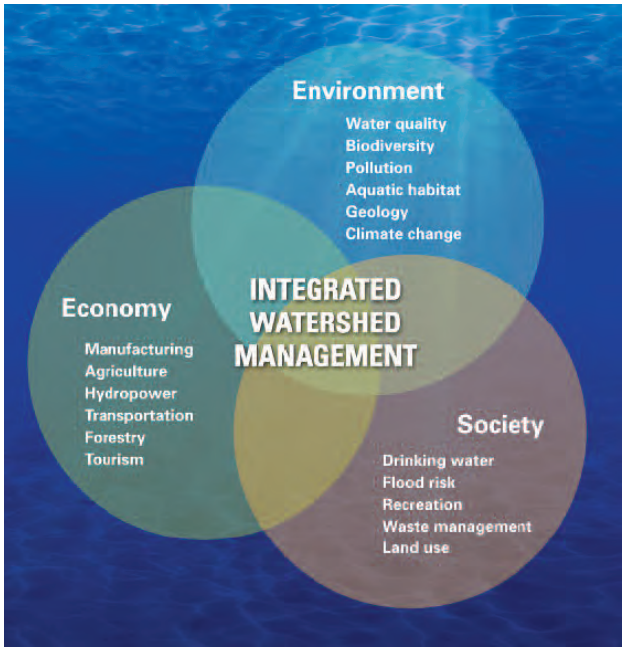
Integrated Water Management at the Watershed Level
A Coalition for Equitable Water Flow (CEWF) Perspective

Introduction:

The management of natural resources at the watershed level has been adopted in many jurisdictions. The International Institute for Sustainable Development has stressed the importance of an ecosystem-based approach to Integrated Water Resources Management (IWRM) and has identified three core elements for success: stakeholder participation; political commitment; and continuous awareness building.

Environment Canada has endorsed IWRM at the watershed level and Ontario is working towards a Provincial Integrated Watershed Management Framework. The Ontario framework includes watershed-based approaches to both Water Management and a Water Budget.



[Schematic: per Conservation Ontario: Integrated Watershed Management in Ontario]

Definition:

Simply put, Integrated Water Resource Management is the practice of making decisions and taking actions while considering multiple viewpoints as to how water should be managed. The need for multiple viewpoints is caused by competition for water and by complex institutional constraints. [Online Water Encyclopedia].

Here is a more technical definition based on Canadian sources:
Integrated Water Resource Management is a cooperative, ecosystem-based approach that considers all water uses (environmental, economic, and social) and stakeholders in the water management decision-making process in order to protect the health of the ecosystem as land uses change. Water demand-management and water conservation are an essential part of an integrated approach to water resource management.
Parks Canada Commitment:

Through the appointment of the "Water Management Advisory Council" (WMAC), Parks Canada has committed to developing a shared vision for a balanced approach to water management in the Trent and Severn watersheds, including a more transparent decision-making process regarding water allocation decisions.

A 2012 Press Release notes: *Water level management on the lakes and rivers of the Trent-Severn Watersheds follows a complex protocol that incorporates many contributing factors. Primary considerations inherent in this approach are flood abatement, protection of the fishery (especially the fall spawn), navigation and recreation - with flood abatement and public safety being of paramount concern. Many factors are taken into account before any water level adjustment is made to the lakes and rivers of the Trent-Severn Watersheds. Parks Canada takes great care in managing these waters to address a wide range of public values. Decisions affecting an individual body of water are scrutinized for impacts to other water bodies as well as the broader system.*

Three Key Components:

The Coalition has identified three key components of an integrated approach to water management as applied to the Trent River watershed: governance; infrastructure; and operations.

Governance

The Coalition has endorsed the recommendations on governance contained in the 2008 Report of the Panel on the Future of the Trent Severn Waterway "It's All About The Water" and believes it unlikely that a truly integrated approach to water management can be implemented until the federal government accepts those recommendations and makes corresponding changes to the governance mandate of the Trent Severn Waterway (TSW).

The Coalition's long-term objective is therefore to have the TSW mandate updated to fully embrace integrated water resource management at the watershed level with a strong focus on water conservation and an equitable balance of water allocation based on a robust demand constraint model.

In the short term, the Coalition will continue to advocate for progress on the multi-stage Water Management Study begun by the TSW in 2010 and for more effective use of the TSW Water Management Advisory Council.

In addition the Coalition will endorse efforts to engage Ontario according to the terms of the 2011 Memorandum of Understanding (MOU) with regard to water allocation and jurisdictional issues.

