward effectively managing water (i.e. progress on achieving corporate targets and/or other indicators of effective water management).

Given the various problems with understanding the nature and application of the corporate performance target for water level management, it is not surprising that there is a lack of rigorous evidence that the target is actually being met. Managers at the St. Ours Canal, as well as the RC

and TSW all reported they believed that water levels were within prescribed ranges 90% or more of the time (i.e., in the case of St. Ours it was reported that the automated nature of the dam meant there was never an issue with maintaining targeted water levels). These reports, however, are based on observation and experience and not a systematic detailed analysis of all water level readings for a given period.

Water-level data for the TSW is available on the Agency's website for 54 lakes and reaches within the system. We reviewed 16 of these—those which have specified upper and lower navigation ranges.⁴⁴ Program data was not available during the evaluation to support a detailed analysis. However, we did a visual review of the reported levels and coded them to general categories, finding four had water level ranges always above the specified navigation range, 8 were generally above (i.e. with the level dipping once or twice down into the navigation range), two were generally within the navigation range, and two could not be coded conclusively. There are, of course, several limitations of this rudimentary analysis. What is important, however, is

⁴⁴ Of the remainder, one had a guideline identified; one had a summer level without an upper or lower limit. Examples of the reported water levels are available here: http://www.pc.gc.ca/lhn-nhs/on/trentsevern/visit/newl/trent_e.asp.

that the consequences of deviations from the target ranges, in terms of public safety, navigation, or natural or cultural resource conservation, are not self evident.⁴⁵

OVERALL FINDING: EFFECTIVENESS

The corporate focus on through waterway management has been on maintaining or improving the condition of waterway assets (i.e., an output) and maintaining water levels (i.e., an immediate outcome). In both cases, we concluded that the expected results are generally relevant for assessing the performance of through waterway management, although there are some exceptions (i.e., a dam that may be in good condition but is not designed properly for its function in the system).

The expected results, while generally relevant, have a number of limitations. Problems with the asset indicator include a lack of understanding of what assets were included in the target, a lack of baseline data for assessing progress, and a lack of clarity on the targeted condition profile of assets in the future. The Agency has a long standing methodology for assessing the condition of assets but is not routinely reviewing and updating these ratings (or its inventories) so that except for a few classes of “high risk” bridge and dam assets, there is little up-to-date information on either the number or condition of potentially relevant assets. The general impression among those we spoke with is that the condition of assets is deteriorating although the significance of this for assessing performance over time is unclear.

There is reasonable evidence that management has in place systems and technologies for assessing water levels in the various waterways and has set targets for water levels at some waterways, although the basis of some of these targets may be quite old. There is evidence both from direct observation, interviews, and document review that numerous activities take place on a daily or hourly basis at the larger waterways to influence and manage water levels. At least at the two largest waterways, management is continuing to invest in the technology to measure water levels and improve communication to facilitate water management.

Although a measurement structure and targets exist, the Agency has never actually reported on the achievement of its water level target. Again, there are several problems in doing so. First, the nature of the Agency’s legal or other obligations to maintain water within waterways or reservoir lakes is not consistently understood. Second, the extent to which the target applies to some or all of the waterways and why or why not, is a source of confusion. Third, there is no clear protocol for how to organize what is, in some cases, a wealth of data for purposes of assessing performance against the target. Finally, there is a lack of understanding of why the specific value of 90% compliance with local targets was selected as the Agency’s overall corporate target and a related lack of clarity on the significance of deviations from local targets for longer-term outcomes such as public safety or navigation. Despite these problems, management generally is of the view that they are complying for the most part with the local water level requirements and when they do not comply it is well justified to manage or mitigate changing demands due to weather or other external factors.

⁴⁵ A similar analysis was conducted for the RC based on hydrographical charts for fourteen major lakes and reaches on the canal covering the period from 2007-2011. In this case, visual inspection of the data suggested that water levels were within targeted levels during the operating season.

4.3 EFFICIENCY AND ECONOMY

A program is **efficient** to the extent a greater level of output is produced with the same level of input, or, a lower level of input is used to produce the same level of output. The level of input and output could increase or decrease in quantity, quality, or both. A program is **economical** to the extent the cost of resources used approximates the minimum amount needed to achieve expected outcomes (Treasury Board *Policy on Evaluation* 2009).

In the case of the through waterway management sub-activity, inputs consist of the overall budgets (expenditures), the staff and assets. Outputs include risk assessments, project proposals and plans, completion of inspection regimes and condition of assets, completed activities intended to regulate water flows and levels (e.g., dams and locks operated) and licenses granted. Outcomes include maintaining water levels, avoidance of disasters, and maintaining transportation flows.

Question 6	Indicators
Is the program economical in producing the expected results and efficient at producing the expected outputs relative to the resources it consumes?	<ul style="list-style-type: none"> • Extent to which there is a relationship between investments and Agency priorities. • Expenditures relative to industry standards and benchmarks.

As noted in the description of the sub-activity, there is uncertainty about the “true” level of inputs (i.e., expenditures, staff, number and type of assets) that support the through waterway management sub-activity (i.e., contribute to public goods). As well, we lack information on key outputs (e.g., condition of assets) or outcomes (e.g., achievement of water level targets). In the absence of this information a rigorous quantitative analysis of the economy and efficiency of through waterway management is not possible.

We are able to provide some observations on the flexibilities and constraints facing management in acquiring inputs and producing outputs and the kinds of decisions program management take with respect to costs, quality, quantity, timeliness, and appropriateness of inputs and outputs. We also conducted some analysis of the sufficiency of inputs (budgets) and the sustainability of waterway operations as a whole.

Management Flexibilities, Constraints and Decision-Making

There is wide spread acknowledgement within the Agency that some decisions with respect to waterway operations reflect tradeoffs between efficiency, economy and results achievement. An example is a decision to retain manually operated locks in some locations rather than replacing them with modern automated locks that would be less costly to operate, in order to retain the heritage values and historic character of the site. It is frequently noted that there is a cost premium for maintaining and operating a heritage asset (i.e., often said to be 20% more than the cost of a modern asset) although as noted in the *Evaluation of the Asset Management Program* (2009), we are unable to identify a source in the asset management literature that quantified this premium.

Both the *Historic Canal Regulations* and the Agency’s own *Historic Canals Policy* provide some flexibilities in how managers operate the waterways. In fact, the substance of both of these documents is largely focused on specific circumstances and situations in which management can

restrict access to, and activities on, the waterways (i.e., including navigation) in order to protect the safety of users and resources.

Management, for example, is not required to operate the waterways for navigation on a year round basis and only provides navigation for part of the year at each waterway. Nor is management required to operate the waterways at all hours and all waterways set a period of time where the locks will be operated during the day for purposes of navigation. In addition, navigation is restricted to those vessels that conform to the maximum size permitted in the waterway (see Table 11 for details of maximum sizes). The Agency's *Historic Canals Policy* explicitly states that waterways will not be modified to accommodate larger boats.

Management has flexibility on how personnel are organized and deployed and how various tasks are accomplished to improve efficiency. The WQFU, for example has adopted some sharing of maintenance staff among its waterways and uses "flying teams" of lock operators to reduce the total number of personnel required to operate some of these structures. Conversely, the *Canada Occupational Safety and Health Regulations*, which fall under the *Canada Labour Code*, require that where a worker is exposed to a hazard of drowning in the workplace, another person be made available to operate all the emergency equipment.⁴⁶ This requirement is often viewed as contributing to increased costs relative to the output, especially when demand for the lock is lowest in the shoulder season.

The increased use of automatic gauges for measuring water levels was also presented as a contribution to the efficiency of operations as it not only improves the timeliness and quality of water level measurement but also reduces the time required to travel to sites to take manual readings.⁴⁷

As was noted in our previous *Evaluation of Through Highway Management* (2010), the routine use of competitive contracting for major repair and construction projects on waterways is inherently intended to result in the lowest cost options for these projects. However, as was suggested in some of our interviews, the specialized nature of the work for through waterways (e.g. specialized contracting for diving services or making difficult repairs to historical assets) means there is a limited pool of qualified firms and less potential of beneficial price competition.

Sustainability of Waterway Operations

Expectation: The Agency has developed a sustainable business model for its management of through waterways.

During interviews, Agency staff pointed to an increase in the number of operating waterways (i.e., Sault Ste. Marie Canal in 1998, the Lachine Canal in 2002), and the expansion of the waterway mandates with respect to environmental assessments and protection of species or habitat over the last 10 to 15 years coupled with stable or decreasing real budgets as evidence of the pressures waterways are under. At the same time, it was reported that waterway seasons and hours of operations have remained largely unchanged. It was also noted that the number of boats traversing locks has decreased

⁴⁶ See reference in *Report of the Auditor General of Canada – Parks Canada: Management of Historic Canals* (Chapter 32, November 1996), paragraph 32.45.

⁴⁷ It must be acknowledged that automated gauges still require staff time for calibration, repair, and maintenance.

(i.e., an estimated 17% between 2005-2006 and 2009-2010⁴⁸). However, this has not affected the Agency's costs, which are largely driven by having staff continuously available to operate the lock and not on the volume of traffic.

As part of the evaluation we sought to verify some of the managers' reports of the financial pressures. We looked at the extent to which expenditures and FTEs were in fact stable or declining between 1994 and 2009, and whether waterway expenditures were adequate relative to investment standards (i.e., the Treasury Board Secretariat *Guide to the Management of Real Property* suggest organizations annually invest approximately 2% of the replacement value of assets in maintenance and an additional 2% in capital renewal).⁴⁹ We encountered many data problems in addressing these questions including inconsistencies over time and between sources, in expenditure and FTE data, and uncertainty about the appropriate inflation adjustments and investment standards for the Agency's context.

