

Tay River Watershed Management Plan



May 2002

Origins

In 1995, the Town of Perth in cooperation with its neighbouring municipalities published the *Perth Community Strategic Plan*. One of its recommendations was to undertake a watershed planning effort on the Tay watershed. The watershed community was enthusiastic about the idea. The Rideau Valley Conservation Authority (RVCA), the watershed planning agency in the Rideau watershed, was prepared to provide the stability, project management and core funding starting in 1998. The planning process was managed by RVCA in cooperation with the Tay River Round Table- the community-based partnership of interested groups and individuals.

Acknowledgements

We gratefully acknowledge the generous advice and assistance of the 80 community members of the Tay River Round Table and especially the Executive Committee members lead by Co-Chairs David Taylor and Mike Mosher (till November 2000). The vibrant lake associations in the watershed have contributed ideas, experience and lake expertise. It is a pleasure to also acknowledge the continuing support of our colleagues in the Leeds, Grenville and Lanark District Health Unit, the Ontario Ministry of Agriculture, Food and Rural Affairs, the Ontario Ministry of the Environment, the Ontario Ministry of Natural Resources, the federal Department of Fisheries and Oceans, and Parks Canada-Rideau Canal. Contributing organizations and individuals are more fully listed in Appendix B.



Rideau Valley Conservation Authority
1128 Mill Street, P.O. Box 599
Manotick, Ontario, Canada
K4M 1A5
Tel: (613) 692-3571
Fax: (613) 692-0831
E-mail: postmaster@rideauvalley.on.ca
Website: www.rideauvalley.on.ca

John H. Miller, Chair
Rideau Valley Conservation Authority

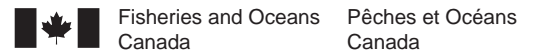
David E.F. Taylor, Chair
Tay River Round Table

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Key Partners

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Township of
BBS
Bathurst Burgess Sherbrooke



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Chapter One

Introduction

The *Tay River Watershed Management Plan* is a comprehensive community look at one of the most significant tributaries of the Rideau River (see Map 1). A broad community of interests in the watershed spent thousands of volunteer hours studying the issues, engaging the experts, debating the merits and devising the strategies for improving the long term environmental health of the lakes, creeks, wetlands, forests and wildlife habitats in the Tay River watershed. The resulting report which you are reading is the Tay's roadmap to watershed health.



The aim of the *Tay River Watershed Management Plan* is to guide and help coordinate watershed management activities in the Tay River watershed over the next two decades. The Plan will help the Tay community make better water management decisions especially in light of trends towards increased shoreline and lake development, higher populations, increasing demands for water-taking and water use, and the anticipated weather extremes brought on by climate change.

The *Tay River Watershed Management Plan* is a high level planning document that firmly identifies watershed issues, advises on broad environmental policy and direction, and identifies an implementation framework and the priorities for action. It can be used by municipalities, government agencies and community groups to undertake actions leading to a healthy vibrant watershed, a livable community and a prosperous and sustainable economy. The Rideau Valley Conservation Authority will encourage municipalities to consider the Plan's principles and directions when making land use planning and development approval decisions within the watershed. By virtue of their leading role in land use planning, municipalities have a major role to play in ensuring long term environmental sustainability. Provincial and federal departments also have significant roles in achieving watershed health by virtue of their regulatory powers in the areas of natural resource management, mining, fisheries, agriculture and public health, and their operational responsibilities for major water control structures in the basin.

Chapter Two outlines the watershed planning process. A general description and assessment of the state of the Tay River watershed is included in Chapter Three. The watershed issues, community vision and related goals and objectives form Chapter Four. Chapter Five is the complete list of actions needed to fully accomplish each goal and objective. Chapter Six is the roadmap to watershed health: the three-year work plan of high priority actions that we can all start on now.

Chapter Six is the key part of this Plan. The priority actions in the three-year work plan were selected based on one or more of the following criteria:

- the action addresses the most serious existing or emerging problems in the watershed,
- the action will take several years to accomplish but costs little to start,

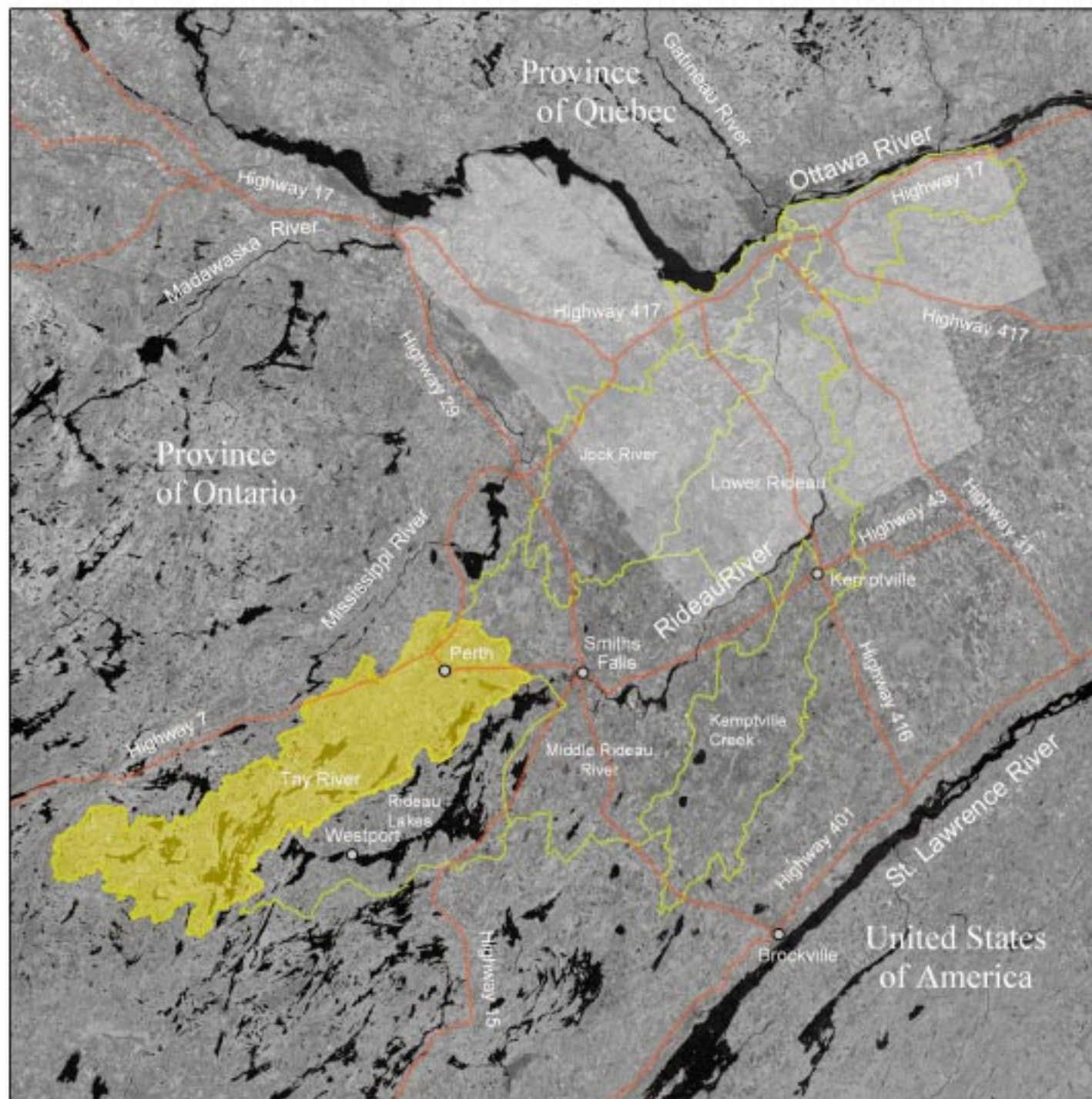
- the action is among the most promising in terms of expected benefits to be attained, or
- the action is critical to future decision-making.

To obtain the necessary commitments to move forward with implementation, it is necessary to assign responsibilities (lead and supporting roles) and to estimate the cost associated with the selected actions. Suggestions are made in Chapter 6 based on RVCA's understanding of the legislative powers, mandates, policies and programs of various stakeholders in watershed management.




The Plan will be reviewed every three years following monitoring of the watershed's response to previous work, verification of resources available, and updating of the management strategy. A new three-year cycle of newly-declared action priorities will then be adopted.



Map 1. Tay River Watershed Regional Location



Legend

-  Tay River Watershed
-  City of Ottawa
-  RVCA_Boundary

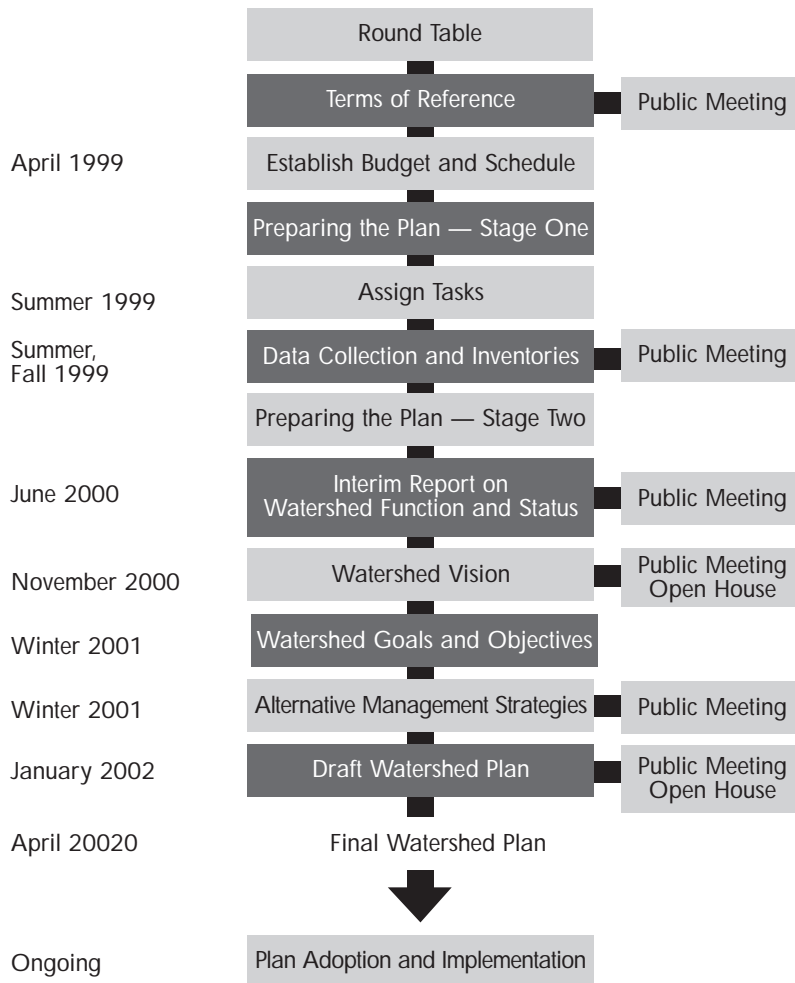
Chapter Two

The Planning Process

The following and Figure 1 provide a synopsis of the process used in the development of the Tay River Watershed Management Plan:

- *Perth Community Strategic Plan* (1995) recommends a Tay watershed plan
- well-attended public meeting in 1997 confirms a public interest for moving forward with the planning exercise; RVCA commits to funding for 1998
- a second major public meeting in November 1998 draws 75 community members to join the fledgling Tay River Round Table; the group discusses watershed issues and terms of reference; Executive Committee recruited from the community
- the Technical Advisory Committee (TAC) is formed in 1998 with technical expertise in water and land management issues; representatives drawn from the six municipalities, RVCA, Ministry of Agriculture, Food and Rural Affairs, Ministry of Environment, Ministry of Natural Resources, Leeds Grenville and Lanark District Health Unit, and Department of Fisheries and Oceans
- data collection through 1998 – 1999; consultants compile all known information on the Tay watershed and produce *Existing Conditions and Trends in the Tay River Watershed* report in June 2000
- newsletters, press releases, displays keep public and members informed of progress (ongoing)
- community “visioning” exercise completed in November 2000 (*Tay River Community Consultation Report*); TAC establishes goals and objectives based on the community vision and the current conditions report (Chapter Four)
- sub-committees are struck in January 2001 to develop the management strategies (actions) to achieve each goal (Chapter Five)
- public and partners to review draft *Tay River Watershed Management Plan* (Spring 2001)
- *Tay River Watershed Management Plan* produced and distributed for adoption (May 2002).

Figure 1: Tay River Watershed Plan Planning Process



Chapter Three

State of the Watershed

Description:

The Tay River, lies within the huge Great Lakes-St. Lawrence drainage basin. The Tay is the second largest tributary of the Rideau River. The 95-km long Tay drains an area of about 800 square kilometres including parts of the following six municipalities: Central Frontenac, South Frontenac, Rideau Lakes, Bathurst Burgess Sherbrooke, Town of Perth and Drummond/North Elmsley (see Map 2). The watershed is the most heavily forested watershed in the Rideau Valley at 63%. It has 46 lakes, many smaller un-named ponds and abundant wetlands. The valley is underlain by two distinct geological formations — the Smiths Falls Limestone Plain (northeast of the outlet from Christie Lake) and the Precambrian Shield (generally south and west of the outlet from Christie Lake). As a result, there is considerable variety and diversity among the subwatersheds of the Tay River drainage area. For the purposes of this discussion and for implementation purposes, four watershed zones within the Tay watershed have been recognized: Zones 1 and 2 within the Limestone Plain and Zones 3 and 4 within the Precambrian Shield area (see Map 3).



The Limestone Plain

The northeastern part of the watershed (from the Tay's mouth at Lower Rideau Lake, upstream to the outlet of Christie Lake) is part of a large, flat Limestone Plain with clay and till overburden (see Map 4). There is good agricultural capability, urban development, and well-defined, large wetlands in this section. Twenty eight percent of this lower part of the watershed is forested. Twenty two percent is farmland. At least five provincially significant wetlands occur in this area. Two of those wetlands — Tay Marsh and Blueberry Marsh — are also provincial Areas of Natural and Scientific Interest (ANSIs). There are two main Tay tributaries in this section: Jebbs Creek which receives flow from Otty Lake and flows primarily through wetland before joining the main river below the Town of Perth at the Perth Wildlife Reserve, and Grants Creek, the outlet of Pike Lake, flowing through a major agricultural area before entering the Tay in the Town of Perth south of the Links O'Tay golf course.

The Town of Perth with a population of 6,000 draws its water supply from the Tay River and returns all of its wastewater to the watershed by way of the Perth Sewage Lagoons located just south of Town on the Perth Wildlife Reserve. The Perth Landfill Site is also downstream and leachate from it is pumped into the sewage lagoons for treatment. The Ministry of Environment (MOE) is currently studying the effluents from this area.

Observations show that urban development in and around Perth, along with agricultural activities have resulted in some fragmentation of habitats and some impairment of water quality. However, water quality remains good overall. Macroinvertebrate sampling indicates good water quality on the river. In general, contamination from metals and suspended solids was not a problem in the watershed. High bacteria levels were often found within the Town of Perth. High phosphorus levels were found in Grants Creek. More consistent water quality monitoring for nutrients and bacteria is needed on both the lakes and the main river to better understand

sample fluctuations on a seasonal and annual basis. Early indications in the groundwater analysis indicate that large parts of the lower watershed act as groundwater discharge zones where water flows from underground reserves into the surface water system in this area.

There are two water control structures in this section of the watershed. The Pike Lake Dam is owned by the Ministry of Natural Resources. It was built in 1970 to maintain recreational water levels on the lake while furnishing controlled flows to downstream areas. The Beveridges Dam and Lock Station between the Tay Marsh and Lower Rideau Lake is owned and operated by Parks Canada as part of the Rideau/Tay Canal system. There are two water control structures within the Town of Perth to maintain water levels and provide aesthetic appeal to the Tay as it flows through Stewart Park. These dams were reconstructed in the early 1970s and are currently in disrepair. A few hundred metres up Grants Creek, at a location known as “Devil’s Rock”, Ducks Unlimited is evaluating the feasibility of installing a dam for preserving and enhancing the highly-valued wetlands and waterfowl production areas upstream on the creek.

There is relatively dense waterfront development on the lakes in this lower portion of the Tay watershed. Most lakes in this area are mesotrophic or moderately enriched with nutrients. Water clarity is usually reduced.

The lower portion of the Tay, from Perth downstream to Lower Rideau Lake via Beveridges Locks and the artificial cut, is also known as the Tay Canal. The natural river portion of the lower Tay flows into Lower Rideau Lake at Port Elmsley (see Map 2). The Tay Canal was originally installed in the river starting in 1832 following the opening of the successful Rideau Canal. This section of the watershed is part of the *Canadian Heritage River* designation given to the Rideau Waterway in 2000 to recognize the nationally-valuable cultural and recreational features of the river. The Tay Basin in the heart of Perth is the docking and turning area for boats coming up from the Rideau Canal. The Town has started a community redevelopment of the Basin including identification of a site for the proposed “Tay Watershed Discovery Centre”.

The Precambrian Shield

The southwestern two-thirds of the watershed is underlain by Precambrian rocks of the Canadian Shield. Soils there are typically shallow. Terrain is rocky and hilly. Lakes and wetlands abound. Land uses such as limited and sporadic agriculture, forest-related activities, cottaging and small rural communities reflect the rugged conditions. This large, western part of the watershed is 80% forested. Of the 46 lakes in the watershed, all but eight are found in this Precambrian Shield area (see Map 3).

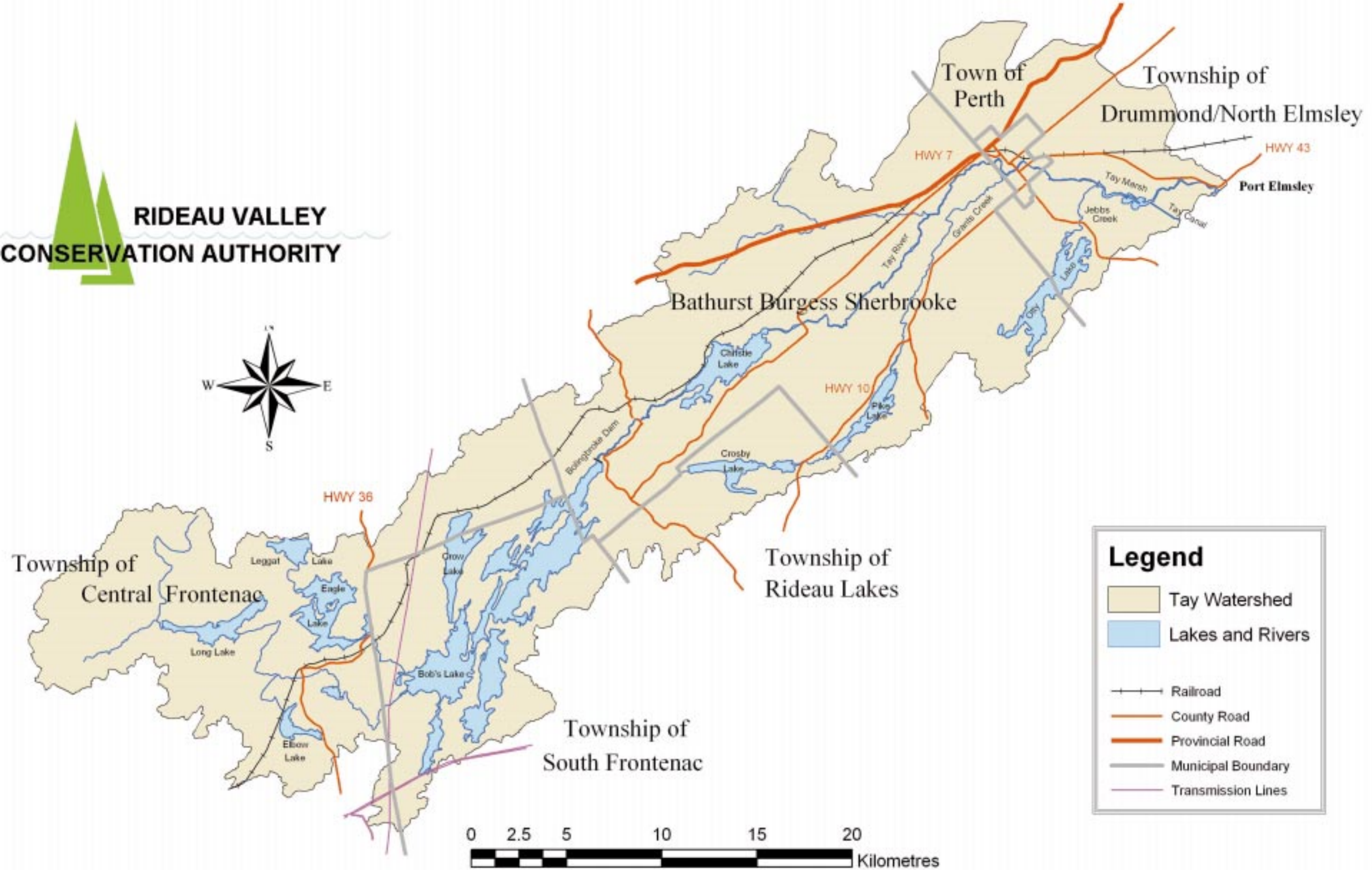
Two Areas of Natural or Scientific Interest (ANSIs) are found here: the Maberly Bog and Christie Lake Wetland. Two other areas are candidates for designation as areas of potential biological significance: Bobs Lake-Mill Bay Peat Forest and Long Bay Island.