Infrastructure

The Panel Report clearly articulated the inadequate funding situation with regard to repair, maintenance and upgrading of the dams, locks and other infrastructure that are the responsibility of the TSW. However the Parks Canada multi-year capital-funding plan fails to adequately address the scale of this challenge leading to a concern that public safety may be increasingly at risk, notwithstanding the fact that Parks Canada has a highly commended dam safety review program.

While the TSW infrastructure is important in order to serve the needs of the canal sections of the waterway, it also serves critical water management needs that are unrelated to the canal. These include public safety considerations such as flood mitigation, safe navigation, protection of the drinking water supply, and avoidance of catastrophic dam failure. An integrated approach to water management would fully recognize these important priorities.

Accordingly, the Coalition believes that responsibility for the capital budget related to 'public safety' infrastructure should be transferred from Parks Canada to Infrastructure Canada and become the responsibility of the federal "Transport, Infrastructure and Communities Portfolio". Only then will this critical infrastructure stand a chance of being given the priority attention it requires within the context of an integrated approach to water resource management.

Operations

Currently the two main operating goals of the TSW are to ensure the canal system has adequate water to maintain navigation water levels during the period from Victoria Day to Thanksgiving, and to protect against flooding particularly during the spring and fall seasons.

In order to control the levels on the canal lakes and connecting channels west of lake Simcoe and to meet minimum flow requirements in the Peterborough area, the TSW manages the levels on the 41 reservoir lakes located in the Haliburton Sector of the Watershed. The management of these reservoirs also controls the levels on the more than 20 flow-through lakes and the connecting rivers in this sector. There are 17 dams in the Gull River basin and 13 dams in the Burnt River basin, as well as 5 dams in the so called central lakes, covering Crystal Lake, the Mississagua Lake chain, Eels Lake and Jacks Lake.

The Coalition has made TSW aware of a number of concerns relating to the reservoir lakes that result from the current water management model. Recently these concerns have included the issue of high water too early in spring while ice is still present on the lakes as occurred in 2011, problems of shoreline erosion and property damage that occur when extremely high water persists into the boating season, and problems experienced in August 2011 when rapid drawdown created hazardous navigation conditions on several of the reservoir lakes, dangerously high flow rates on some connecting rivers, and restricted access to water-access properties.

The Coalition believes that a more sophisticated water management model is required in order to be able to effectively account for a broad range of system constraints and to follow an integrated approach to water management that recognizes the interests of all stakeholders. It is understood that just such a model has been proposed to the TSW and is currently under review. However the ability to factor in multiple constraints will only support an integrated approach to water resource management of the Trent watershed if the TSW adopts a change of mandate as recommended in the Panel Report.

What will change with successful implementation of IWRM?
The Coalition is aware that conceptual approaches, such as Integrated Water Resource Management, may appear overly academic or bureaucratic to the average waterfront property owner. The bottom line for them is knowing what will change as a result of this new approach.

The Coalition suggests that we might hope to see some of the following outcomes:

- incidents of over-bank flooding reduced on RAFT lakes as 'preferred water levels' are considered as part of water management;
- incidents of dried-out river-beds, stagnant-water algae blooms, and disruption of pickerel spawning reduced as river flow rates are better monitored and adjusted to meet local constraints;
- a reduction in the number of extreme water level events on the flow-though lakes as a result of better monitoring and improved management of their water levels;
- less damage to wetlands, fish and wildlife habitat as water level fluctuations are moderated;
- less ice damage to property as lake levels are raised more gradually when ice remains on the lakes in early spring;
- improved navigation and water access as "preferred water level" constraints are built into the water management model;
- fewer instances of water line exposure and freezing;
- a comprehensive approach to water conservation across the watershed in 'dry years' when the normal supply is insufficient to meet the traditional level of water demand.

Conclusion
The Coalition has made Integrated Water Resource Management the foundation of efforts to achieve its mission. Accordingly we will work to increase stakeholder awareness and participation in support of gaining political commitment to implement IWRM for the Trent watershed.

References

Approaching Integrated Watershed Management: Exploring Interests and Challenges. Summary Report of an Inter-Agency Workshop held June 21, 2005 in Peterborough, Ontario. Edited by Doug Hodgins, Mystic Consulting Services.

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Its All About the Water: Report of the Panel on the Future of the Trent Severn Waterway, March 2008.