Based on the analysis we were able to complete, we tentatively concluded the following:

- Real expenditures over this 15 year period on waterways were at best stable and more likely decreasing. This is particularly evident when temporary EAP-supported expenditures are not included and when inflation adjustments are made based on Statistics Canada's construction price index, which is considerably higher than the normal consumer price index of inflation.
- It is uncertain whether FTEs allocated to waterway operations have decreased or not given questions about the consistency of coding these over time.
- Collective annual expenditures on all nine canals/waterways (i.e., for the 9 all together) do not meet the Treasury Board Secretariat guidelines (i.e., if we assume that the Agency's estimated replacement value of canal assets is correct an annual investment of \$80M in O&M and \$80M in capital investment would be required based on \$4B RV).

Whether the Agency's existing capital budget could support all requirements for waterway maintenance and capitalization depends on the standard applied and the RV used. For example, assuming a \$4B CRV, requirements would range from \$60M to \$160M, depending on the standard applied. The Agency had a capital budget in the range of approximately \$97M and \$130M between 2007-2008 and 2010-2011, exclusive of EAP funding.

Inadequate or deferred investment in repair and maintenance decreases the life span of assets. For example, several sites report they have been unable to continue basic maintenance such as bridge washing and painting, which has resulted in steel bridge structures rusting at an

⁴⁸ The estimate is based on boat counts from eight of the nine canals for the period. Separate data from the RC and four of the canals in Quebec suggests the volume of boats traversing locks peaked in the mid to late 1980's. The number of boats passing through locks is independent of the number of boats on the canals (i.e., users who do not pass through a lock). The Agency does not have information on the latter group of users although it is assumed to be large.

⁴⁹ Other investment standards have been suggested, including an annual 1.5% of RV suggested by the TSW Panel. In a report prepared by the Corporate Research Group (2008), different investment standards were recommended for different classes of Agency assets. The *Evaluation of the Parks Canada Asset Management Program* (2009) recommended that the Agency establish investment standards either for the asset portfolio as a whole or for classes of assets. This has not yet taken place.

accelerated pace. This results in increased future costs for recapitalization (i.e., characterized as borrowing from the future by one key informant) and increased risks of catastrophic collapse of a critical asset such as a dam or bridge, which can result in property damage and personal injury and legal liabilities for the Agency. The issue was recognized by the TSW Panel, which concluded “it is a testament to Parks Canada staff that they have been able to keep the system operating with minimal disruption in service despite the age of the infrastructure.” The Agency has reported an estimated \$1B in deferred maintenance and capital investment for dams.⁵⁰

Revenue generation on waterways from all sources, which could serve to offset some of the cost pressures, covered less than 10% of the aggregate waterway costs over the last four years.⁵¹ Most of the management and/or business plans for the waterways include proposals to increase revenue (i.e., selling postcards at lock stations, new charge for users of commercial water lots on federal lands, move towards rates that are closer to market rate). However, when interviewed, site management reported that they did not expect increases in revenue from these strategies to be significant. During the course of the evaluation, more significant changes to revenue generation strategies were proposed (e.g., licensing of all boats which operate on waterways) but we did not pursue these as they were outside the scope of the work.

It is also generally recognized that many users of water from the through waterways (e.g., private individuals drawing water for a cottage) do not obtain a license and therefore there is some forgone revenue. However, waterway managers report either a lack of capacity to enforce regulations and license requirements and/or concern that the costs of collecting the fees would not be justified given the size of the revenue to be collected. Similar considerations apply when introducing new fees. As well, managers must consider whether and to what extent other jurisdictions provide a similar service or activity without charging a fee and the extent fees and services are seen as competing with the private sector.

As a result, there was virtually unanimous agreement in our interviews that the current business model for the waterways was not sustainable. Existing resources were increasingly directed to ensuring public safety (i.e., asset inspection, maintenance and recapitalization) and keeping the waterways open and functioning, with only limited resources left to deliver basic programs and activities in the areas of PCA’s core mandate.

Access to temporary funding of various kinds has helped management address various urgent situations or high priority needs. Numerous examples were highlighted during the evaluation. For example, between 2006-2010, the WQFU spent more than \$10.2 M to repair two bridges at the Lachine Canal, replace one bridge at the Chambly Canal and complete additional works on structural culverts at various sites; the allocation of \$32M from Budget 2009 to upgrade, repair and/or reconstruct locks, dams, bridges and canal walls at various places; and close to \$38M of EAP funding was directed to waterways projects that are mainly said to contribute to the through

⁵⁰ See *Evaluation of Parks Canada’s Asset Management Program (2009)* for an extensive discussion of the concepts of deferred maintenance and capital investments for the Agency’s asset program as a whole.

⁵¹ Across all nine canals the largest source of revenue is fees paid by boaters for lockage and mooring, (i.e., essentially recreational fees related to private benefits users obtain for the canals). Revenue from hydro power generation on the two canals in Ontario was \$1.5M in 2009-2010. Total revenue from licenses and business fees on canals amounted to \$1.1M in 2009-2010. Of course the revenue profile differs by canals with for example recreational fees and hydro and realty fees each accounting for about a third of revenue on the TSW.

waterway management sub-activity. While management view this type of funding positively, it is also seen as insufficient for dealing with the long-term sustainability of the waterways.

Expectation: The Agency has prioritized expenditures for maximum impact.

The Agency's Capital Planning Process Directive details the requirements to assist sites with the prioritization of asset expenditures. Despite this directive, sites' asset managers and those in National Office perceive that they do not have adequate corporate guidance to assist sites with these types of decisions. While processes are in place for the approval of proposed projects, decisions for prioritization are left to each field unit at least up to the limit of its investment authority (i.e., \$2M), resulting in an inconsistent approach to the rationalization of infrastructure spending. At present, available resources are most often spent to address the most urgent needs related to operational breakdown of assets and critical public health concerns although some effort is also devoted to addressing the needs of level one cultural resources. In the case of EAP funding, resources were often directed at shelf ready projects which may or may not have been the most critical areas for investment.

As already noted in the discussion of public safety, the Agency has undertaken an ongoing review and assessment of the condition and investment requirements for dams it manages.⁵² A preliminary risk classification of some 235 dams was shown previously in Table 7. The next step will be to conduct more thorough inspections with a first round of dam safety reviews, which will provide an assessment of the full condition of these structures, starting with the high-risk structures by 2012 (i.e. high classification dams that are in poor condition, with or without potential for loss of life).⁵³ More dam safety reviews for other poor condition dams, with a low or significant classification, will be completed by 2015. Dams that are presently deemed in good or acceptable condition will have their own dam safety review completed between 2014 and 2024 depending on their classification.⁵⁴ The assessments are costly with estimates ranging from \$3.5 to \$5M to complete reviews of all "high-risk" assets. The five field units with responsibilities for waterway dams are currently each developing action plans to ensure that the priority dam safety reviews can be completed within the time allocated. Strategies such as bundling reviews by region are proposed to improve their efficiency and help reduce costs.

Once all reviews are completed, the information on condition, risk and estimated costs of required works will allow the Agency to strategically identify which assets to prioritize for repairs or recapitalization. It will also provide the detailed data required to build a business case for additional funding, should this be deemed necessary. However, it may take several years for useful data to be compiled.

It was also reported that representatives from the three field units with the largest waterways (RC, TSW and the WQFU representing five canals) did some work in collaboration to prioritize

⁵² In 2005, an external engineering consultant was engaged to evaluate the existing dam safety program against industry standards and identified many areas of non-compliance. A recent jurisdictional review by Hatch and Mobec Engineering (2008) was used to produce the Agency's directive on dam safety, which is currently and gradually being implemented.

⁵³ Mandatory only for dams deemed vulnerable either because of its poor condition or a design deficiency affecting its safety.

⁵⁴ Dam Safety Directive 2009, Section 3.1. See also Dam Safety Program Update, January 2011.

asset expenditures based on risk (i.e., a Tri-Canals Symposium in August 2010) however this initiative is not currently being pursued. The field units are however continuing to pursue individual approaches to risk management (e.g., WQFU is updating a report that prioritizes risks for each of its key through waterway assets and estimates related costs for 2010-2015).

OVERALL FINDING: EFFICIENCY AND ECONOMY

Evidence that the through waterway management sub-activity is managed economically and efficiently rests largely on the fact that managers have made use of various flexibilities in designing the offer (e.g., seasonality, hours of operation), and implemented initiatives in all locations to maximize the efficiency of staff inputs.

Managers tend to report that the current mode of operating is unsustainable in the long term. Possible increases to revenue from traditional sources that could serve to offset increased costs are viewed as limited and unlikely to significantly address the issue of adequacy of inputs. At the same time the Agency continues to absorb the costs of many public benefits without realizing significant revenue.

The extent to which current capital budgets can meet projected capital requirements for waterways depends on the standard applied. Collective annual expenditures on the waterways do not meet the Treasury Board Secretariat guidelines based on a \$4B RV. Whether the Agency's existing capital budget could support all requirements for waterway maintenance and capitalization depends on the standard applied and the RV used. In the absence of sufficient inputs, maintenance and recapitalization of important assets continues to be deferred, leading to increased future costs and increased threats to public safety. The Agency has reported an estimated \$1B in deferred maintenance and capital investment for dams.

The Agency is aware of these challenges and has undertaken some important initiatives to improve and coordinate risk assessment and investment decision making among the waterways. However, it will take some time to fully realize the benefits associated with better coordination and improved risk management.

4.4 ALTERNATIVES

Question 7	Indicators
Are there any alternative approaches that could be used to achieve expected results?	<ul style="list-style-type: none"> • Best practices exist in benchmark service providers that could be implemented by the Agency. • Past operational reviews present options for further efficiency gains.