There are many small wetlands in this portion of the watershed. Currently, only four have been evaluated and one — Michaels Creek Marsh in Bobs Lake — has been designated as a provincially significant wetland. It is known to contain at least four provincially significant species of plants and animals. The lakes and forests of the Precambrian Shield portion of the watershed are less disturbed by human impact. They are habitat to healthy populations of fish, game, birds, insects and flora— some of which are as yet uncatalogued. The sport fishery in particular is a highly-valued resource.

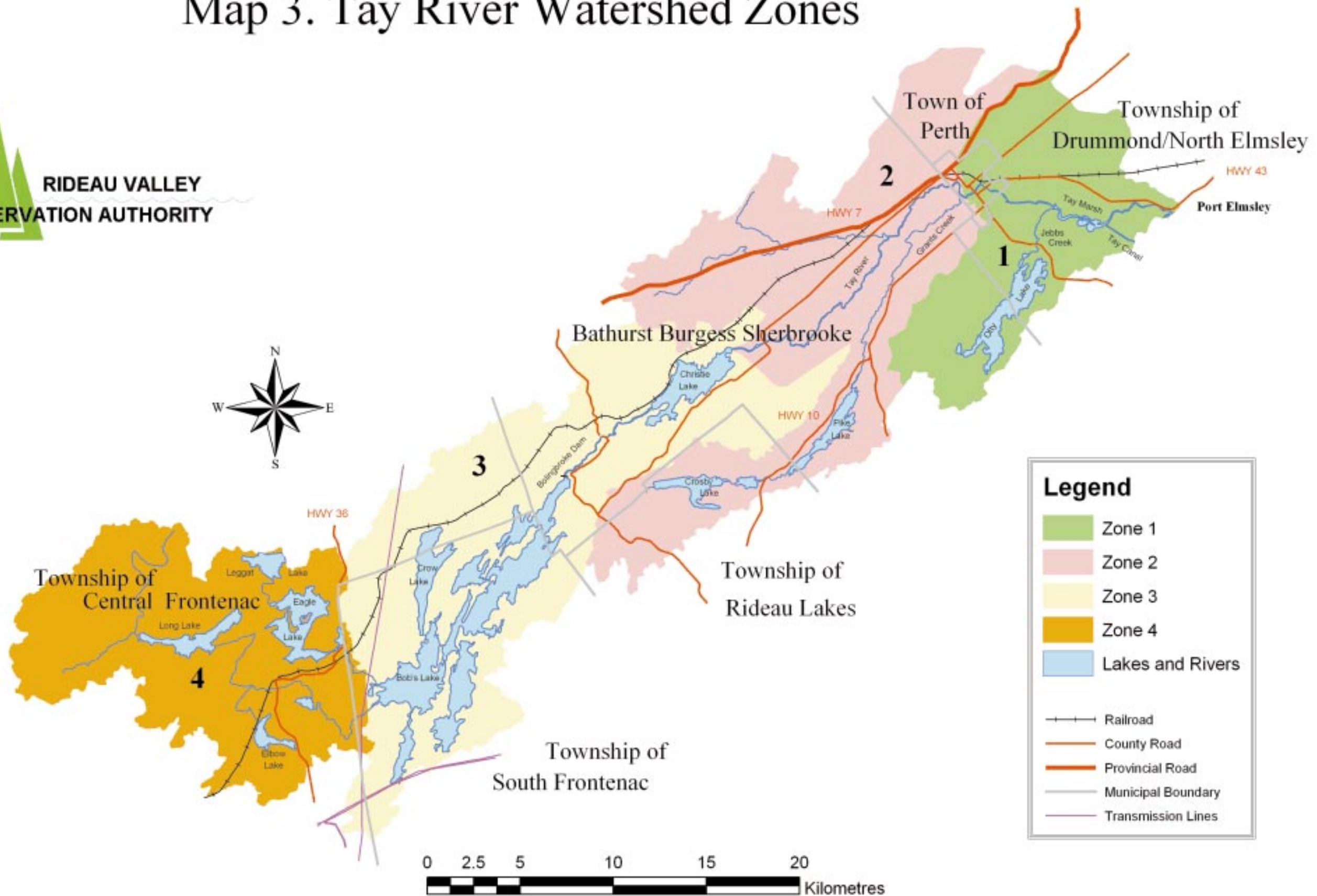
Eagle Lake, Crow Lake and Green Bay in Bobs Lake are lake trout lakes. Stocking occurs on a regular basis since none of them has a fully self-sustaining population. Limited information is available about game and other fish in the Tay watershed. However, the Fish Habitat Study contracted in 2001 by the Department of Fisheries and Oceans and carried out in cooperation with the Ontario Ministry of Natural Resources is expected to provide more information. Lake associations are also active on many lakes including Pike, Christie, Bobs and Crow in terms of monitoring and improving fish habitat.

The main water control structure on the Shield portion of the Tay is the Bolingbroke Dam owned and operated by Parks Canada as part of its Rideau Canal navigation system. The dam is critical to the hydrology of the entire watershed. It maintains water levels on the huge Bobs Lake-Crow Lake system and provides river flow downstream to Christie Lake and the Town of Perth. Bobs Lake is one of the main storage reservoirs used by Parks Canada to maintain navigational levels on the Rideau Canal.

Map 2. Tay River Watershed



Map 3. Tay River Watershed Zones

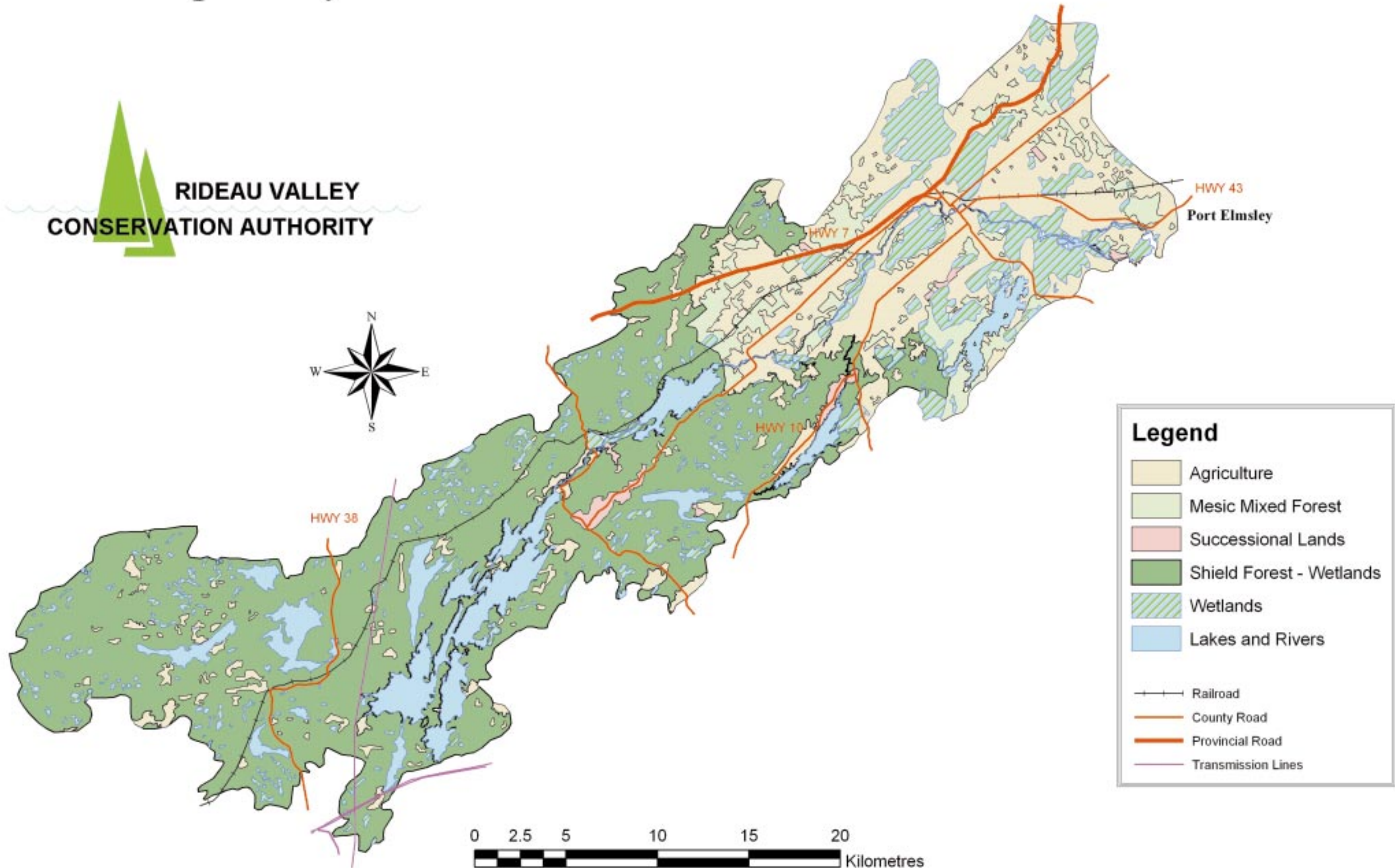


Legend

- Zone 1
- Zone 2
- Zone 3
- Zone 4
- Lakes and Rivers
- Railroad
- County Road
- Provincial Road
- Municipal Boundary
- Transmission Lines



Map 4. Tay River Watershed Land Cover Classification



Legend

- Agriculture
- Mesic Mixed Forest
- Successional Lands
- Shield Forest - Wetlands
- Wetlands
- Lakes and Rivers
- Railroad
- County Road
- Provincial Road
- Transmission Lines

More groundwater study is needed to characterize the groundwater regime and its vulnerability to contamination in the area.

Land use is primarily rural with a large, seasonal cottage base of activity. Eight percent of the Canadian Shield portion of the watershed is actively farmed. Lake shore development continues and tourism, sports fishing and recreation play a large role in the economy and land use of the area. This western part of the watershed is part of an important identified north-south wildlife corridor link between Algonquin Park and the Adirondacks in northern New York state.

A full description of the Tay River watershed including its known natural features, ecological functions, biodiversity, and water quality is found in the *Existing Conditions and Trends in the Tay River Watershed* report (June 2000), an excerpt of which is contained in Appendix A.

General Watershed Health:

It is important to understand that we need to know more about the Tay River watershed before making absolute statements about its health. Currently, there are many gaps in our knowledge of how the watershed works. This plan will identify many of those gaps in research and study that remain to be filled to really understand how this intricate natural ecosystem works and where the existing, imminent and potential threats to its health are. Obvious gaps in our knowledge include a reasonable estimate of



the water budget of the watershed, reliable long term water quality information on all the lakes and reaches of the river, reliable groundwater vulnerability mapping and comprehensive wetland and fish habitat surveys.