Muskoka River Water Management Plan, Final Plan Report, January 2006. http://www.muskokawaterweb.ca/5/5.6/mrwmp_planning.htm

Strengthening Integrated Water Resource Management in Canada: Discussion Paper by Anne Morin and Bernard Cantin, September 2009, published by the Government of Canada, Policy Research Initiative on Sustainable Development.

Water and Canada: Integrated Water Resources Management. Environment Canada, 2005.

Acronyms Used in This Document and Its Appendices

CEWF	Coalition for Equitable Water Flow
IWRM	Integrated Water Resource Management
MOU	Memorandum of Understanding
RAFT Lakes	Reservoir and Flow-Through Lakes
TSW	Trent Severn Waterway National Historic Site
WMAC	Water Management Advisory Council

Appendices

1. Governance Backgrounder
2. Infrastructure Backgrounder
3. Operations Backgrounder

Coalition Position on Integrated Water Management

Governance Backgrounder

This backgrounder details the Coalition's position regarding the governance of water management in the Trent watershed and the prospects for meeting the objective of Integrated Water Resource Management (IWRM).

Water management practices at the Trent Severn Waterway (TSW) were examined in the 2008 Panel Report, "It's All About the Water." In summary, regarding the governance of the watershed, the Panel found:

- *"Government agencies don't communicate or work together well, or in some cases, at all;*
- *Government agencies are not communicating with the public;*
- *Property owners are frustrated by a lack of communication about the reasons for and timing of changes in water levels – most understand that their property is on a reservoir system, but would find it easier to adjust to changes if they were given advance warning;*
- *A "one-window" approach for the waterway would make it easier for the public to get in touch with the right people;*
- *A new governing body for the waterway, one that is free from government red tape and can "just get things done", should be formed; and,*
- *Many responsibilities should be shifted to the province, or at the very least waterway and provincial staff need to work more closely with each other."*

The Panel made 26 recommendations, two of which stand out with respect to governance and IWRM.

"Recommendation 11

Improve management of water by creating and appropriately funding an independent water management agency, reporting to the federal Minister of Natural Resources, to assume responsibility for managing water storage, flows, allocation and use in the Trent and Severn watersheds.

Recommendation 12

Better assure adequate water supplies throughout the Trent-Severn Heritage Region in the future by:

(a) Promoting an integrated approach to water management;
(b) Fostering a strong water conservation ethic as part of the formal mandate of the water management authority; and,
(c) Implementing a Canada/Ontario harmonized water pricing regime that helps to offset water management costs and encourages water conservation."

The Guiding Principles recommended for incorporation into the mandate of the Independent Water Management Agency and the recommendations for governance of the Agency are included in Attachment A, below.

Ongoing Practice
The Federal government has not adopted the key recommendations of the Panel Report in particular those noted above on the governance of the TSW.

At the core of the TSW governance mandate are the following requirements:

- Supply water for the navigation on the canal portion of the waterway from Victoria Day weekend to Thanksgiving.
- Prevent flooding in the watershed.

This is the fundamental water management strategy which TSW adheres to, particularly at times of water stress, either drought or flood.

Notable Actions by Parks Canada
In an apparent response to the Panel Report, Parks Canada has taken a couple of notable steps.

First, a Memorandum of Understanding (MOU) has been signed with the Ontario government to cooperate in areas of overlapping jurisdiction regarding the "waterway". With regard to water management, the MOU states: *Canada will establish and fund a Water Management Advisory Council (WMAC) to provide advice on water allocation and related matters. Ontario will participate as a member of the WMAC.* Because the Council only provides advice it is difficult to see how the changes proposed by the Panel can be effected until the actual governance mandate of TSW is changed.

Second, the TSW has commenced a multi-stage Study to improve the overall water management capability. The initial phase, now at completion, was to document existing TSW practices, examine alternative water management models and comment on the long-term affects of climate change on the watershed. To date, only a summary presentation of the climate change impacts has been made public. This shows increasing water demand pressures over time. Continuation of this Study and the implementation of more sophisticated water management tools are considered essential to integrated water management of the watershed.

CEWF Position on TSW Governance
The Coalition finds it very unlikely that true IWRM can and will come about while the governance mandate of the TSW remains as it currently stands. Our long-term objective is to have this mandate changed through quiet but persistent diplomacy to one that fully embraces integrated water management at the watershed level with a focus on conservation and balancing of water allocations.

In the shorter term, the Coalition will push for progress on the multi-stage Water Management Study ongoing at TSW and for more effective use of the Water Management Advisory Council.