Expectation: The Agency has considered alternatives to its current program design.

Our review of practices in other jurisdictions found that waterways are almost always operated by some form of government organization, based largely on tax revenues and appropriations. For example, a 2009 study commissioned by the Inland Waterways Advisory Council (IWAC) in Britain⁵⁵ reported that public funding amounted to around 98% of budgets in most waterways they reviewed. A benchmarking study completed in support of the TSW Panel⁵⁶ found that similar waterways in other parts of the world are primarily funded by federal tax-based appropriations.

All of the comparison waterways reviewed during the course of the evaluation involve ownership and operation by one or multiple government agencies, most frequently an entity linked to the federal government. The source of these entities' mandates is most frequently legislation or agreement among parties involved. Most similar service providers also make use of a Board whose members represent a variety of interests/backgrounds to assist with decision-making. The Inland Waterways study noted that none of the variations they identified in funding led to obvious models or solutions to ensure sustainability of operations.

Managing through waterways characteristically involves multiple jurisdictions with different authorities. In PCA's case, for example, approval and permitting for shoreline activities may involve the Agency but also provincial and/or municipal approval. Waterway stakeholders in Ontario noted that there is often public confusion about which entity does what, and several stakeholders felt that a one window approach would serve the public best, and allow for consolidation and better use of resources.

Alternative Service Delivery: The Agency itself reviewed a wide range of management options as part of its 1993 operational review of canals based on the assumption, even at that time, that the canal operations were unsustainable (see Appendix I for more details on the options and evaluations). While variations on the options are possible, in our view they continue to represent the full range of possible alternative scenarios for program design including variations identified in the management of canals in other jurisdictions (e.g., management by a special agency as is the case in the New York Canal System).

In the 1993 review, possible alternatives were evaluated based on considerations of costs, revenue, resource protection, effect on users, economic and social impact, and strategic considerations. Broadly, two major options were considered—either divestiture of waterways to a third party or continued Agency ownership. Within each broad category several alternatives were proposed.

⁵⁵ Inland Waterways Advisory Council (IWAC), *Funding and income sources for overseas waterways*, November 2009, p. 77.

⁵⁶ Review of Other Models of Waterway, Waterway Corridor Management and Financing (July 2007).

With respect to divestiture, options considered included transfer of the waterways to another federal agency, to a special operating agency (i.e., which would have to be created for this purpose), partial privatization involving continued Agency ownership and responsibility for major capital works but other aspects of service delivery devolved to the private sector, or transfer of day-to-day operations to a partner which is essentially a more limited form of the third option. All of these options were ultimately rejected as contrary to the PCA mandate and/or having major negative socio-economic impacts. In addition, there is the practical barrier of finding a potential party who would be willing to take on the liabilities inherent in waterway operations while continuing to ensure that the Agency's mandate concerns were addressed.⁵⁷

Alternative arrangements while maintaining Agency ownership and operation ranged from no changes to the then current model (i.e., a baseline model), through full or partial closure (i.e., essentially altering the timing and location of the availability of navigation in different sections of a waterway or waterway), as well as scenarios based on more centralized administration (i.e., one administrative structure for the RC and TSW in Ontario, or one structure for all waterways in Ontario and Quebec). A final scenario focused on increasing revenue without changing provisions for navigation or administrative structures. In the end, the review recommended the last option involving no major changes to service delivery or administration. This approach continues to characterize waterway management as a whole up to the present day. It is widely recognized that it has not served to address the central issue of developing a sustainable model for waterway operations.

Recognition of this fact prompted the Agency to launch the canals visioning exercise mentioned in the introduction. The exercise was undertaken simultaneously with this evaluation but is broader in scope since it encompasses the heritage conservation and visitor experience aspects of waterway operations as well non-mandated functions of waterways.

During the course of the evaluation, we noted wide-spread agreement among senior management and on-site staff on the need to rethink the role of through waterways within the PCA family of sites. Waterway managers and staff as well as members of our expert panel frequently expressed the view that the nature of waterways, their various roles and obligations, and their potential value to the Agency have never been clearly understood or appreciated within the organization. There was a general view that there was no clear voice for through waterways within the Agency and no integrated "canals program" in the same way that there are National Park, National Marine Conservation Area, or NHS programs.⁵⁸

The fact that the waterways are all designated NHSs leads naturally to their inclusion as part of the NHS program. However, many view this as a "force-fit." In a few cases, the historical character of waterways is questioned (e.g., Carillon Canal or St. Peter's Canal) given that the original historic structures or features are almost completely buried under modern structures.

⁵⁷ This barrier to divestiture is also present for other sub-activities in PA5 Townsite and Throughway Infrastructure. Efforts to divest through highways are discussed in the *Evaluation of Through Highway Management* (2010). Various efforts have also been made to devolve management of townsites to municipal self governing entities. In the case of the communities of Banff and Jasper this has been successfully achieved but not for other communities.

⁵⁸ Recent initiatives, such as meetings of the personnel from the three field units with the largest canals, are seen as beginning to address the issue of coordination and operating more as one program.

Concerns were also raised regarding the adequacy of existing NHS tools (policy, guidance) for managing the dynamic nature of waterway operations where the continued functional use of the site is part of its historical character. The need to sustain the operation of major engineering assets for public safety and operational purposes also makes the waterways different from other NHSs.

Considerations such as these lead naturally to suggestions that the waterways merit or require central office administrative structures, such as exist for NPs and NHSs, and/or that waterways should be represented as a separate type of system in the Agency PAA, similar to the others managed by the Agency. Key informants' opinions vary on the value of these kinds of changes. On the one hand, there is a desire for a more prominent voice and a coherent vision for waterways as a whole; on the other, there is recognition of the fact that the nine waterways differ significantly in the scope and scale of their operations as suggested by their importance as historical resources. This latter point stresses the fact that the nine waterways themselves do not necessarily represent a coherent single entity, although again the same point could be made regarding the system of NPs or other NHSs which vary significantly in the scope and scale of operations.

Other suggestions focused not on creating a waterway program but rather on clarifying the current definitions of waterway-related activities within the existing PAA. It was suggested, for example, that the PA5 Townsite and Throughway Infrastructure be renamed "Public Infrastructure" and the through waterway management sub-activity be renamed public water level management with the associated change that waterway bridges would no longer be part of this sub-activity but re-assigned to a revised through highway management sub-activity. This would help to clarify the results associated with the sub-activities and support more consistent coding of expenditures against the sub-activities (although additional tools would be required for the latter point).

We did not reach a definitive conclusion on the merits of various proposals to amend the PAA to better reflect the reality of waterway operations and the results that are to be achieved. The key in our view is to ensure, regardless of the PAA structure, that expenditures data is accurately captured and performance expectations are clear, measurable and supported by appropriate systems and protocols.

Stakeholder Involvement: One variation on the current service delivery model, which has received increased attention in the last several years, is increasing the extent to which stakeholders of various kinds are informed of and involved in waterway management. The TSW Panel noted that informing and involving a variety of stakeholders (both formally and informally) is key to managing the often conflicting needs and interests⁵⁹ and for building a shared sense of responsibility for the effects of water management decisions. Conflicts can be mitigated or avoided by ensuring that there is an adequate explanation of the need to change water levels or flows. Knowledge conveyed to stakeholders via effective outreach programs (i.e.,

⁵⁹ Residents on reservoir lakes from which water is drawn to feed the navigable segments of the system want less fluctuation in water levels. Power generators want less "wastage" of water that could otherwise generate electricity. Citizens and natural resource managers want fish and wildlife habitat needs to be formally considered.

well maintained websites, regular meetings with partners and stakeholders, and advance notice or early warning of major events) strongly contributed to managing stakeholder perspectives and reducing conflicts.⁶⁰

All the waterways are engaged, to a greater or lesser extent, in stakeholder management and public consultations, as required in the Agency's management planning process (i.e., as required under legislation). Since the completion of the TSW Panel report, the TSW has established an advisory committee in early 2010 to engage water users in the review of water management policies. It will also provide advice on these issues and work towards a shared vision for a balanced approach for water management in the watersheds it manages. In our interviews with stakeholders, some indicated that it has been a slow start, with few concrete actions so far, but that this mechanism promises to be effective in dealing with water management issues. Other waterways have not adopted the advisory committee model.

The TSW has also taken steps to provide the public with real-time access on water levels for most lakes and reaches in the watershed.⁶¹ Stakeholders for this waterway viewed this as a positive step but expressed an interest in having additional water level information for the reservoir lakes, providing forecast information to help residents predict water change levels, and being more transparent by providing the rationale of decisions. These changes would potentially save time answering calls, provide improved notice to users of changing information, and facilitate users' ease of access the information.

OVERALL FINDING: ALTERNATIVES

Waterways and waterway systems across many jurisdictions are typically managed by government entities, often the federal government, and obtain most of their budgets from tax revenue. All the various arrangements face difficulties in finding a sustainable model for waterway operations that is less dependent on tax revenue.

The Agency has long recognized that waterway operations are not sustainable and has conducted various reviews and studies of alternatives, most recently and systematically in 1993. While this review is dated, it clearly identified a complete range of potential arrangements, involving complete or limited forms of divestiture and third-party delivery or changes in service delivery or administrative structures that remain relevant today.

Despite considering many options, the basic model of waterway management (i.e., direct delivery by PCA staff, and continued through navigation on all waterways) has remained unchanged virtually since the waterways were acquired by the Agency. Attempts to address the situation have largely focused on increasing revenue but efforts to date have not, and are not expected to, generate sufficient returns to support current commitments and obligations.

⁶⁰ Similar issues and challenges regarding improving coordination between segments of the system, a lack of a modern gauge network, and the need for improved communication with stakeholders were also reported in the New York Canal System.