But what we do know about the watershed, largely from lake associations and government sources along with some new research, leads us to believe that the overall watershed is in reasonably good health. Biodiversity of species and habitats appears to be good compared to similar watersheds in our area. Water quality characteristics most often meet or exceed provincial guideline standards. Macroinvertebrate populations consistently show healthy water quality by the type and diversity of their species. Forest cover accounts for 66% of the watershed (more than any other tributary to the Rideau) while wetlands abound, especially in the upper end of the watershed (Map 4). Twenty two percent of the watershed is farmed. Eleven percent is made up of rivers and lakes. The urban portion of the watershed represents less than 5% of the total area with the Town of Perth being the only major urban centre. Despite the moderate human influence in Zones 1 and 2, riparian vegetation in the corridor is still fairly abundant, consistent and intact along both the main river and the tributaries.

We are in the fortunate position of doing this plan while the watershed is only modestly-impacted by human activities and population pressures. Most people will recognize that it is much easier and more effective to maintain good health rather than try to restore it after it's gone.

The relatively good health of the watershed means that many of the actions proposed in this plan are “preventative” in nature. They are meant to maintain and enhance existing good conditions. There appear to be relatively few “remedial” actions to take as compared with other more heavily-impacted, heavily-populated watersheds in Eastern Ontario.

The future health of the Tay watershed will be affected by a number of global trends including a growing and aging watershed population, the local effects of global climate change and increasing cottaging, tourism and waterfront “use” (see Appendix A). Scientists tell us for instance to expect more severe weather such as floods, droughts and variable temperatures as a result of the changing world climate. The effects on the watershed are unknown. Tourism growth, and increasing human impact generally, will be one of the main stressors.

“Tourism” is already a huge industry and many people and communities depend on the influx of cottagers, fishermen and “day-trippers” from the Ottawa and Kingston population centres. New eco-tourists and the aging watershed population will accelerate the stress on the watershed through increased need for services, conversions of cottages to year-round dwellings, conversions of farmland to residential development, pressure to build new waterfront properties, and increased impacts on all natural resources including water quantity, water quality and fish and wildlife habitat. MOE has issued 16 surface water-taking permits in the Tay watershed and the number is expected to increase. Agriculture, industrial use, riparian mis-use all contribute to stress on the natural fabric of the watershed.

The watershed has been resisting the stresses with only marginal changes in fundamental health. Do we really want to find out how much more stress the watershed can take without serious complications? We do know that maintenance is less costly and more effective than remedial measures. The time is right for concerted action to maintain and even improve the long term health of the Tay watershed. Everyone has a role to play as the action plan in Chapter Six shows. It is a question of families, communities, businesses and governments at all levels taking care of their environment, their watershed together.

Chapter Four

Watershed Vision, Goals and Objectives

The vision statement for the Tay River Watershed as adopted by the Tay River watershed community is:

All residents and other stakeholders are committed to watershed stewardship. We are working together to ensure the watershed is healthy — environmentally, socially and economically -and that the character, quality of life and heritage features of the area are maintained or improved.

The following Mission Statement was developed in order to guide the approach to achieving the vision above:

To manage the watershed to benefit present and future generations by integrating research, environmental protection, natural resource management, social development and economic development as air, land and water uses change.

Several significant issues were repeatedly raised during the public discussions leading up to the development of this plan, including:

- maintenance of surface and groundwater quality (in particular, the role of agriculture, the Perth Sewage Lagoons and other land management practices and their effects on water quality)
- balanced management of water within the watershed (the public has expressed interest in an in-depth discussion of the rationale for Parks Canada's water allocation decisions/operations and to be satisfied that they reflect current attitudes and priorities with respect to water resources management)
- increasing, competing demands on water supplies (wake-up call for a review of procedures and policies for the allocation of water due to increasing demand for agriculture, industry, golf courses, Perth's municipal supplies, lake-based recreation and the need to maintain instream aquatic habitat)

- perceived watershed management coordination problems (the absence of a unifying strategy or plan on which to base coordinated action within the watershed by municipalities and various federal, provincial and regional government agencies with fisheries, land and water resource management responsibilities)
- lack of information on and understanding of watershed resources.

The watershed planning process resulted in the development of five major goals and a number of related objectives:

Goal #1: To maintain and improve water quality for all water users.

- Objective 1: Prevent groundwater contamination.
- Objective 2: Reduce surface water contamination from nutrients, chemicals and bacteria.
- Objective 3: Determine sources of water quality impairment and establish water quality trends.

Goal #2: To use and manage both surface and groundwater wisely to meet current and future needs.

- Objective 4: Determine the water budget for the watershed.
- Objective 5: Balance competing demands for water use in a sustainable manner.
- Objective 6: Recognize the real value of water.

Goal #3: To maintain and improve watershed habitats to support fish, plant and animal populations.

Objective 7: Protect and improve aquatic habitats throughout the watershed.

Objective 8: Protect and improve terrestrial habitats throughout the watershed.

Goal #4: To provide educational opportunities for watershed users to identify ways to contribute to maintaining a healthy watershed environment.

Objective 9: Learn more about the watershed and fill in our knowledge gaps about how it works, including historical information.

Objective 10: Promote communication and motivation among all stakeholders about the importance of maintaining a healthy watershed environment.

Objective 11: Promote communication among watershed stakeholders for the purpose of exchanging data and understanding mutual needs.

Goal #5: To promote an integrated and consistent approach to the management of the watershed.

Objective 12: Cultivate partnerships among individuals, community groups, businesses and government agencies.

Objective 13: Coordinate efforts and streamline the delivery of resource programs and services by all levels of government.

Objective 14: Encourage a coordinated system for governmental water management activities.



Chapter Five

Complete Watershed Action List

Just as all of the elements in the watershed are interrelated, the actions we undertake are related to the achievement of several objectives at the same time. Listed here is the full range of watershed management actions needed to fully accomplish all of the stated objectives. The action statement is followed by a short rationale for that action. The numbers in brackets following the rationale indicates which of the 14 stated objectives the action relates to.

This list is not presented in order of priority. The three-year action plan presented in table form in Chapter Six is made up of the selected high priority action items from this complete watershed action list.

Complete Watershed Action List:

#1: Undertake a groundwater study to determine groundwater reserves, dynamics, and vulnerability.

Groundwater is a major source of drinking water in the Tay watershed. In order to protect groundwater resources from adverse impacts due to development, land uses and land management practices, it is necessary to more thoroughly characterize the resource through more comprehensive studies of groundwater quantity and quality. This information will lead to groundwater protection measures for municipalities, businesses and landowners. (1, 3, 4, 5, 6, 9)

#2: Develop and enforce policies to achieve the protection of surface and groundwater quality and groundwater recharge areas **in all Official Plans and Zoning By-Laws.** (sedimentation, mandatory septic system inspections, sewage treatment facilities upgrades, mandatory setbacks from water for development, agriculture and forestry activities, nutrient management planning, Provincial Stormwater Management Practices Planning and Design manual, well upgrades and decommissioning programs (OFA), explore de-icing options to road salt)

Prevention is the best policy when protecting groundwater quality and municipalities have the main role through the municipal land use planning process. (1, 2, 3, 5, 6, 9, 13, 14)

#3: Create a watershed information repository which all watershed stakeholders may access.

A central, updatable, accessible repository of groundwater, surface water and other watershed monitoring information will help us toward coordinated action and protection. (3, 5, 7, 8, 9, 10, 11, 12, 14)

#4: Develop a coordinated communication program to inform all watershed stakeholders about the recommendations of the Plan first of all, and then of stewardship practices, watershed dynamics, watershed events, and other communication vehicles to help protect watershed resources. (pesticides, rural land use practices, living by water, shoreline naturalization)

An effective, continuous communication program aimed at several different types of "resource users" will help them do the right things for the watershed during their daily work, travel and home activities. (1, 2, 5, 6, 7, 8, 9, 10, 11, 12)

#5: Develop and promote incentive stewardship programs to encourage farmers to apply best management practices. (cattle fencing, erosion control, manure management, alternate watering systems, Environmental Farm Plans, conservation tillage, pesticide/fertilizer management)

Special attention should be given to farmers to help with the task of environmental protection because of the high cost of meeting today's environmental standards by family farm operations. (1,2,6,7,8,10,11,12)

#6: Conduct **septic system surveys** to ensure proper functioning of all units.

The majority of the Tay watershed is serviced by private septic systems, many of which are old and not up to current standards or not well-maintained. Such systems, particularly numerous faulty systems around the lakes, can cause premature aging of the lake and unnecessary water quality problems. (1,2,3,6,7,12,14)

#7: Continue **water quality monitoring of potential point sources** of surface and groundwater quality impairment such as landfill sites, farmlands, industrial sources, sewage lagoons, stormwater outflows.

Runoff is the main source of pesticides, chemical fertilizers, oil, metals, road salt, leachate and other contaminants. They can be controlled by proper land management practices in both the town and rural setting. (1, 2, 3, 7, 9, 13)

#8: Continue (and expand where possible) **baseline water quality monitoring for surface water and groundwater**. (Provincial water quality monitoring network, provincial groundwater monitoring program, Watershed Watch program on the lakes)

Baseline data for a minimum of 10 years will be helpful in establishing water quality trends. (1, 2, 3, 7, 9, 12, 14)

#9: Consider **investigative surface water and groundwater quality monitoring** to determine sources and types of impairment if the situation is warranted. (Potentially faulty septic systems around lakes, the Perth Sewage Treatment Facility, agricultural lands; businesses, stormwater outfalls)

This sampling program is to be available for particular potential point source problems of water quality impairment. It would make the link between water quality and inappropriate land use having a negative effect on the watershed. (3, 7, 10, 11, 12, 13, 14)

#10: Provide a **continuous public education program on the proper storage, use and disposal of hazardous materials** including the promotion of the provincial “Spills Hotline” number to report accidental spills and discharges of hazardous materials.

Hazardous household and industrial materials must be kept out of the ecosystem, particularly the groundwater. An educational program to make the link between personal use and watershed health and keep best management practices front of mind will prevent a lot of problems. Municipal household hazardous waste disposal days several times per year are very helpful. (1, 2, 6, 7, 8, 10)

#11: **Continue macroinvertebrate monitoring** of watershed streams to complement baseline chemical water quality data.

The quantity and type of macroinvertebrates in a stream gives a general, inexpensive analysis of water quality. (3, 7, 9, 10, 11, 12, 13)



#12: Undertake **comprehensive Lake Management Plans** for watershed lakes (starting with those which have a lake association) to protect water quality and fish and wildlife habitat, and to determine trends, sources of impairment, inappropriate land use practices, and undertake lakeshore capacity assessment studies.

Lake Management Plans are subwatershed or lakeshed plans for a particular lake or set of interconnected lakes. They give a lot more information on a smaller geographic area and are very useful for developing lake (watershed) management strategies. (1, 2, 3, 5, 7, 8, 9, 10, 11, 12, 13, 14)

#13: **Develop a water budget analysis for the watershed** identifying all water inputs, sources and outflows through monitoring and modelling.