Attachment A (from the 2008 Panel Report)

Guiding Principles of the (Independent Water Management)Agency
The following principles should be enshrined in the agency's mandate in the enabling federal/provincial agreement:

- Accountable, open governance, supported by a clear and widely-shared watershed vision;
- A "precautionary approach" built on water conservation and integrated water management that form the fundamental principles by which water is managed;
- Continual improvement in predictability and responsiveness, in system modeling, monitoring, system adjustments, and communications;
- Open, continuing, and timely engagement of and provision of information to citizens and business; and,
- Adequate resources to manage and maintain the system as a matter of public safety, economic security, and environmental health.

Governance
A five to seven member board of water management representatives from Canada and Ontario would govern the agency. This board would establish and maintain operating policies and water use priorities. Board meetings would be held on a regular basis and be open to the public. A stakeholder advisory committee would provide formal input to the board. It would represent First Nations, select municipalities, and conservation authorities, as well as citizens with an interest in water management relating to the environment, shoreline residence, tourism, waterpower, recreational fishing, boating and resource extraction.

Coalition Position on Integrated Water Management

Infrastructure Backgrounder

This backgrounder details the Coalition's position regarding the maintenance and improvement of the Water Management Infrastructure throughout the Trent River Watershed.
Improving the Condition of Waterway Infrastructure was addressed in the 2008 Panel Report, "It's All About the Water". The following paragraphs summarize the main findings of the Panel with respect to the system infrastructure:

> *The Trent-Severn Waterway is a remarkable feat of engineering. The locks and dams provide for the movement of boats and the control of water through 18,000 square kilometres of watershed. Nearly 1,500 engineering structures and pieces of major equipment are required to keep it operating. Gabions and shore walls keep constructed channels open. Nearly 100 buildings provide service to the public and house the administrative staff who oversee the waterway operation. Dozens of specialized pieces of equipment from mobile cranes to huge planers for making log gates are required to keep the system in reasonable repair. More than 1,500 aids to navigation mark channels and hazards.*
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> *During our travels along the waterway, we marveled at the extent and diversity of the infrastructure – even more so when we recognized that most of the major engineering works were constructed between 1845 and 1920. 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.*
>
> *We also saw that this infrastructure is generally not in good condition. We saw leaking dams, deteriorating concrete, walls slipping into the channel and many other examples of public assets in disrepair.*
>
> *Recent engineering assessments of major civil works along the system do not suggest a significant risk of catastrophic failure of any of the dams with associated major damage to property and potential personal injury. We would note however that huge investment in the dams is required to bring them into compliance with the intent of the Canadian Dam Safety Guidelines. Parks Canada has provided some funding for this work, however there is much left to do.*

The Panel made the following specific observations with respect to infrastructure:

- *There is an annual shortfall of tens of millions of dollars in investment to maintain and replace the waterway's built assets.*
- *Staff cuts in the maintenance organization of the waterway have exacerbated the deterioration of assets and led to a loss of unique staff knowledge and expertise from which it will be difficult to recover.*
- *Priorities for investment in asset management seem to be based solely on asset condition when other considerations such as historic value and environmental factors need to be accorded greater value. We believe, for example, that investment in water conservation measures should be a high priority in the allocation of capital funding.*

- *The waterway long-term capital plan makes little or no provision for modernization of non-historic assets to improve their efficiency and permit them to serve new markets more effectively.*
- *The Parks Canada budget cycle for capital expenditures and the allocation of supplementary funding does not permit adequate time for planning and the development of sound project management expertise.*

Parks Canada and/or Public Works Canada maintains a complete inventory of the Infrastructure Assets with complete details as to age, condition, value and the need for remedial work and improvement, together with an estimated cost. The issue is not one of "knowing what to do" but is one of "where is the money"
The Panel's assessment for establishing appropriate funding Levels resulted in:

Recommendation 25

> *Ensure that waterway infrastructure is maintained, repaired and replaced according to appropriate standards by increasing the annual infrastructure maintenance, repair and replacement budget by $21 million per year on a phased-in basis starting immediately.*

This was based on:

> *...the annual target for investment in repairs, maintenance and replacement of waterway infrastructure should be in the order of two per cent of the asset replacement value($1.4 billion). This translates into a budget augmentation of $21 million per year. This additional funding should be phased in over a five-year period to allow the organization to recruit the engineering, technical and other expertise required to use the funding effectively. The monies should be dedicated funding in the form of an A-Base budget increase. The current Parks Canada practice of allocating supplementary capital funds on a competitive basis within a two or three-year time horizon prevents reasonable planning and project management from occurring.*

During the recent period when Infrastructure Funding was available under the Government's Stimulus Program, TSW did obtain some additional funds which allowed them to replace all the old stop logs with new timbers and to complete the installation of automated level gauges at control structures at a number of additional locations throughout the system.