⁶¹ The information displayed on this site is obtained automatically from hydrometric stations operated by PCA within the Waterway; this data will typically be posted every 24 hours. In addition, manual water level readings are also displayed but this data is updated less often as a result of the time required to compile manual readings. http://www.pc.gc.ca/lhn-nhs/on/trentsevern/visit/ne-wl/trent_e.asp

A need for change is widely acknowledged, and has led to a re-visioning exercise to address the overall place, role and sustainability of waterways within the context of the Agency's overall mandate. Specific suggestions for modifying organizational arrangements in National Office and treating the waterways as a separate entity in the PAA structure have been advanced but would not address questions regarding the nature and type of waterway expenditures the Agency wants to capture or the choice of relevant performance metrics and supporting measurement processes and data.

5. CONCLUSIONS AND RECOMMENDATIONS

PCA manages nine through waterways, which collectively account for about 6% of the Agency's annual spending and represent approximately 10% of the estimated \$10.5B in replacement value of the Agency's asset portfolio. Operation of these waterways contributes to the Agency's mandate objectives of heritage resource conservation and visitor experience. As well, it provides a number of public benefits outside the Agency's core mandate, including management of water levels and/or parts of watersheds to prevent flooding or other adverse consequences related to public safety and protection of property, providing a water source for municipalities, providing municipal infrastructure (e.g. bridges that span waterways and link communities), and providing surplus water for hydro power generation. Failure to adequately manage the public safety risks of the through waterways could have major consequences with respect to loss of life, personal injury, and large socio-economic impacts on populations and infrastructure in close proximity to the waterways. Given the risks inherent in waterway operations, the through waterway management sub-activity of the PAA (i.e., the public benefits of waterway operations) was identified as a high priority for evaluation in the *2010-2011 Parks Canada Evaluation Plan*.

The evaluation addressed:

- 1) **Relevance:** Is through waterway management aligned with federal roles and responsibilities? Is it consistent with government and Agency priorities? Is there a continued need for through waterway management?
- 2) **Performance:**

Effectiveness: To what extent has the Agency made progress towards its performance expectations with respect to the condition of contemporary assets, and water level management?

Efficiency and Economy: Is through waterway management efficient and economical in producing the expected outputs and outcomes? To what extent is the sub-activity sustainable and are investments being directed to the areas of highest need?
- 3) **Design and Delivery:** To what extent have alternative approaches been considered and used to support program delivery?

Our broad conclusions are:

- Federal government involvement in managing these waterways is a long established historic precedent. Ownership and responsibility for the waterways is embedded directly in Agency legislation and recognized in other legislation and regulations specific to the through waterways. The manner the Agency manages the waterways is consistent with and contributes to the Whole of Government Framework objectives related to health and safety, economic development, a vibrant Canadian culture and heritage, and, in a more limited way, environmental protection.
- The Agency operates waterways with three objectives: as NHSs, contributing to the Heritage Resource Conservation Program of the PAA; as places set aside for the enjoyment of Canadians, contributing to the Visitor Experience Program; and as operations, providing a variety of public benefits unrelated to the Agency's core mandate (e.g., flood control, provision of water, the maintenance of municipal and provincial transportation infrastructure in the form of bridges, and the provision of hydro power in Ontario). The latter are captured

either as part of the through waterway management sub-activity of the PAA or as part of internal services.

- Ensuring public safety and avoidance of damage to property is a widely shared objective in waterway management both within the Agency and among stakeholders and interested parties despite their other often divergent interests. In fact, this is generally acknowledged as the first priority of waterway management ahead even of PCA's mandate objectives (i.e. protecting the historic aspects of waterways and specific cultural resources in addition to providing a satisfying and meaningful visitor experience).
- Short of full divestiture of the waterway program, the Agency has little alternative but to engage in activities contributing to non-mandate public benefits of waterway operations and would face significant opposition if it tried to limit or cease allowing the various activities. The option of divestiture of waterway operations has been examined but never formally pursued not least because of the practicalities involved in finding a willing partner/organization able to manage the waterways in a manner that respects both the Agency's mandate and the various non-mandate obligations.
- Although the conceptual distinction between conservation, visitor experience and public benefits is well established in the Agency, efforts to align inputs and results with these categories have not been successful to date. Expenditure data aligned to the various results is not captured consistently across the Agency. Efforts to specify and track potentially relevant dimensions of the outputs (e.g., asset condition) have floundered due to uncertainty regarding the meaning of "contemporary" assets, lack of up to date asset condition ratings over time and uncertainty about what was implied by the target that the condition of 70% of the assets would be maintained over time. Similar issues exist with efforts to track the potentially relevant immediate outcome, maintaining water levels. There is confusion and uncertainty on where the target applies, how it should be measured, and the significance of deviations from targeted levels for drawing conclusions about the achievement of either mandate or non-mandate objectives.
- Other indicators for capturing the public benefit aspects of waterway operations were suggested during the evaluation including the number of dam failures and the extent of reductions in the number of high risk dams over time, the frequency of flooding, and the frequency of closures of waterway bridges, durations of closure and extent to traffic disruptions.
- The lack of consistent alignment of waterway expenditures to the three types of waterway objectives and problems with public benefit metrics limited our ability to conduct a rigorous quantitative analysis of the efficiency and economy of the through waterway management sub-activity. At the level of waterway operations as a whole, it is clear that the Agency retains and uses various flexibilities which contribute to efficient and economical operations (e.g., seasonality of operations, hours of operation within season, size of vessels within waterways). Use of these flexibilities constitutes much of our evidence that managers take into account questions of economy and efficiency in the design and delivery of the waterway program as a whole.
- In terms of the sustainability of the waterways, real expenditures over the 15 year period we reviewed were at best stable and more likely decreasing. Whether the Agency's existing capital budget could support all requirements for waterway maintenance and capitalization depends on the standard applied and the RV used. The Agency could not maintain waterway assets if management reports of a \$4B CRV is accurate and 2% + 2% standards were to be

applied. Assuming a \$4B CRV, requirements would range from \$60M to \$160M, depending on the standard used. The Agency had a capital budget in the range of approximately \$97M and \$130M between 2007-2008 and 2010-2011, exclusive of EAP funding. Furthermore, the Agency has reported an estimated \$1B in deferred maintenance and capital investment for dams.

- With respect to program design and delivery, the key concern was the sustainability of the current waterway operating model for achieving the diverse objectives: ensuring through navigation, conserving and presenting cultural resources, fulfilling natural resources objectives, and providing public benefits.

In summary, while the evidence from the various lines of inquiry provides strong support for the continued relevance of through waterway management, evidence of the performance (i.e., effectiveness, efficiency and economy) of through waterway management—particularly the public-benefit aspects of Agency operations—is weaker. The evidence is largely based on the avoidance of specific events (e.g., major flooding, major bridge collapse), the provision of water for municipal purposes, and support for generating hydro power at a few waterways.

Some of the issues identified with through waterway management also apply to other programs or sub-activities in the Agency's PAA. In particular, problems with asset data have been extensively documented in the *Evaluation of Parks Canada's Asset Management Program* (2009) and are the subject of on-going management action plans. Therefore, they are not subject to new recommendations in this evaluation.

The following recommendations were developed for action by the responsible managers and are specific to the through waterway management sub-activity.

Recommendation 1:

The CAO should coordinate as soon as possible, in conjunction with VP Eastern Canada and the CFO, a review of the representation of waterways in the Agency's PAA (i.e., the need for a canals or waterways "program" similar to other system-based programs, and/or the specific definition of the through waterway management sub-activity in the context of the overall Throughway and Townsite Infrastructure Program), and propose changes, if necessary, to clarify the scope and intent of the activities, to Executive Management Committee for approval.

Response

Agree. The CAO will work with the VP Eastern Canada and the CFO to propose changes, to review the representation of waterways in the Agency's PAA, and propose any necessary changes to Executive Management Committee for approval. This will be part of the annual MRRS update to be provided to TBS by September 2012. Target date: September 30, 2012

Recommendation 2:

The CAO and CFO should formally agree on and articulate their respective roles in defining what expenditures are to be coded to the Agency's general classes of results (e.g., heritage resource conservation, visitor experience, townsite and throughway infrastructure) and provide within this framework, consistent direction for business units in how to code relevant expenditures.

Response

Agree. The CAO and CFO will require the active participation of the VP Eastern Canada to define appropriate and consistent coding of waterway expenditures, and reinforce that direction.

The CAO and CFO will agree on and articulate their respective roles regarding determining and communicating direction on coding of expenditures to the Agency's general classes of results. The CAO and CFO will work with the VP Eastern Canada to confirm a consistent framework for coding canal expenditures, and direction will be issued to all implicated business units to ensure that the expenditures on canals are coded in such a way as to be aligned with the Agency's general classes of results. Target date: September 30, 2012

Recommendation 3:

The VP Eastern Canada should follow-up periodically to ensure waterway management is complying with direction to consistently code expenditures.