A water budget is the essential tool needed to estimate inflows, outflows and storage of water within the watershed as they vary in time and space. Hydrologic modelling will simulate the watershed's response to weather and human activities in the watershed. It will be useful in water management decisions such as optimizing dam operations, water taking permit applications, low flow and drought conditions, instream aquatic habitat needs and flood attenuation. (4, 5, 6, 9, 10, 11, 12, 13, 14)

#14: Monitor the **amount and the movement of water through the watershed** through the establishment of a network of flow meters, seepage meters and piezometers including upgrading the streamflow gauge at Perth to collect continuous data, and disseminate the information widely in the community.



Additional data on actual stream flows and water levels at more locations throughout the watershed is needed in order to check and improve on the accuracy of our analyses/modelling and to evaluate the effectiveness of our water control operations in terms of water quantity targets. (4, 5, 6, 7, 9, 10, 11, 12, 13, 14)

#15: Undertake research to determine the **instream aquatic needs** in terms of water quantity and water quality in order to determine what constitutes a “healthy” system.

There is a need to apply “state of the art” scientific knowledge and research in defining water quantity and quality needs from an ecological perspective throughout the watershed. This work will help us establish instream limits and constraints on water resource expectations for human activities. (5, 6, 7, 9, 10, 11)

#16: Inventory, catalogue and maintain a **repository of all water takings** (including those not requiring a permit) on a watershed basis.

There are several significant consumers of water in the watershed. This “human use” aspect must be part of the water budget exercise. (4, 5, 6, 7, 9, 10, 11, 13)

#17: **Monitor the hydraulic effects of beaver dams** in the watershed and prepare a Beaver Management Strategy.

Beavers and their dams play a key role in water distribution on a small river such as the Tay. This action will give us the tools to help manage them. (4, 5, 7, 8, 9, 10, 11)

#18: **Identify all present water uses** and their related operations including dam operations.

The goal is to combine this information with the water budget, the water flow study and the research into instream needs to see how water flows through the system, where it is retained or lost and how much could be called “surplus” for future use. (5, 6, 7, 9, 10, 11, 14)

#19: Following preparation of the water budget, define management objectives and set policy for the allocation or “use” of water.

Future pressures will put even more stress on the limited amount of water in the watershed. This action will attempt to make fair use of the resource based on objectives. (5, 6, 11)

#20: Explore watershed management options to determine the best way to address water management issues on a watershed basis and thus overcome the perceived issues of poor communication, inadequate coordination and conflicting mandates among water management agencies now working in the watershed.

The establishment of a “management board, agency or committee” has been suggested as a possible answer to the perceived overlap and confusion of environmental agencies now responsible for parts of the watershed ecosystem. A more effective approach to achieving inter-agency collaboration, without necessarily creating an additional bureaucratic body, is sought. (10, 11, 12, 13, 14)

#21: Research and full public discussion of the value of water and the cost of water use in the watershed including land values on clean lakes, “free” water in the river, water treatment, cost of degraded ecosystems, cost of remedial actions, “cost” of water in light of climate change and increasing water takings.

Demand for water in the Tay is high and growing. The optimal water management policy is one that minimizes overall cost to supply and maximizes the degree to which demands are met including the underlying criterion that instream ecosystem needs are to be met first. Beyond the Tay River watershed boundaries, there is a growing appetite for reforms in water policy throughout Ontario and Canada. (1 2, 5, 6, 7, 10, 11, 12)

#22: Prepare a Fisheries Habitat Management Plan including assessment of trends, spawning areas, population characteristics and conservation measures needed.

A Fisheries Habitat Management Plan will identify the fish resources and recommend ways to make them sustainable. Tourism including fishing and nature

appreciation depends on a healthy fish habitat in the watershed. Encourage education about invasive and endangered species. (7,8,10,11,12,13,14)

#23: Protect natural shorelines in all planning processes (setbacks, buffers and zoning) and in agricultural and forestry activities in order to re-establish degraded shorelines by planting native vegetation along the shores of all watercourses (including lakes). Support and participate in MAPLE and its volunteer efforts at shoreline rehabilitation.

The restoration of riparian vegetation is the single most effective method to maintain healthy lakes and rivers. The goal is a flourishing green ribbon of life along the watershed from headwaters to outfall into Lower Rideau Lake. (2,7,8,11,12,13,14)

#24: Create a riparian corridor in all planning documents and the means to protect it through conservation easements, private land stewardship and public acquisition.

Raising riparian respect to new levels through obligations in the planning process would go a long way to ensuring the best natural water quality and habitat protection measure we have. (2,6,7,8,11,12,13,14)

#25: Undertake fish population assessment by seine netting and other means.

This action will help us determine the health of fish populations over time. (7,10,13)

#26: Establish and/or support educational materials, a “Home Assist” program, Living by Water, LLGreen, ecoPerth, REAL, stewardship councils, MNR’s Guardians of the Watershed program, watershed workshops and demonstration sites to allow landowners to use good stewardship practices and principles in designing and maintaining their private lands.



Much of the watershed is privately owned and therefore we need the cooperation of private landowners to manage their property in an environmentally friendly way. (1, 2, 7, 8, 10, 11, 12, 13, 14)

#27: Identify critical wildlife habitat areas and linkages in the landscape and devise a management plan to protect and enhance these areas.

This research and plan will help us protect important wildlife travel corridors on a small or large scale; might be accomplished through designations in Official Plans and Zoning documents, private land stewardship, land trusts or public acquisition. (7, 8, 10, 13, 14)

#28: Evaluate all unevaluated wetlands in the watershed.

This action will address the general lack of wetland information. (7, 8, 10, 11, 13, 14)

#29: Protect all wetlands in the watershed (including those in the Canadian Shield area) through appropriate measures in municipal planning documents, private land stewardship incentives, land trusts, public acquisition and potentially through regulations under Section 28 of the *Conservation Authorities Act*.

In light of the major role that wetlands play in groundwater recharge, fish and wildlife habitat and surface water quality protection, their continued existence is imperative to the future health of the watershed. (1, 2, 7, 8, 10, 11, 12, 13, 14)

#30: Assess forest resources in the watershed for stand conditions, habitat value, species and age composition, ecological features and significance to overall watershed health.

This research will address a general lack of detailed information on the forest resources of the watershed and identify any detrimental forestry practices. (7, 8, 10, 11, 12, 13, 14)

#31: Develop and distribute information regarding the introduction and control **of invasive, non-native species to the watershed.**

Zebra mussels and purple loosestrife are examples of non-native species that are invading local ecosystems in Eastern Ontario. (7, 8, 9, 10, 12, 13, 14)

#32: Publish and distribute the Tay River Watershed Management Plan.

This action will give all players and partners a solid base and common roadmap by which to pursue their individual efforts for the long term health of the watershed. (12, 13, 14)

#33: Undertake monitoring and research to determine the assimilative capacity of the river.

This action will help us understand the ecosystem limits or how much stress the Tay can accommodate without becoming irreversibly degraded. (5, 6, 9, 10, 11, 13, 14)

#34: Establish a watershed monitoring network to collect information on all aspects of the watershed ecosystem.

This volunteer network will collect and bring together much hitherto unknown information providing important data for sound watershed management decisions. It will also encourage communication, integration and analysis of the basic data for all stakeholders to use. (9, 10, 11, 12, 13, 14)

#35: Establish and support the “Friends of the Tay Watershed” group.

The Friends will be a citizen action group focused on implementing the recommendations of the Plan with special emphasis on stewardship activities, education opportunities (among general public as well as raising Tay profile in the schools) and communications among stakeholders. (1, 2, 3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14)

#36: Encourage and **support the establishment of lake associations** on lakes which are not already organized.

The best stewards of the water are those with the most at stake. Lake associations have been a key element of the efforts to maintain water quality, fish habitat, natural shorelines and other environmental aspects of lakes. (2, 3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14)

#37: Establish a **Tay Watershed Discovery Centre** in the Town of Perth to provide information and encourage understanding of the watershed, the resources and their protection.

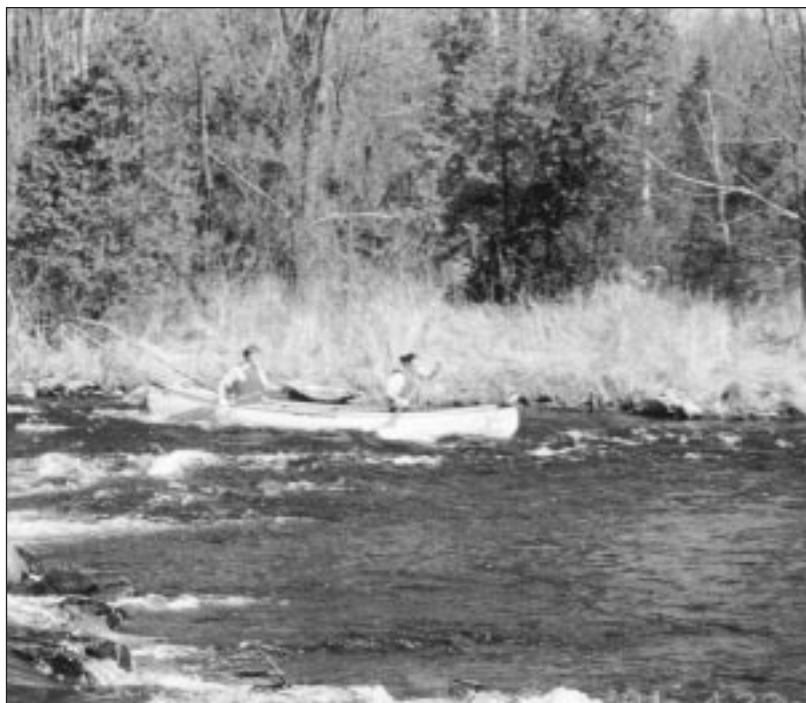
A locally-available information and communication system is one way to raise profile and get watershed information into the hands of local stewards, agencies, municipalities, citizens, tourists, businesses and schools. It will become a recognized centre of watershed pride and celebration. (9, 10, 11, 12)

#38: **Celebrate the watershed** through special events and publications.

Many of the improvements to environmental health will come from the will of the thousands of private landowners. Every chance to increase their interest, understanding and pride in the Tay should be taken. (9, 10, 11, 12)

#39: Encourage all agencies, municipalities, residents and interest groups to **endorse the Tay River Watershed Management Plan and commit to its implementation** as the community guide to protecting the health of the Tay watershed.

Part of the implementation plan will be to start work now on preventing further degradation of the watershed resources. It will take some time, effort and money to move the Tay protection measures up the priority ladder in all of those groups. (10, 11, 12, 13, 14)



#40: **Support municipalities** with information, public support and agency effort to balance the needs for growth, development and protective management of the watershed within their jurisdictions.