CEWF's position with respect to Waterway Infrastructure is summarized as follows:

- Establish the Infrastructure work program priorities based on a comprehensive Integrated Water Management Plan;
- Support the TSW and Parks Canada in any way possible to access the additional funding needed as identified in the Panel Report, such as transferring the capital budget related to "Public Safety" infrastructure from Parks Canada to the "Transport, Infrastructure and Communities Portfolio".

Coalition Position on Integrated Water Management

Operations Backgrounder

The two main operating goals of the Trent Severn Waterway (TSW) are to ensure that the canal system has adequate water to maintain navigation water levels during the period from Victoria Day to Thanksgiving, and to protect against flooding particularly during the spring and fall seasons. In order to control the levels on the canal lakes and connecting channels in the Trent watershed and to meet minimum flow requirements in the Peterborough area, the TSW manages the levels on the 41 reservoir lakes located in the Haliburton Sector of the watershed. The management of these reservoirs also controls the levels on the more than 20 flow-through lakes and the connecting rivers in this sector.

The thirty-five reservoir dams include 17 dams in the Gull River basin and 13 dams in the Burnt River basin, as well as the dams in the so called central lakes, covering Crystal Lake, the Mississagua Lake chain, Eels Lake and Jacks Lake.

The normal annual cycle of reservoir operations begins in winter when TSW undertakes snow surveys to monitor the water level in the snowpack as a basis for predicting the magnitude of the spring runoff. Depending on the amount of moisture stored in the snowpack the TSW gradually adds logs back in to the reservoir dams, over the period from mid-February through April, to capture the late winter and spring runoff and ensure that with all logs in place the reservoirs are all filled by the end of the spring runoff period. Filling the reservoirs is complicated by the need to maintain minimum flow levels in connecting channels and flow through lakes where walleye are spawning at that time of year. In most years the highest levels on the reservoirs are achieved in May or June after the ice is out.

The reservoirs are normally kept at or near the full level through the early part of summer until water is required to maintain navigation levels on the Canal Lakes. When water is needed in the canal the reservoirs are drawn down using the “equal percentage drawdown” principle, which aims to take the same proportion of the total available water level drawdown from each reservoir. This means that when a reservoir lake that has a seasonal fluctuation of 1 metre is down 0.5 metres, a lake with a seasonal fluctuation of 2 metres would be down 1 metre. In dry years the drawdown may begin as early as June, while in wet years like 2011 it may not begin until well into August. The systems of connected reservoirs, particularly in the Gull and Burnt River systems, present a very complex management problem. Even in wet years some draw down must occur to maintain flows in connecting rivers and the levels in flow-through lakes. The rate of drawdown is further complicated on the Gull River reservoirs where a specific agreed minimum flow level at Norland is a constraint that sometimes requires the reservoirs in that system to be drawn down even when water is not required for the canal.

By mid August regardless of water demand for the canal, the TSW always begins the gradual drawdown of all reservoirs. The goal of this activity is to ensure that flood storage is available in case we experience extreme rainfall events in the fall as has occurred in the past when tropical storms have tracked over Ontario. TSW also aims to have the reservoirs down to winter levels by mid October, at the latest, to ensure the levels are stable before the lake trout spawn in the trout lakes.

The Coalition has made, and continues to make, TSW aware of water management concerns from the reservoir lakes. Recently these concerns have included the issue of high water too early in

spring while ice is still present on the lakes as occurred in 2011, the problems of shoreline erosion that occur when extremely high water persists in to the boating season, and particularly the problems experienced in August 2011 when rapid drawdown created hazardous navigation conditions on many of the reservoirs and dangerous flow levels on connecting rivers.

It should be noted that the winter set levels, as a percentage of the possible drawdown, vary considerably from lake to lake. For most of the reservoir lakes the winter set level is between 60 and 80% of the total drawdown possible. However at the extreme ends of the range, Kushog Lake is one of several that are drawn down by 100%, while Miskwabi Lake and Drag Lake are drawn down by only 40%. This typically means that at some point in September the 'equal percentage draw down' rule must be abandoned in order to achieve the winter set level prior to trout spawning.