Response

Agree. VP Operations, Eastern Canada, will reconfirm the coding intent with the field units concerned particularly as it applies to through waterways, provide prescriptive use of PA coding in allocation of supplemental funding, and institute quarterly monitoring each year to reconfirm compliance. Monitoring may be reduced, once it is confirmed that the process is being followed appropriately and in accordance with direction. Target date: TBD

Recommendation 4:

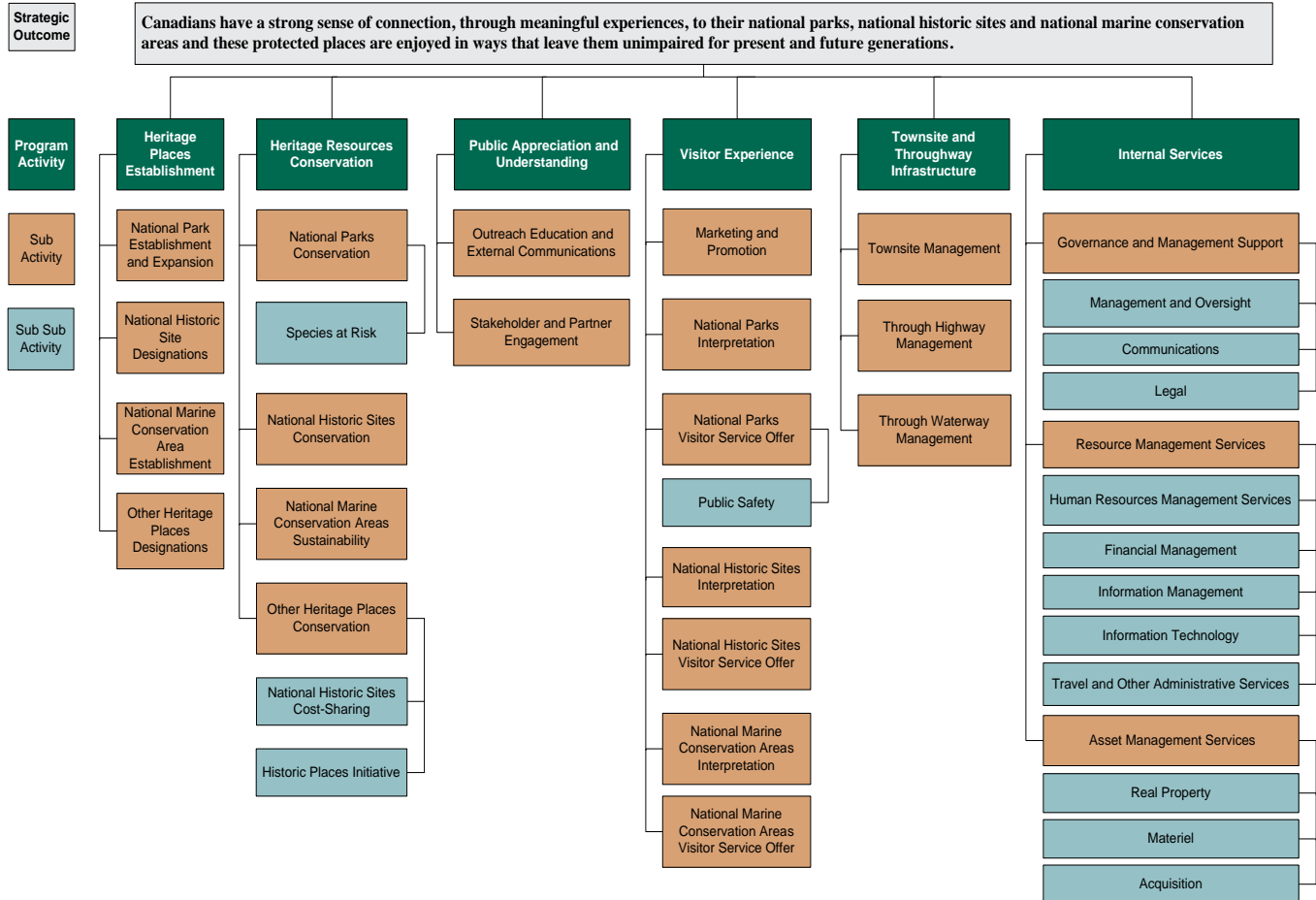
The CAO should coordinate, in conjunction with VP Eastern Canada, a review of the corporate performance targets with respect to maintaining condition of contemporary assets and maintain water levels on waterways, and ensure that they are clear, measurable and monitored, or alternatively, propose new metrics and targets that will be clear, measurable and monitored.

Response

Agree. The CAO will work with the VP Eastern Canada to ensure that the corporate performance targets with respect to maintaining condition of contemporary assets and maintain water levels on canals are clear, measurable and monitored, or alternatively, propose new metrics and targets that will be clear, measurable and monitored. This will be part of the annual MRRS update to be provided to TBS by September 2012. Target date: September 30, 2012

Appendix A. Strategic Outcome and Program Activity Architecture

Parks Canada Agency Strategic Outcome and Program Activity Architecture 2009/2010



Appendix B. Summary of Previous Canal Reviews

There have been numerous reviews of the waterways over the past two decades. While most of these are older studies (1996 or earlier), many aspects of their findings and recommendations are still relevant today and have been considered as part of the evaluation's review of the through waterway management sub-activity. Notably, there has been significant repetition of messages over time – i.e., that:

- PCA needs to clarify its responsibilities for and/or the core business of through waterways;
- If through waterways are retained by the Agency, additional resources need to be allocated to ensure that operational and capital needs are met; and
- PCA should continue to deal with water management and water control structures in a publicly responsible manner.

The following table outlines the purpose and key recommendations of each of these studies. For the two most recent documents, we've included the responses to the recommendations.

Purpose of Study	Key Recommendations	Response to Recommendations
Heritage Canals Task Force (1987)		
<p>To respond to recommendations of Nielson Task Force regarding the Heritage Canals program [original report not available]. Recommendations of this earlier report included that: revenues be brought in line with O&M (\$14.2 M); Lachine Canal be divested; Sault Ste. Marie Canal be converted to non-operating status; Parks explore more contracting of maintenance; and Real Property consider the transfer of some canals to the provinces.⁶²</p> <p>The 1987 report responds to the recommendations by identifying Parks' mandate and functions related to Heritage Canals and by suggesting/ evaluating various options to reduce costs.</p>	<ul style="list-style-type: none"> • That Parks determine the program's responsibilities for Heritage Canals, including options for retention or divestment to the Bureau of Real Property Management. • If retention is the supported option, that additional resources be allocated to the management of Heritage Canals (via combination of increased revenue/cost off-sets and supplementary funding). • An agreement be made to transfer the Lachine Canal to another Agency or level of government. 	Not available.
Parks Canada Operational Review No. 30 – Canals (1993)		
To examine the organization and operation of heritage canals in Canada in order to identify opportunities for streamlining and	<ul style="list-style-type: none"> • That the mission⁶³ for the heritage canals be endorsed, and that they be marketed as an integral navigable network. 	Not available.

⁶² At the time that these reports were completed, closures were in effect for the Lachine Canal (due to contamination) and Sault Ste. Marie Canal (as a result of structural issues). These issues have since been resolved and the canals re-opened.

⁶³ Heritage Canals Mission Statement (1993): Working with others, protect the canals' cultural and natural resources and provide a unique heritage experience that contributes to the Canadian identity and to the national economy in a significant, sustainable manner.

Purpose of Study	Key Recommendations	Response to Recommendations
<p>savings. A series of nine management options were considered:</p> <ol style="list-style-type: none"> 1. Maintain current level of resources and services. 2. Downsize operation by (a) closing canals, (b) closing canals to navigation but retain as NHS, or (c) maintain partial navigation. 3. Transfer canals to another agency. 4. Create a special operating agency. 5. Partial privatization. 6. Transfer day-to-day operations to partners. 7. Joint administration of the Rideau-TSW. 8. Joint Quebec-Ontario administration. 9. Enhance revenue / change management practices. 	<ul style="list-style-type: none"> • To best fulfill the heritage-canal mission, that the “enhance revenue/change management practice” option be pursued. This would include a further review of options for revenue enhancement, the concept of a special operating agency, and the development of a business plan providing direction in key areas. • That PCA increase opportunities to work with others. • That PCA continue to deal with facilities (especially water control structures) in a publicly responsible manner. 	
Corridors of Change (1995)		
<p>To identify opportunities for streamlining and savings for Heritage Canals; an external and independent review that builds off the operational review completed in 1993.</p> <p>Objectives of the review included to:</p> <ul style="list-style-type: none"> • Develop mechanisms for canals to increase their role as economic stimulants; • Examine requirements for efficient service delivery with minimal negative impact on client requirements; • Identify revenue generation potential; • Develop indicators for fair market value for services provided/proposed; • Identify a base level of funding; and • Examine all physical assets and develop implementation plans for retention, revenue production or disposal. 	<p>The report identifies 122 recommendations, focused on five directions:</p> <ul style="list-style-type: none"> • Increasing tourism; • Stabilizing canal hours of operation; • Efficiency in service delivery and cost reductions; • Broadening the range of market-based user fees and charges; and • Creation of more business-like canal organizations. <p>Of these, 17 recommendations are seen as foundational “priorities”. Among others, these relate to: defining the core business of heritage canals; establishing separate business units for the TSW and RC; and the creation of advisory committees, partnerships and communications strategies for each canal.</p>	<p>Not available.</p>