Municipalities are major players but they are not alone. All partners can support municipal efforts by participating in discussions and advocating for sustainable levels of protection for watershed elements. (12, 13, 14)

Chapter Six

Roadmap to Watershed Health: A Three-Year Work Plan

The Three-Year Work Plan:

The watershed management strategy should be implemented in a cycle which involves selecting and acting on the most important elements, monitoring the watershed's response, reviewing the results, updating the management strategy and resuming implementation of the most important elements, and so on. The duration of each work plan cycle should be three to five years to obtain adequate political/institutional support and resources.



It is necessary to select the elements from the complete list of watershed actions (Chapter Five) which will address the most pressing problems in the watershed (the Groundwater Study would fall into this category). At the same time, it is prudent to start work on some actions that are most promising in terms of the expected benefits to be attained from their implementation (the proposed septic system surveys for example), or are most critical to future decision-making (the proposed Water Budget analysis). This should also include those strategies which may take many years to fully implement but do not require a large amount of effort to start (water quality monitoring, macroinvertebrate sampling, wetland evaluations).

In order to obtain commitment to move forward with implementation, it is necessary to assign responsibilities for work plan items and to estimate the cost associated with the selected actions. Suggestions are made within Table 1 based on RVCA's understanding of the legislative powers, mandates, policies and programs of various stakeholders in watershed management.

It also recognized that many of the recommended actions don't fit neatly into the mandate or constrained budget of any single agency, group or organization. Accordingly, it is expected that to make decent progress in watershed management, it will be necessary to cultivate partnerships between agencies and across the various sectors of watershed interests for effective delivery of watershed actions.

Table 1. Priority Actions: the Three-Year Work Plan
(Assumptions and details of the cost estimates are found in Appendix C).

Action	Details	Players	Goal/Issue Satisfied	New \$ (000s)
1. Distribute and Promote the Tay River Watershed Management Plan	<ul style="list-style-type: none"> plan will outline strategies for all stakeholders to help improve health of the watershed 	<ul style="list-style-type: none"> RVCA lead; all stakeholders participate 	<ul style="list-style-type: none"> watershed management communication 	<ul style="list-style-type: none"> 0
2. Develop a Communications Network/Strategy for implementation	<ul style="list-style-type: none"> identify and create links with stakeholders to facilitate implementation 	<ul style="list-style-type: none"> RVCA lead all stakeholders 	<ul style="list-style-type: none"> watershed management communications 	<ul style="list-style-type: none"> 115.2
3. Update Official Plans to reflect goals of watershed plan	<ul style="list-style-type: none"> ensure policies reflect intent of watershed plan and applied consistently through the watershed 	<ul style="list-style-type: none"> all municipalities RVCA to co-ordinate 	<ul style="list-style-type: none"> all goals 	<ul style="list-style-type: none"> 0
4. Create an Information Depository	<ul style="list-style-type: none"> have one agency/group be holder of all information pertinent to the watershed 	<ul style="list-style-type: none"> RVCA, MNR, Parks Canada, municipalities, GIS lab, DFO, MoE 	<ul style="list-style-type: none"> communication 	<ul style="list-style-type: none"> 66.6
5. Distribute educational materials to all stakeholders	<ul style="list-style-type: none"> create information distribution opportunities throughout watershed requires co-ordination of effort 	<ul style="list-style-type: none"> RVCA, LRC, FoTW, all municipalities 	<ul style="list-style-type: none"> communication/education 	<ul style="list-style-type: none"> 0
6. Conduct Studies, collect data, monitor resources as required	<ul style="list-style-type: none"> collect more information on water levels and quantity, water quality, plant and animal communities, wetlands, etc. through studies and monitoring as needed 	<ul style="list-style-type: none"> RVCA, MNR, MoE, FoTW, developers, municipalities 	<ul style="list-style-type: none"> Education, all goals 	<ul style="list-style-type: none"> 479.5
7. Establish A Watershed Management Working Group	<ul style="list-style-type: none"> working Group will develop (and update regularly) a 3-year workplan and budget to implement the recommendations and also explore the possibility of establishing a board, agency, committee or other similar group, that would address water management issues on a watershed basis, in an effective manner 	<ul style="list-style-type: none"> RVCA to initiate, MoE, MNR, OMAFRA, H. Unit, municipalities, DFO, Parks Canada, business rep, FoTW 	<ul style="list-style-type: none"> watershed management 	<ul style="list-style-type: none"> 25
8. Create/Support Friends of the Tay River Watershed	<ul style="list-style-type: none"> Community group to undertake grass roots implementation of recommendations of the plan, promote stewardship, education, government agency compliance 	<ul style="list-style-type: none"> Watershed Community 	<ul style="list-style-type: none"> education 	<ul style="list-style-type: none"> 0
9. Create New and Promote Existing Stewardship Programs	<ul style="list-style-type: none"> use existing programs: CFWIP, WHF, etc. to achieve goals of plan create Rural Clean Water Program to address best management practices in farm and rural areas and provide incentives create Home Visit program to encourage BMP's on all rural and shoreline properties 	<ul style="list-style-type: none"> MNR, RVCA, Living by Water, OMAFRA, OFA, OSCIA, ARLA, MAPLE 	<ul style="list-style-type: none"> water quality 	<ul style="list-style-type: none"> 450
10. Determine Water Budget of Watershed	<ul style="list-style-type: none"> undertake modelling and monitoring to determine inputs, outputs, net surplus/deficit of water in Tay system 	<ul style="list-style-type: none"> MoE, RVCA, Parks Canada, MNR 	<ul style="list-style-type: none"> water quantity watershed management 	<ul style="list-style-type: none"> 420
11. Undertake Groundwater Study and Aquifer Vulnerability Mapping	<ul style="list-style-type: none"> determine location and extent of groundwater resources recharge/discharge areas determine areas vulnerable to groundwater contamination 	<ul style="list-style-type: none"> MoE, RVCA, municipalities 	<ul style="list-style-type: none"> water quantity water quality 	<ul style="list-style-type: none"> 0
12. Undertake Septic System Surveys to determine effectiveness	<ul style="list-style-type: none"> find pilot municipality to undertake survey to determine effectiveness of existing systems — are they contributing to poor ground and surface water quality? 	<ul style="list-style-type: none"> Municipalities 	<ul style="list-style-type: none"> water quality 	<ul style="list-style-type: none"> 75
13. Identify Methods to determine Environmental Requirements for Surface Water	<ul style="list-style-type: none"> once water budget determined, determine how much water, if any, in system is surplus and can be "used" 	<ul style="list-style-type: none"> RVCA, Parks Canada, MNR, industries 	<ul style="list-style-type: none"> water quantity, fish and wildlife watershed management 	<ul style="list-style-type: none"> 15

Table 1. Con't.

Action	Details	Players	Goal/Issue Satisfied	New \$ (000s)
14. Inventory all Water Takings	<ul style="list-style-type: none"> • both permitted and not. Will help determine supply and demand of water in system 	<ul style="list-style-type: none"> • MoE, RVCA 	<ul style="list-style-type: none"> • water quantity 	<ul style="list-style-type: none"> • 20
15. Identify Terrestrial habitats and existing and potential corridors throughout Watershed	<ul style="list-style-type: none"> • Identify species and communities in terrestrial environments to determine composition, significance and potential • Protect in planning documents • Enhance where appropriate 	<ul style="list-style-type: none"> • MNR, Municipalities, FoTW, landowners 	<ul style="list-style-type: none"> • fish and wildlife recreation, forest integrity 	<ul style="list-style-type: none"> • 50
16. Undertake Fisheries and Fisheries Habitat Management Plans	<ul style="list-style-type: none"> • Examine health and extent of fisheries resource and their habitat to identify management policies, direction, needs 	<ul style="list-style-type: none"> • MNR, DFO, RVCA, lake associations, FoTW 	<ul style="list-style-type: none"> • fish and wildlife tourism and recreation 	<ul style="list-style-type: none"> • 50
17. Celebrate the Watershed	<ul style="list-style-type: none"> • Hold events and activities designed to draw attention to and show appreciation for the watershed and its amenities 	<ul style="list-style-type: none"> • Watershed Community 	<ul style="list-style-type: none"> • education, recreation, tourism 	<ul style="list-style-type: none"> • 25
18. Establish a "Tay Watershed Discovery Centre"	<ul style="list-style-type: none"> • Develop plans for a communications and information centre in cooperation with other partners to encourage stewardship, promote the economy and act as a centre of watershed pride and celebration 	<ul style="list-style-type: none"> • FoTW, Parks Canada, RVCA, DFO, MNR, MOE, Town of Perth, local businesses, interested community organizations 	<ul style="list-style-type: none"> • education, tourism, stewardship, communication 	<ul style="list-style-type: none"> • 286
19. Define Rules for the Use of Water	<ul style="list-style-type: none"> • Coordinate actions and management decisions by agencies about the permitted uses of water and establish priorities for that use 	<ul style="list-style-type: none"> • Parks Canada, municipalities, MoE, RVCA, MNR, Watershed Community 	<ul style="list-style-type: none"> • watershed management • communication 	<ul style="list-style-type: none"> • 0
20. Undertake Lake Management Plans	<ul style="list-style-type: none"> • Like subwatershed plans on a lake basis, these will examine environmental, social and economic goals and objectives for land use, lake capacity, water management and fisheries and habitat management on lakes and rivers 	<ul style="list-style-type: none"> • RVCA coordinate — Lake Associations, DFO, MNR, Municipalities 	<ul style="list-style-type: none"> • watershed management • water quality and quantity • fish and wildlife • education 	<ul style="list-style-type: none"> • 247.5
21. Develop School Education Programs to focus on Tay Watershed and its issues	<ul style="list-style-type: none"> • Integrate Tay issues into science and environmental studies programs in schools • Engage in data collection where feasible 	<ul style="list-style-type: none"> • all Local Schools 	<ul style="list-style-type: none"> • education 	<ul style="list-style-type: none"> • 25
22. Establish a Volunteer Data Collection Strategy	<ul style="list-style-type: none"> • Working with members of the community, schools, lake associations, establish a volunteer network to collect needed information on Tay Watershed resources e.g. water quality, water levels, macroinvertebrates, frog watch, creel census, etc. 	<ul style="list-style-type: none"> • RVCA to co-ordinate • FoTW, DFO, MNR, schools, Watershed Community 	<ul style="list-style-type: none"> • education 	<ul style="list-style-type: none"> • 116
23. Review the Status of Dams and Dam Operations	<ul style="list-style-type: none"> • Review integrity and operational policies of all dams and prepare management strategy for the watershed if necessary 	<ul style="list-style-type: none"> • RVCA, MNR, Parks Canada, municipalities 	<ul style="list-style-type: none"> • water quantity • watershed management 	<ul style="list-style-type: none"> • 35
24. Undertake Flood Plain Mapping Development	<ul style="list-style-type: none"> • Undertake engineered mapping in those areas where none is presently available, where updates are needed or where development warrants 	<ul style="list-style-type: none"> • RVCA, municipalities 	<ul style="list-style-type: none"> • water quantity 	<ul style="list-style-type: none"> • 200

Review of the Plan:

On a regular basis, the *Tay River Watershed Management Plan* needs to be reviewed and updated based on the additional information gathered through the monitoring activities, on the completion of tasks in the work plan, and on the need to respond to emerging issues and concerns in the watershed. An annual report card on progress is desirable to keep the community focused on the watershed and its protection. Formally, it is suggested that after each three years of watershed management effort, a brief should be prepared to document the following:

- progress made on watershed management actions listed in the three-year work plan
- observed trends in watershed conditions as indicated by monitoring efforts, correlated as much as possible with the watershed management efforts which have been made
- changes in external influences on watershed conditions since the last review
- modifications to the overall strategy, as determined through dialogue and consensus-building among watershed stakeholders
- priority actions to be pursued for the next three years of watershed management work (an updated work plan)

As part of its ongoing watershed management program, the Rideau Valley Conservation Authority accepts the coordinating role, in consultation with municipalities, the provincial ministries, federal departments, the Friends of the Tay Watershed and other non-governmental organizations to ensure that the periodic review, analysis and watershed reporting is done in an efficient manner through an open and accountable process.