Purpose of Study	Key Recommendations	Response to Recommendations
OAG Ch. 32 – Management of Historic Canals (1996)		
<p>The OAG’s audit objective was to assess whether PCA is managing the canals in an efficient and cost-effective manner, given its mandate and priorities.</p> <p>While audit focused on the management of the RC and Trent-Severn Waterway, many of the audit findings also pertain to the other canals.</p> <p>The audit also examined the proposed reconstruction and reopening of the Sault Ste. Marie lock.</p>	<p>There were 16 recommendations included in the audit. Key among these are that PCA should:</p> <ul style="list-style-type: none"> • re-examine its options and develop a realistic strategy and action plan that will lead the organization toward reducing costs and increasing revenues across the entire canal system (32.36). • gather information on public/private benefits and perform the cost analysis necessary to establish user fees that conform to TB Policy and ensure that revenue from navigation more closely approximates relevant costs (32.41, 32.42 and 32.69) • consider divestment or closure of underutilized locks (32.55). • clarify its responsibilities for navigation (32.60) • establish clear priorities with respect to navigation, preservation of canal structures, historical presentation and natural resource conservation; and implement actions that reflect those priorities for each canal and heritage canals as a whole (32.60, 32.72, 32.74). • review the categorization of assets for the purposes of protection and preservation so that available funds can be directed to those of greatest historical value and ensure that the maintenance function reflects actual needs (32.82, 32.83, 32.94) 	<p>PCA responded to the recommendations. The following are some elements of answers to the key recommendations:</p> <ul style="list-style-type: none"> • it is implementing significant cost reductions across the canal system. Some costs are due to the restoration and preservation of Historic Canals for the benefit of all Canadians, and are appropriately funded through general government revenues. No feasible way has yet been identified to derive revenue to offset other costs, from all those who enjoy the many benefits associated with recreational activities and water management. (32.36) • will continue to meet the legal requirement for the provision of through navigation on the Historic Canals in the most effective and efficient manner. (32.55) • legal advice to PCA has confirmed a legal obligation to provide for through navigation (32.60) • resources should be properly directed to the cultural resources of historic significance. (32.82, 32.83) • more relevant and reliable information will be used for management decision making, responding to government reporting and accountability initiatives (32.94)
Panel on the Future of the Trent-Severn Waterway (2008)		
<p>In response to a parliamentary motion to evaluate the future of the TSW, the Minister of the Environment formed this external and independent panel to look at:</p> <ul style="list-style-type: none"> • Protection and presentation of the waterway’s cultural heritage; • Ways of assuring the future of the waterway’s natural 	<p>The Panel’s final report contains 26 recommendations. While many of these relate specifically to the TSW, some can be more broadly applied across canals. Key recommendations include:</p> <ul style="list-style-type: none"> • Reduce jurisdictional uncertainty by resolving outstanding jurisdictional issues. 	<p>The Government of Canada has directed PCA to take a leadership role in working with all stakeholders to achieve the Panel’s recommendations. Responses to the report under six broad areas are:</p> <ul style="list-style-type: none"> • Improving the Condition of Waterway Infrastructure, by committing \$83 million over 5

Purpose of Study	Key Recommendations	Response to Recommendations
<p>environment;</p> <ul style="list-style-type: none"> • How the waterway can contribute to the present and future outdoor recreational needs of local population and Canadians; • A water management regime that is seen to meet the demands and expectations of a diverse array of stakeholders and needs; • A framework for jurisdictional and inter-agency coordination and governance along the waterway corridor; • Contributions to economically sustainable communities, including the role of renewable energy; and, • A sustainable funding framework. 	<ul style="list-style-type: none"> • Work toward integrated water management (for control storage, flows, allocation and use of water) by: <ol style="list-style-type: none"> 1. asserting federal rights and responsibilities. 2. creating and appropriately funding an independent water management agency. • Transfer historic canal legislation to PCA and modernize current regulations for historic canals. • Revise “Parks Canada Guiding Principles and Operational Policies” to incorporate a broader and more assertive vision for visitors and for natural and ecological values. • Encourage development of new hydro generation facilities. • Significantly enhance PCA’s capacity to manage its historic resources throughout the waterway region by: (a) implementing an ongoing cultural resource inventory and monitoring program; (b) enhancing cultural resource management capacity through additional managerial and technical staff; ... and, (d) entering into a partnership with other organizations. • Significantly improve PCA’s capacity for messaging by: (a) investing significant new resources in interpretation and communications staff; (b) developing and implementing an interpretive plan that reflects the stronger and broader vision; (c) enhancing the interpretation capacity of lock and bridge staff. • Ensure boater safety and enjoyment of the waterway. • Ensure that waterway infrastructure is maintained, repaired and replaced according to appropriate standards by increasing the annual budget. • Maximize effectiveness of investment in maintenance, repair and replacement of waterway built assets through development 	<p>years to invest in infrastructure renewal.</p> <ul style="list-style-type: none"> • Improving the Performance of Governments, by exploring the development of the recommended collaborative networks to strengthen communications and coordination. To clarify jurisdictional issues, meet with the Government of Ontario to develop a Memorandum of Understanding, setting out areas of collaboration and coordination. Finally, PCA will work with Transport Canada and other stakeholders to improve the Historic Canal Regulations. • Assuring the Future of Our Water, by establishing an advisory committee that will engage water users in the review of water management policies and provide advice on the issues and shared vision for a balanced approach for water management. Under the proposed Canada – Ontario MOU, a specific agreement could consider measures for coordinated service delivery and harmonized permitting for the occupancy and use of the bed of the Waterway. • Planning for Future Places to Live and Enjoy, by developing a Planner’s Forum as a means of coordination on key issues such as waterfront development. • Encouraging the Development of Renewable Energy, by seeking to maximize the waterway’s full potential through open and competitive processes. • Protecting, Presenting, and Enjoying Our Cultural Heritage by working with heritage organizations in the Trent-Severn watersheds to develop a Heritage Network and realigning resources on the

Purpose of Study	Key Recommendations	Response to Recommendations
	of well-trained and experienced personnel with a strong succession program.	TSW to improve the ability to tell the Waterway story and engage Canadians.
Review of Historic Canals Regulations (ongoing)		
Following a recommendation of the TSW Panel, the Historic Canals Regulations Working Group (HCWG) was formed in 2008 to make recommendations that would guide the drafting of amendments to the <i>Historic Canals Regulations</i> and the <i>Canal Regulations</i> . The HCWG consisted of representatives from Policy and Government Relations and all canals except the Sault Ste. Marie. ⁶⁴	Options have been presented to address issues identified by the review, each of which would to some extent necessitate amendments to the <i>Department of Transport Act</i> . The largest proposed change would move authorities for historic canals to some legislation under PCA's mandate. Work continues in discussion with Transport Canada to determine the best course of action.	Not applicable – work ongoing.

⁶⁴ Sault Ste. Marie Canal was not able to send any of its staff, but the HCWG kept in contact with the canal manager and visited the canal in an attempt to engage them in the regulatory project.

Appendix C. Definitions of Selected Assets

Breakwaters: Structures constructed to protect the shore area from waves. They can be either permanent or floating structures

Control Dams and weirs: A barrier constructed to obstruct the flow of a watercourse including: vertical dam sections, pier, abutments, sills, spillways, gates, valves and operating systems.

Locks and Marine rails: A chamber with gates on both ends connecting two sections of a canal or other waterway, to raise or lower the water level in each section including the walls of the chamber, sills and spillways, gates and valves and operating systems. Also, include marine railways.

Navigation Channels: A natural or artificial waterway connecting two bodies of water including the channel beds and banks.

Walls: A structure designed to maintain differences in ground elevation including the retaining walls which can be constructed concrete, stone, timber crib, steel piles and pre-cast concrete panels, rock filled wire baskets or reinforced earth.

Road Bridges: Structures built to carry traffic on public roads including snowsheds, overpasses, abutments, piers, main structural members, deck joints, bearings, approaches, railing systems, and traffic control systems.

Source: PCA, Asset Accounting Policy and Procedures, March 2007

Appendix D. Waterway Expenditures by Program Activity

Field Unit	Waterway	PA1 - Established Heritage Places	PA2 - Conserved Heritage Resources	PA3 -Public Appreciation and Understanding	PA4 - Quality Visitor Experiences	PA5 - Townsite & Throughway Infrastructure	PA6 - Internal Services	2010-11 Total
2010-11								
Western Quebec	Carillon Canal		20,429	182	1,623,490	105	2,804	1,647,009
	Chambly Canal		184,632	16	1,809,090	2,408	5,445	2,001,592
	Lachine Canal	36,761	223,258	65	2,083,706	38,680	59,366	2,441,835
	Ste-Anne-de- Bellevue Canal		30,153		356,520		3,105	389,779
	Saint-Ours Canal		33,009		572,037	13,191	6,602	624,839
Eastern Ontario	Rideau Canal		2,312,730	114,552	4,735,653	1,433,094	1,543,358	10,139,387
Northern Ontario	Sault Ste. Marie Canal		386,433	11,245	721,671	30,941	213,497	1,363,789
Cape Breton	St. Peter's Canal		24,404	165	585,428		1,701	611,698
Central Ontario	Trent-Severn Waterway	974	1,073,809	317,709	11,657,165	2,717,045	2,120,443	17,887,145
	Grand Total	37,734	4,288,857	443,934	24,144,762	4,235,464	3,956,323	37,107,073
2009-10								
Western Quebec	Carillon Canal		8,996		1,185,372		4,306	1,198,675
	Chambly Canal		532,304		1,675,602		6,641	2,214,547
	Lachine Canal		848,402		1,863,601		49,991	2,761,994
	Ste-Anne-de- Bellevue Canal		526	37	333,453		778	334,794
	Saint-Ours Canal		4,581		495,103		2,044	501,728
Eastern Ontario	Rideau Canal	32	2,251,234	121,061	5,324,929	674,383	955,041	9,326,680
Northern Ontario	Sault Ste. Marie Canal		305,619	8,004	450,460	0	169,130	933,212
Cape Breton	St. Peters Canal		50,544	36	347,950		2,492	401,022
Central Ontario	Trent-Severn Waterway	1,031	1,079,674	187,267	10,023,896	1,752,739	2,008,115	15,052,722
	Grand Total	1,063	5,081,878	316,405	21,700,367	2,427,122	3,198,537	32,725,372
2008-09								
Western Quebec	Carillon Canal		24,270		1,149,015		-17,009	1,156,277
	Chambly Canal	-450	874,965		1,663,163		2,409	2,540,087
	Lachine Canal		1,741,439		2,120,935		-37,966	3,824,409
	Ste-Anne-de- Bellevue Canal		910	1,310	309,303		-496	311,026
	Saint-Ours Canal		103,283		502,320		7,445	613,049
Eastern Ontario	Rideau Canal		3,158,826	69,415	5,318,441	583,721	719,277	9,849,679
Northern Ontario	Sault Ste. Marie Canal		408,215	10,393	807,713	198	234,160	1,460,679
Cape Breton	St. Peters Canal		17,420		231,391		718	249,528
Central Ontario	Trent-Severn Waterway	407	1,046,549	168,172	8,627,787	3,833,950	1,939,389	15,616,253
	Grand Total	-43	7,375,876	249,290	20,730,068	4,417,869	2,847,927	35,620,987

Source: Financial Reports provided by Finance – Program Expenditures (2250)

Appendix E. Evaluation Matrix

Evaluation Questions	Expectation	Indicators	Data Source
Relevance: Is through waterway management consistent with Agency and federal government priorities, and does it address the needs of Canadians?			
1. Is through waterway management aligned with federal roles and responsibilities?	The federal government and PCA have a constitutional and legislative mandate for through waterway management.	Extent to which through waterway management is constitutionally and legally aligned with federal roles and responsibilities and defines a role for PCA for waterway management.	<ul style="list-style-type: none"> • Document and literature review • Key informant interviews • Expert panel
2. Is through waterway management consistent with government and Agency priorities?	<p>Through waterway management is consistent with the Agency's mandate and strategic outcomes.</p> <p>Through waterway management is consistent with the whole of government framework.</p>	<p>Extent to which through waterway management is consistent with the Agency's mandate and priorities.</p> <p>Extent to which through waterway management is consistent with the whole of government framework.</p>	<ul style="list-style-type: none"> • Document and literature review • Key informant interviews • Expert panel
3. Is there a continued need for through waterway management?	<p>There is a strong public benefit derived from through waterway management.</p> <p>There is evidence of continued support/demand for through waterway management among Canadians and user groups.</p>	<p>Level of use (trends in navigation and other appropriate uses).</p> <p>Extent that through waterway management provides important social and economic benefits.</p> <p>Public support/demand for through waterway management.</p>	<ul style="list-style-type: none"> • Document and literature review • Key informant interviews • Stakeholder interviews • Expert panel
Performance and Results: Is through waterway management achieving desired results (i.e., outputs and outcomes)? Are results attributable to program activities? Is the program efficient and economic in the production of desired results (i.e., outputs and outcomes)?			
4. To what extent has the Agency made progress towards its performance expectations with respect to the condition of contemporary assets?	Performance targets are clear, meaningful, and progress towards intended levels of performance is being achieved.	<p>Meaningfulness and clarity of target.</p> <p>Extent to which asset condition has been assessed.</p> <p>Baseline and current condition of contemporary assets.</p> <p>Extent to which work plans have been developed for asset maintenance</p>	<ul style="list-style-type: none"> • Document review • File review of asset management data • Key informant interviews • Site visits
5. To what extent has the Agency met its	Legal and operation requirements for water levels are understood.	Extent to which systems have been developed to obtain accurate and timely water level	<ul style="list-style-type: none"> • Document and literature review, • File review of water level data,

<p>performance expectations with respect to water level management?</p>	<p>Systems are developed (or exist) to obtain accurate and timely water level measures.</p> <p>Performance targets are clear and meaningful.</p> <p>Evidence of progress toward effectively managing water (i.e. progress on achieving corporate targets and/or other indicators of effective water management).</p>	<p>gauge measurements.</p> <p>Extent to which water level gauge measurements meet legal and/or operational requirements.</p> <p>Unintended (negative) results as a result of water management are minimized or avoided where possible.</p>	<p>including reports of any flood / drought events.</p> <ul style="list-style-type: none"> • Key informant interviews • Stakeholder interviews • Expert panel • Site visits
<p>6. Is the program economical in producing the expected results and efficient at producing the expected outputs relative to the resources it consumes?</p>	<p>The Agency has developed a sustainable business model for its management of through waterways.</p> <p>The Agency has prioritized expenditures for maximum impact.</p>	<p>Extent to which there is a relationship between investments and Agency priorities.</p> <p>Expenditures relative to industry standards and benchmarks.</p>	<ul style="list-style-type: none"> • Document and literature review • Cost analysis • Benchmarking – comparison to similar service providers and industry standards for recapitalization of assets • Key informant interviews
<p>Alternatives: Are there any alternative approaches that could be used to achieve expected results?</p>			
<p>7. Are there any alternative approaches that could be used to achieve expected results?</p>	<p>The Agency has considered alternatives to its current program design.</p>	<p>Best practices exist in benchmark service providers that could be implemented by the Agency.</p> <p>Past operational reviews present options for further efficiency gains.</p>	<ul style="list-style-type: none"> • Document and literature review • Benchmarking • Key informant interviews • Expert panel

Appendix F. Documents Consulted

Legislation

- Parks Canada Agency Act
- Historic Canals Regulations, Department of Transport Act
- Historic Sites and Monuments Act
- Dominion Water Power Act
- Navigable Waters Protection Act
- Fisheries Act
- Canadian Environmental Assessment Act
- Species at Risk Act
- Canada Labour Code

PCA Corporate Documents

- 2010/11 Parks Canada Agency Corporate Plan
- 2010/11 Parks Canada Report on Plans and Priorities
- 2009/10 Parks Canada Performance Report
- Update to Parks Canada Long-Term Capital Plan
- National Historic Site 2010-11 Performance Expectations Worksheet
- Parks Canada Capital Planning Process Directive (June 2005).

Asset Management

- Asset Management System
- Long Term Capital Plan, 2005-06 to 2010-11

Water Management

- Trent-Severn Waterway: Water Management Study
 - Review of Water Management Systems and Models (April 2011)
 - Data Collection and Management Guide (April 2011)
 - Water Management Manual – Description of the Current Approach to Water Management (May 2011)
- Rideau Canal Water Management Study (June 1994)

PCA Policy

- Historic Canals Policy, Parks Canada Guiding Principles and Operational Policies
- Cultural Resource Management Policy, Parks Canada Guiding Principles and Operational Policies
- Directive for Dam Safety Program of Parks Canada Dams and Retaining Structures (2009)
- Directive for Design, Construction, and Inspection of Vehicular and Pedestrian Bridges (January 2008)
- Rideau Canal and Trent-Severn Waterway, Policies for In-Water and Shoreline Works and Related Activities (2007)

Other Policies / Instruments

- TBS Policy, Directive and Guidelines on Evaluation
- TBS Policy on Management, Resources and Results Structures
- TBS Guide to the Management of Real Property

Waterway Management Plans

- Lachine Canal National Historic Site of Canada Management Plan (2002)
- Rideau Canal National Historic Site of Canada Management Plan (May 2005)
- Rideau Canal World Heritage Site Management Plan (2005)
- Sainte-Anne-de-Bellevue Canal National Historic Site of Canada Management Plan (May 2005)
- Saint-Ours Canal National Historic Site of Canada Management Plan (2005)
- Sault Ste. Marie National Historic Site of Canada Management Plan (February 2007)
- St. Peters Canal and National Historic Sites of Canada Management Plan (February 2009)
- Trent-Severn Waterway National Historic Site of Canada Management Plan (October 2000)

Management Reviews and Previous Evaluations

- Report of the Auditor General of Canada – Parks Canada: Management of Historic Canals (Chapter 32, November 1996)
- It's All About the Water: Report of the Panel on the Future of the Trent-Severn Waterway (March 2008)
- Government Action Plan in Response to Report of the Panel on the Future of the Trent-Severn Waterway (2008-2009)
- Evaluation of Parks Canada's Asset Management Program – Office of Internal Audit and Evaluation, PCA (July 2009)
- Evaluation of Parks Canada's Through Highway Management – Office of Internal Audit and Evaluation, PCA (November 2010)
- Parks Canada Operational Review No. 30 – Canals (1993)

Other documents:

- Funding and Income Sources for Overseas Waterways, Inland Waterways Advisory Council (November 2009)
- Review of Other Models of Waterway, Waterway Corridor Management and Financing (July 2007)
- PCA – Chart of Accounts
- Various economic impact studies prepared for each waterway (see table 8)
- Historic Sites and Monuments Board of Canada designations for each waterway
- PCA, Eastern Ontario Field Unit Asset Management Report, (March 2010)
- Hatch and Mobec Engineering for PCA, Risk Analysis and Development of the Parks Canada Dam Safety Program Jurisdictional Review and Recommendations for Development of a Parks Canada Dam Safety Guideline (July 31, 2008)

Appendix G. Water Bodies under PCA Jurisdiction

This list of water bodies under the jurisdiction of PCA for the Rideau Canal and Trent-Severn Waterway is from PCAs *Trent-Severn Waterway and Rideau Canal – Policies for In-water and Shoreline Works and Related Activities, 2007*. It does not include forty-four lakes in the Haliburton Highlands area (i.e., Haliburton Highlands reservoir lakes in the list) that are dammed to collect spring runoff water <http://www.pc.gc.ca/eng/lhn-nhs/on/trentsevern/plan/plan8/plan8a.aspx>.