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Appendix A

Introduction from the *Existing Conditions and Trends in the Tay River Watershed* Report (June 2000)

Introduction

The Tay River watershed is the most magnificent tributary in the entire Rideau Valley (Figure 1). The river flows in a northeasterly direction from the height of land on Carnahan, Scanlin and Leggat lakes through some of the best cottage country and headwater areas in Ontario. Beautiful lakes such as Bobs, Christie, Crow, Davern, Eagle, Elbow, Farren, and Long all form part of the Tay watershed. Grants Creek, the major tributary to the Tay with Crosby and Pike lakes, joins the main stem just above the Town of Perth. The river continues on through the provincially significant Tay Marsh eventually tumbling, after a journey through six municipalities, into Lower Rideau Lake at Port Elmsley. With a catchment area of about 805 square kilometres and an overall length of about 95 kilometres, it is the second largest tributary of the Rideau. The Tay system has the most westerly point as well as the highest point in the Rideau Valley and is considered by some to be the true “source” for the entire lower Rideau system.

In many ways, the Tay Valley is a smaller version of the Rideau Valley itself. The watersheds flow from southwest to northeast. The upper parts of both watersheds are on the Canadian Shield with bedrock scraped clean of soil, many clear deep lakes, and sparse human settlement. The lower parts are more heavily populated as the rivers leave the Shield and flow through good farming country on the limestone plain. Water quality declines from the sparsely-populated upper watershed to the urbanized lower parts. As you read the research findings on land use, streamflow, surface water, groundwater and ecology, you will find that they all stem from the basic geology and geography of the landscape. Where people live, what they do, the wetlands, lakes and forests and their biodiversity are all a fundamental result of the type and tilt of the land.

Approximately 2/3 of the watershed lies within the Frontenac Axis, a southern extension of the Canadian Shield, and contains a large forest-wetland complex. The

abundance of this natural heritage should be regarded as a provincial asset. The extensive forest, wetlands, lakes and rivers support a wealth of biodiversity and other natural heritage features and functions that are in general decline throughout much of the rest of southern Ontario. The remaining third of the watershed lies on the agriculturally dominated Smiths Falls Limestone Plain and contains isolated woodlots, important riparian corridors and several large provincially significant wetlands.

A healthy Tay River with its lakes, creeks and wetlands is crucial to the people who live, work and play in the area. The river has provided many benefits over the centuries of human use including food, jobs, sources of power and water, transportation, familiar place names, geography, history, memories and probably will provide a good part of the future. Living there, even if just for the summer months, becomes part of people’s personality. They become Tay people. And Tay people have one thing in common: a huge respect for the lifeline called the Tay River.

The Tay was identified by the Perth Community Strategic Plan of 1995 as one of the important economic and social features of the region. In order to protect and improve the key elements of the watershed environment, the Tay River Watershed Plan was born. A community-based group, the Tay River Watershed Round Table, was created from the diverse interest groups within the watershed including landowners, farmers, tourist operators, regulatory agencies, businesspeople, industries, municipal representatives and concerned citizens. The Round Table, now about 75 strong, assists in the watershed planning process with the cooperation of a Technical Advisory Group and the Rideau Valley Conservation Authority. The report you have in your hands is a major milestone in that planning process. It represents our current state of knowledge of the conditions and trends within the watershed and will be the information platform from which we embark on the rest of the community watershed planning adventure.

The Existing Conditions and Trends Report is a summary of the information gathered by consultants for the Rideau Valley Conservation Authority. Their original reports by Ecological Services, Seabrook Hydrotech & Associates, and an RVCA staff team) contain much fuller and more technical information. Those reports will be available in September 2000 on the web at www.rideauvalley.on.ca.

A number of societal and global trends should be mentioned as a general framework in which to fit the environmental specifics of the Tay watershed which follow. They are operating in the background, often at a higher level than the watershed, but all have effects on the use and quality of the natural resources in the Tay.

1. The watershed population is growing and aging. This fact has several implications for watershed planning including land base for housing, the rate of conversion of farmland for development, increasing and sometimes competing uses of surface and groundwater, potential decline in native biodiversity, and drinking water/waste water management.
2. The Tay watershed is close to the huge populations in Ottawa and Kingston, a growing number of whom are seeking leisure activities within a day's drive. This fact has more obvious implications for lakeshore development, fishing pressure and water quality protection in the future.
3. Municipal officials in the Tay watershed are proving to be leaders in the field of recognizing and protecting important natural and cultural features within their areas through the adoption of new Official Plans. Some work is being done on harmonizing policies between neighbouring municipalities where a lake or water body is divided by a municipal boundary.
4. Municipalities and municipal business groups are very alert to the opportunities that increased tourism and, in particular, recreational trail development will mean to their citizens. Coupled with item #3, the future looks bright for sustainable tourism initiatives that will offer jobs, taxes and new development and at the same time, protect the natural resource base from abuse.

5. There is a growing desire and expectation for public involvement and action to get the environmental protection job accomplished. In many areas, lake associations, watershed landowners and volunteers from many different walks of life have declared their commitment to the maintenance and improvement of the Tay watershed. They are currently involved in water level sampling additional to what the agencies are able to do, researching and compiling well records as part of groundwater studies, efforts to build and maintain trails through the valley, and the emerging "watershed watch" program to sample and report on water quality in the lake district.

6. There is general consensus among scientists that our climate is getting warmer. The best projections tell us that both floods and droughts will become more frequent in Eastern Ontario. There will be an increase in heavy rainstorms and other extreme weather. Winters become warmer and wetter; summers warmer and drier. There will likely be increased forest fires and threats to forest-area communities.

Against this backdrop of global trends, we present the report on *Existing Conditions and Trends in the Tay River Watershed* for your reading pleasure. We hope that it will give you the food you need for thought and then for action in helping maintain the superior quality of life and environmental health now present in the Tay River watershed. The players and the elements are in place for a well-thought-out, informed, active, inclusive, transparent process to produce a *Tay River Watershed Plan* that is valued by the watershed community. Reading this report and understanding the existing conditions and trends is the first step in making it happen. Won't you join us?

Appendix B

Contributing Organizations and Individuals

Tay River Round Table Executive Committee

Joyce Barr, Township of South Frontenac
 Charles Billington, Rideau Valley Conservation Authority
 Orion Clark, Christie Lake Association
 David Crowley, Town of Perth
 Carol Dillon, Glen Tay resident
 Cathy Hamlen, Perth resident
 Simon Lunn, Parks Canada- Rideau Canal
 Cam MacLeod, Rideau Valley Conservation Authority
 John Miller, Rideau Valley Conservation Authority
 Lynn Preston, Rideau Valley Conservation Authority
 Joe Slater, Greater Bobs and Crow Lakes Association
 David Taylor, Glen Tay resident
 Monika Taylor, BBS resident
 Shaun Thompson, Ministry of Natural Resources
 Dan Wicklum, Perth resident

RVCA Board of Directors

Dwight Bennett, Township of North Grenville
 Stephen Bird, City of Ottawa
 Mary Bryden, City of Ottawa
 Jan Harder, City of Ottawa
 Charles Long, City of Ottawa
 Allan McCallum, Township of Rideau Lakes
 Michael McEwen, Township of Drummond/North Elmsley
 John H. Miller, Bathurst Burgess Sherbrooke (Chair)
 Janet Stavinga, City of Ottawa (Vice-Chair)
 Bill Stevenson, Township of Elizabethtown-Kitley
 Wendy Stewart, City of Ottawa
 Cathy Willoughby, Merrickville-Wolford

Technical Advisory Committee

Chris Anderson, Ontario Ministry of Citizenship,
 Culture and Recreation
 Martha Bradburn, Planner, Rideau Valley
 Conservation Authority

Gordon Burns, Clerk Administrator, Township of
 South Frontenac
 Kerry Carnegie, Regional Information Coordinator,
 Ontario Ministry of Food, Agriculture and Rural Affairs
 Ross Cholmondelay, Biologist,
 Ontario Ministry of Natural Resources
 Sylvia Coburn, Planner, Lanark County Land Division
 David Cooke, Kingston Frontenac Lennox &
 Addington Health Unit
 Tola Cooper, Biologist,
 Rideau Valley Conservation Authority
 Eric Cosens, Planner, Town of Perth
 Kathy Coulthart-Dewey, Clerk/Treasurer,
 Bathurst Burgess Sherbrooke
 Heather Fox, Clerk Administrator,
 Township of Central Frontenac
 Mezmure Haile-Meskale, Hydrogeologist,
 Rideau Valley Conservation Authority
 Clyde Hammond, Ontario Ministry of the Environment
 Patrick Larson, Water Technician, Rideau Valley
 Conservation Authority
 Anne Levac, Planner, Township of South Frontenac
 Simon Lunn, Biologist, Parks Canada —
 Rideau Canal
 Cathy MacMunn, Planner, Township of Central Frontenac
 Kerry McGonegal, Water Manager, Parks Canada —
 Rideau Canal
 Dale McLenaghan, Kemptville District,
 Ontario Ministry of Natural Resources
 Martin Moir, Inspector, Leeds, Grenville and
 Lanark District Health Unit
 Kelly Pender, Chief Administrative Officer, Town of Perth
 Lindsay Penney, Biologist,
 Rideau Valley Conservation Authority
 Lynn Preston, Watershed Planner,
 Rideau Valley Conservation Authority
 Bruce Reid, Water Management Coordinator,
 Rideau Valley Conservation Authority
 Jason Schaefer, Ontario Ministry of the Environment
 Paul Snider, Clerk/Treasurer, Township of
 Drummond/North Elmsley