Rideau Canal

- Rideau Canal from Ottawa Locks to Hogs Back
- Rideau River to the Hogs Back Dam
- Kemptville Creek to Highway 43
- Lower Rideau Lake
- Big Rideau Lake
- Adams Lake
- Tay River to Port Elmsley
- Tay Canal
- Upper Rideau Lake
- Newboro Lake
- Loon Lake
- Pollywog Lake
- Benson Lake
- Mosquito Lake
- Stevens Creek
- Indian Lake
- Clear Lake
- Opinicon Lake
- Sand Lake
- Whitefish Lake
- Cranberry Lake
- Little Cranberry Lake
- Dog Lake
- The River Styx
- Cataraqui River including Colonel By Lake, and the Great Cataraqui Marsh to Bell Island

Trent-Severn Waterway

- Trent River
- Rice Lake
- Otonabee River, including Little Lake (except the part of the river north of Hunter Street Bridge north to Naussau Bridge)
- Lake Katchewanooka
- Clear Lake
- Stoney Lake
- Lovesick Lake
- Lower Buckhorn Lake
- Upper Buckhorn Lake
- Chemong Lake
- Pigeon Lake
- Little Bald Lake and Big Bald Lake
- Big Bob and Little Bob Channels
- Haliburton Highlands reservoir lakes
- Sturgeon Lake
- Lake Scugog and the Scugog River
- Cameron Lake
- Rosedale River
- Balsam Lake
- Gull River south of Coboconk
- Mitchell Lake, Canal Lake and the connecting channels
- Talbot River between Canal Lake and Talbot Dam
- Channel between Talbot Dam and Lake Simcoe
- Channel between Lake Couchiching and the Severn River
- Sparrow Lake
- Severn River, including Gloucester Pool and Little Lake

Appendix H. Selected Water Level Ranges

Trent-Severn Waterway, Navigational Water Levels

Lock Name	Lock Number	Lake Name (as applicable)	Max Water Elevation (m)	Min Water Elevation (m)
			1978 GSC	
Trenton	Lock 1		80.10	79.95
Sydney	Lock 2		86.29	85.83
Glen Miller	Lock 3		94.54	94.38
Batawa	Lock 4		99.99	99.84
Trent	Lock 5		105.49	105.04
Frankford	Lock 6		110.39	110.09
Glen Ross	Lock 7	Percy Reach	113.47	113.32
Percy Reach	Lock 8		119.38	119.23
Meyers	Lock 9		124.29	123.83
Hagues Reach	Lock 10		131.61	131.15
Ranney Falls	Lock 11/12		146.21	145.76
Campbellford	Lock 13		153.24	152.78
Crowe Bay	Lock 14		160.85	160.70
Healey Falls	Lock 15		167.52	167.37
Healey Falls	Lock 16/17	Seymour	183.99	183.69
Hastings	Lock 18	Rice Lake	186.72	186.59
Scott's Mills	Lock 19	Little Lake	189.17	189.01
Ashburnham	Lock 20		192.72	192.52
Peterborough Lift Lock	Lock 21		212.58	212.48
Nassau Mills	Lock 22		216.70	216.62
Otonabee	Lock 23		220.33	220.17
Bouro	Lock 24		223.99	223.84
Sewer Creek	Lock 25		227.14	226.98
Lakefield	Lock 26	Katchewanooka	232.02	231.92
Young's Point	Lock 27	Stony/Clear	234.35	234.05
Burleigh Falls	Lock 28	Lovesick	241.47	241.42
Lovesick	Lock 30	Lower Buckhorn	242.64	242.56
Buckhorn	Lock 31	Buckhorn/Pigeon/Chemong	246.08	245.92
Bobcaygeon	Lock 32	Sturgeon	247.76	247.73
Lindsay	Lock 33	Scugog	249.92	249.78
Fenelon Falls	Lock 34	Cameron	255.04	254.96
Rosedale	Lock 35	Balsam	256.19	256.16
Kirkfield Lift Lock	Lock 36	Mitchell	256.19	256.16
Bolsover	Lock 37	Canal	241.25	241.15
Talbot	Lock 38		234.68	234.58
Portage	Lock 39		230.44	230.34
Thorah	Lock 40			226.04
Gamebridge	Lock 41			221.82
Couchiching	Lock 42	Couchiching/Simcoe	219.06	218.69
Swift Rapids	Lock 43	Sparrow	212.48	212.36
Big Chute	Marine Railway		196.21	198.06
Six Mile Lake	Six Mile Dam	Six Mile	186.43	185.67
Port Severn	Lock 45	Gloucester Pool	180.50	180.42

Source: TSW Water Management Study, Water Management Manual, Appendix C (May 2011).

Rideau Canal Reach Ranges, Navigation and Non-Navigation

Station Name	Navigation Season (m)	Non-Navigation Season (m)
Ottawa	64.03 – 64.08	62.45
Hartwells	70.68 – 70.74	68.35
Hogs Back	74.90 – 74.94	72.71
Black Rapids	77.78 – 77.83	75.44
Long Island	85.45 – 85.50	85.09 – 85.14
Becketts Island	85.50 – 85.55	85.14 – 85.19
Burritts Rapids	88.68 – 88.73	88.20- 88.25
Nicholsons	92.97 – 93.02	91.52 – 91.57
Clowes	95.25 – 95.30	94.95 – 95.00
Merrickville	102.88 – 103.00	102.85 – 102.95
Kilmarnock	103.54 – 103.66	103.40 – 103.45
Edmonds	106.35 – 106.41	106.10 – 106.15
Old Slys	111.31 – 111.46	110.85 – 110.90
Combined	119.15 – 119.25	117.13
Detached	121.74 – 121.80	121.60 – 121.65
Poonamalie	123.90 drawdown	123.10 (Oct 15 th level)
Bob's Lake	162.70 drawdown	161.38
Beveridges	130.90 – 130.95	130.80 – 130.85
Wolfe Lake	136.58 drawdown	135.88
Narrows	124.65 drawdown	124.10
Chaffeys	122.00 – 122.12 rule curve 122.05	121.28 – 121.89
Davis	118.65 – 118.80 rule curve 118.75	117.91 – 118.55
Jones Falls	116.00 – 116.10	115.65 – 115.86
Upper Brewers	98.65 drawdown	97.90 – 98.60
Lower Brewers	92.70 – 92.80 rule curve 92.75	92.76
Kingston Mills	88.65 – 88.78 rule curve 88.70	88.10 – 88.71

Source: Rideau Canal staff, January 2011.

Appendix I. Operational Review of Canals (1993), Summary of Options and Impacts

Potential annual savings for PCA are not presented here as these estimates are now too outdated to be relevant.

Option	Description	Services Provided	Impacts
1. Maintain current level of resources and services.	<ul style="list-style-type: none"> Through navigation during peak & shoulder season. Water management. Maintenance of marine, water control and bridge structures. Protection of cultural and natural resources. 	<ul style="list-style-type: none"> Operation of marine & bridge assets. Maintenance of navigation channels. Dam and weir operation. Monitoring & control of flows. Public safety. 	<ul style="list-style-type: none"> Status quo.
2. Downsize operations:			
a) Close canals	<ul style="list-style-type: none"> Cease all activities. Ownership, water control & security stopped. Some structures mothballed/filled in. 	<ul style="list-style-type: none"> Gradually walk away from all responsibilities. 	<ul style="list-style-type: none"> Mandate not met; loss of cultural and natural resources. Effect on economy, tourism, and local communities. Loss of jobs. Loss of revenue.
b) Maintain as NHS	<ul style="list-style-type: none"> Cease navigation. Protect only historic structures. Cease maintenance of navigation channels. 	<ul style="list-style-type: none"> Maintain water control. Maintain interpretation. 	<ul style="list-style-type: none"> Mandate partially met. Marine structures not recapitalized. Effect on economy, tourism, communities. Loss of jobs.
c) Partial navigation	<ul style="list-style-type: none"> Navigation in areas of high traffic & commercial activity. 	<ul style="list-style-type: none"> Maintain all services required for navigation in selected areas. Water control in affected reaches. 	<ul style="list-style-type: none"> Loss of through navigation. Effect of economy and tourism. Loss of jobs.
3. Transfer canals to another federal agency	<ul style="list-style-type: none"> Total divestiture. 	<ul style="list-style-type: none"> No services provided by PCA. 	<ul style="list-style-type: none"> Net savings to Canada is nil. PCA cultural mandate not met.
4. Create a special operating agency	<ul style="list-style-type: none"> Fully or semi-autonomous agency owns/operates all or part of canals. Partially self-funded through revenue. Report to Minister to ensure core mandate is respected. 	<ul style="list-style-type: none"> Maintain all or most services currently offered. 	<ul style="list-style-type: none"> Mandate met but practices changed to accommodate partners. Part or all revenues retained. Minimal socio-economic impact.
5. Partial privatization	<ul style="list-style-type: none"> Retain ownership, continue to recapitalize. Privatize operation. 	<ul style="list-style-type: none"> Maintain all or most services currently offered. 	<ul style="list-style-type: none"> Loss of revenue. Maintenance of standards and quality uncertain. Potential legal liability.

Option	Description	Services Provided	Impacts
6. Transfer day-to-day operations to a partner	<ul style="list-style-type: none"> Operation of selected activities by partners; shared objectives. 	<ul style="list-style-type: none"> Maintain all or most services currently offered. 	<ul style="list-style-type: none"> Partial loss of control over management of resources.
7. Joint Rideau-TSW administration	<ul style="list-style-type: none"> Centrally-located admin for both canals. Shared support functions. 	<ul style="list-style-type: none"> Maintain all or most services currently offered. 	<ul style="list-style-type: none"> Managers too distant from operational issues; increased travel costs and managers less accessible to public.
8. Joint Quebec-Ontario administration	<ul style="list-style-type: none"> Centrally-located admin for canals. Shared support functions. 	<ul style="list-style-type: none"> Maintain all or most services currently offered. 	<ul style="list-style-type: none"> Managers too distant from operational issues; increased travel costs and managers less accessible to public.
9. Enhance revenue/ change management practices	<ul style="list-style-type: none"> Combination of elements from other options, with focus on revenue. New sources of revenue explored. 	<ul style="list-style-type: none"> A number of scenarios are possible. 	<ul style="list-style-type: none"> Numerous scenarios.