Myrna Stearry, Clerk/Coordinator, Township of Rideau Lakes
Shaun Thompson, Biologist,
Ontario Ministry of Natural Resources

Action Strategy Sub-Committees

Surface and Groundwater Quality:

Orion Clark
Eric Cosens
Cathy Hamlen
Mezmure Haile-Meskale
Patrick Larson
Martin Moir
Jason Schaeffer

Surface and Groundwater Quantity:

Mezmure Haile-Meskale
Cathy MacMunn
Kerry McGonegal
Dale McLenaghan
Bruce Reid
Joe Slater
Paul Snider
David Taylor

Fish and Wildlife:

Martha Bradburn
Ross Cholmondelay
Simon Lunn
Julie MacAdoo, Planner, Township of Rideau Lakes
Cam MacLeod
Lindsay Penney
Andy Smith, Department of Fisheries and Oceans
Shaun Thompson

Communication and Education:

Susan Brandum, LLGreen and REAL
Kerrie Carnegie
Anne Levac

Lake Associations

Adam Lake Property Owners' Association
Beveridge Bay Cottagers Association
Big Rideau Lake Association
Birch Island Property Owners' Association

Black Lake Association
Burrige Lake Association
Christie Lake Association
Collin's Point Residents Association
Crosby Lake Association
Davern Lake Association
Friends of Devil Lake
Eagle Lake Property Owners Association
Elbow Lake Ratepayers Association
Farren Lake Property Owners Association
Greater Bobs and Crow Lakes Association
Leggat Lake Association
Little Silver Lake Property Owners Association
Long Lake Property Owners Association
Otter Lake Association
Otty Lake Association
Pike Lake Association
West Devil Lake Association
Wolfe Lake Association

Tay River Round Table

Don Adams
Peter Au
Ken Baker
David Ballinger
Joyce Barr
Darlene Beveridge
Susan Brandum
Judy Brown
Robert Campbell
Olivier Chatillon
Christie Lake Boys and Girls Camp
Orion Clark
Arthur Code
J. Cosgrove
David Crowley
Doreen Davis
Eric Devlin
Mel and Carol Dillon
Lillian Drummond
Mel Fleming
Russell Foster
Karen Fox
Howard French
Gail Graser
Jean Griffin

Dell Hallett
Cathy Hamlen
Al Hearty
Jim Humphrey
Charlie James
Alan Jordan
J.P.Kennedy
Ross Kerr
Bill Lee
Lloyd Lee
Hal Lily
Links O'Tay Golf Club
Grant Machan
Robert MacLean
Cam MacLeod
Maple View Golf Course
Lana March
Allan McCallum
Dave McFadden
Lynn McIntyre

Joe Menna
John H. Miller
Mike Mosher
Roger and Diana Nuttall
Lynn Preston
Don Rasmussen
Rideau Trail Association
Rideau Waterway Land Trust Foundation
Dudley Shannon
Joe Slater
Brian and Jackie Stapledon
Charles Stewart
David Taylor
Monika Taylor
Shaun Thompson
Lowell Yorke

Appendix C

Resources Required to Implement Chapter Six Recommendations*

No.	Priority Action	Assumptions about work to be done over a five year time frame	New money required (000's)		
			Cap.	Oper.	Tot.
1	Distribute/Promote the Tay River Watershed Management Plan	<ul style="list-style-type: none"> no new resources required; adequately covered by previous and current RVCA budget. 	0	0	0
2	Communications Strategy for implementation of recommendations	<ul style="list-style-type: none"> each program or project that can be described as contributing to implementation of the watershed plan should have a communications strategy which highlights the connection. Include an allowance of about 5% on top of the cost of the action itself, to cover the staff time and hard costs associated with communications of this sort. Resources req'd for Actions 1 and 3-24 = \$2,304.6k x 0.05 = \$115.2k 	45.9	69.3	115.2
3	Update Official Plans to reflect watershed goals	<ul style="list-style-type: none"> no additional resources should be required; RVCA plan review staff and municipal planners should, as part of their regular workload have regard for and advocate for implementation of the Watershed Plan, where appropriate, when OP's come up for review and when OPA's are applied for. 	0	0	0
4	Create an Information Repository and disseminate information	<ul style="list-style-type: none"> investment in IT systems is required at RVCA to establish and maintain an information system for Tay and other tributaries of Rideau; needs a full time IT specialist for entire RVCA territory, at about \$50k/year (if Tay contribution is one sixth of total, need \$8300/year x 5 years = \$41.6k) assume "dissemination" involves publications to advertise availability of electronic info from websites, and periodical printed summaries — tailored for Tay River watershed — two per year at \$2.5k each = \$25k over five years 	0	66.6	66.6
5	Distribute educational materials to all stakeholders	<ul style="list-style-type: none"> seems to be covered already by activities 2 and 4 	0	0	0
6	Identify indicators, collect info and monitor watershed conditions	<ul style="list-style-type: none"> programs in first five years: <ul style="list-style-type: none"> water quality in river and lakes — sustainability of Watershed Watch— needs about \$60k per year to keep watershed watch going after Trillium grants — 50% of lakes are in Tay basin; could increase stations in regular RVCA program - add'l \$5,000 req'd per year (students and lab costs) - \$35k/yr x 5 yr= \$175k total benthic macro-invertebrates; \$7,500/yr for crew of three trained students with expenses, and additional professional bio to supervise and do spring and fall surveys (about 0.1 py @ \$50k/yr = \$5k/yr); total of \$12.5k/yr = \$62.5k over 5 years shoreline/stream assessments & fish habitat surveys; 0.5 py of a bio with two summer students, plus expenses = \$25k/yr + \$8.4k/yr +\$3,000 = \$36.4k/yr ; \$182k over 5 years additional streamflow gauges: two @ \$15k each = \$30k capital cost plus annual cost of \$3,000 each = \$6k/yr = \$60k over five years 	30	449.5	479.5

7	Establish a Watershed Management Working Group	<ul style="list-style-type: none"> doesn't require significant new money unless the intent is to create a new organization with its own identity — an allowance of \$5k/year covers additional admin cost for coordination (\$25k over five years) 	0	25	25
8	Create Friends of Tay Watershed	<ul style="list-style-type: none"> Volunteer organization — no additional resources required from traditional sources 	0	0	0
9	Create new and Promote existing stewardship programs	<ul style="list-style-type: none"> similar to Jock input - as a portion of the Clean water program — Tay needs about 20% of an annual program costing about \$450k/year at maturity — \$90k/year x 5 years = \$450k 	0	450	450
10	Determine water budget of the watershed through hydrologic modelling	<ul style="list-style-type: none"> applying information from latest proposal — looking for as much as \$225k initial outlay over first two years, then \$65k/yr to maintain and apply the model to the whole Rideau watershed — over five years — \$420k over five years 	225	195	420
11	Undertake groundwater study and aquifer vulnerability mapping	<ul style="list-style-type: none"> funding announced by MOE already in late 2001 — no additional resources required - need for regional study will have been satisfied through this study - it might reveal need for additional more specific groundwater projects 	0	0	0
12	Undertake septic system surveys and introduce appropriate by-laws	<ul style="list-style-type: none"> point of sale type of inspection, user fee program (pay as you go); the initial costs relate to designing the program and formulating the by-law (\$20k required), covering start-up costs (\$15k) and initial staffing (cover 50% of one annual salary of one inspector and one clerk for year = \$45k + \$35k)x0.5 = \$40k; total over five years = \$75k 		20	55 75
13	Identify methods to determine instream requirements for ecological sustainability	<ul style="list-style-type: none"> literature review and consultation with experts = \$15k; application of hydrologic modelling thereafter 	15	0	15
14	Inventory all water takings	<ul style="list-style-type: none"> MOE PTTW's are now catalogued; un-licensed users to be surveyed; and other surrogate measures to be used to estimate total withdrawals from system= \$20k study 	20	0	20
15	Identify protect and enhance significant terrestrial habitats and corridors	<ul style="list-style-type: none"> need to assign a biologist to this program area — likely a two year contract position, in addition to other duties — assume it occupies 50% of their time for two years \$50k/yr x 0.5 x 2 years = \$50k - split between habitats and corridors 	50	0	50
16	Undertake fisheries and fisheries habitat management plans	<ul style="list-style-type: none"> some work on this undertaken in 2001; assuming it should continue at same level of effort for another two years - \$25k x 2 = \$50k required 	50	0	50
17	Celebrate the watershed	<ul style="list-style-type: none"> modest funding required to stage watershed events — allow \$5k per year as support 	0	25	25
18	Create a "Tay Watershed Discovery Centre	<ul style="list-style-type: none"> Town of Perth has submitted an OSTAR application for \$76,000 for 2003-2004 to construct basic 900 sq ft space; fitting the space with displays, stock, furniture, computer, etc estimate \$35k; operating expense (part-time staff of one with volunteers) \$35k/yr x 5 years = \$175k 	111	175	286

19	Define rules for use of water	<ul style="list-style-type: none"> done through management board, Rideau low water response team and application of hydrologic modelling; doesn't require new spending unless outside facilitators or experts are required 	0	0	0
20	Undertake lake management plans	<ul style="list-style-type: none"> assume five lakes are identified for fairly detailed lake management planning — cost sharing between local ratepayers, municipality and province need to be considered; if each lake management plan takes 18 months to complete about 3.3 of them can get done over a five year period. If each one costs \$75k we need to find \$247.5k over the five year period 	247.5	0	247.5
21	Develop school curricula on Tay River projects/issues	<ul style="list-style-type: none"> involves preparation of resource material for use by teachers — assume it costs 10k to produce a high quality kit, and a few thousand a year to promote it — \$25k over 5 years 	25	0	25
22	Establish and coordinate volunteer data collection strategy	<ul style="list-style-type: none"> some of RVCA existing resources are being steered in this direction presently, but the action needs a full time coordinator of volunteers — perhaps one for the whole Rideau Valley at \$60k per year plus \$10k in expenses — if Tay is one third of program — about \$25k/year x 5 = \$116k over five years 	0	116	116
23	Review status of dams and dam operation	<ul style="list-style-type: none"> no new funding required to review dams status and operating plans — calls for application of hydrologic modelling for significant storages (covered in item 10); and direction of existing staff and resources for smaller structures — dam replacement/refurbishment feasibility study for Haggart Island dams is needed at a cost of \$35k — construction costs not included 	35	0	35
24	Undertake flood plain mapping	<ul style="list-style-type: none"> assume Glen Tay to Christie Lake is done within five years (need base mapping and engineering analysis) 	200	0	200
Totals			1074.4	1626.4	2700.8

*The figures suggested are intended only as "ball park" estimates of the amount of investment needed to deliver a more comprehensive water management program on the Tay system.

"cap." = capital cost - one time investment that's required - specific surveys and studies, as well as physical infrastructure

"oper." = operational cost - recurring annual costs to run and maintain a program on an ongoing basis

