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WATERSHED REPORTING:
Improving Public Access to Information

THE CONSERVATION AUTHORITIES OF ONTARIO

AUSABLE BAYFIELD • CATARAQUI REGION • CATFISH CREEK • CENTRAL LAKE ONTARIO • CREDIT VALLEY
CROWE VALLEY • ESSEX REGION • GANARASK REGION • GRAND RIVER • GREY SAUBLE • HALTON REGION
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LONG POINT REGION • LOWER THAMES VALLEY • LOWER TRENT VALLEY • MAITLAND VALLEY • MATTAGAMI REGION
MISSISSIPPI VALLEY • NIAGARA PENINSULA • NICKEL DISTRICT • NORTH BAY MATTAWA • NOTTAWASAGA VALLEY
OTONABEE REGION • QUINTE CONSERVATION • RAISIN RIVER • RIDEAU VALLEY • SAUGEEN VALLEY
SAULT STE. MARIE REGION • SOUTH NATION • ST. CLAIR REGION • TORONTO REGION • UPPER THAMES RIVER

PROJECT PARTNERS

UPPER THAMES RIVER CONSERVATION AUTHORITY

RIDEAU VALLEY CONSERVATION AUTHORITY

Ontario

This guide was made possible by the **Government of Ontario** and **Conservation Ontario** in partnership with the **Upper Thames River Conservation Authority,** and the **Rideau Valley Conservation Authority**.

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EXECUTIVE SUMMARY

This report was developed under the leadership of staff from Conservation Ontario and the Upper Thames and Rideau Valley Conservation Authorities. While its focus is on reporting, it reinforces efforts currently underway in the province to enhance environmental monitoring networks and data analysis tools. Also, public demand for easily understood environmental information and a need to demonstrate accountability has led conservation authorities to develop State-of-the-Watershed Reports and Watershed Report Cards. More standardized and focused reporting across watersheds will assist broader regional and provincial evaluation and communication on the state of the environment and on the progress being made in its protection.

It is anticipated by Conservation Ontario that standardized watershed reports, targeted at the watershed public, could assist in fulfilling the Part 2 Walkerton Inquiry Report (O'Connor, 2002) recommendation that an annual "State of Ontario's Drinking Water Report" be tabled in the legislature including information on the quality of source water and a review of source protection initiatives.

Acknowledgements

The Guide to Watershed Reporting was developed as a Ministry of Environment funded pilot project to demonstrate leading edge watershed management initiatives in Ontario.

Integral to the development of this guide was participation from over 70 people from conservation authorities, provincial and federal agencies, academia, and interest groups.

A team was involved in gathering and assimilating the information for this guide. Team members include:

Ted Briggs
Upper Thames River CA

Cliff Craig
Rideau Valley CA

Pat Larson
Rideau Valley CA

Karen Maaskant
Upper Thames River CA

Cathy Quinlan
Upper Thames River CA

Ian Wilcox
Conservation Ontario

Conservation Ontario thanks the Ontario Government for providing the initial funding for our watershed management projects. We'd also like to thank the Ministry of Natural Resources and the Ministry of the Environment for their assistance in making these projects a success.

The partners of the watershed-based demonstration projects have been working collaboratively since April 2002 to produce the results contained in this final report, released in May 2003.

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1.0 INTRODUCTION

State of the Watershed Reporting is one of the primary components of watershed management. Measuring and reporting watershed health demonstrates agency accountability, directs targeting of programs and services and is an outcome measure for program evaluation. Ontario's conservation authorities (CAs) have developed a variety of state of the watershed products as part of their watershed management efforts. While these products have been effective locally, the lack of standards in reporting content and frequency has prevented comparison of results among neighbouring watersheds. Municipalities that cross two or more watershed boundaries would benefit from seeing information reported in a comparable format. The introduction of standards for state of the watershed reporting will allow these comparisons and, through coordinated effort among all CAs, permit development of a comprehensive state of the watershed report covering all CA managed watersheds.

The intent of this guide is to encourage the consistent reporting of a standardized set of indicators by all CAs on a five-year cycle. It is recognized that many CAs will continue with timely and, perhaps, more frequent reporting on an expanded suite of indicators based on local issues and demand.

This guide focuses specifically on the use of environmental indicators in measuring watershed health. Other important indicators (e.g. economic, social, agency performance) may be included in individual conservation authority reporting efforts but are beyond the scope of this project.

This final guide is concise. It is intended to be used by practitioners familiar with the terms and concepts of environmental reporting. Its primary use will be as a quick reference guide for CAs as they develop their standardized watershed reports. Those interested in a more comprehensive introduction to watershed reporting are directed to the Case Study paper and references listed in Appendix C.

Conservation authorities from across Ontario provided input into the development of this guide. Over 70 representatives from conservation authorities and provincial and federal agencies participated in a series of four regional workshops during May of 2002. Additional experts were also consulted for further technical input (see Table 1). Prior to the workshops, a case study summary was also completed which provides an overview of watershed reporting efforts at various scales in the United States and Canada with emphasis on CAs.

Ultimately this product is intended as a guide. Experience will undoubtedly lead to further refinement, but what is proposed here is practical, achievable and useful as a starting point.

WATERSHED REPORTING:
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Table 1: Attendance - Watershed Reporting Workshops

St. Clair Region Strathroy, May 9th

1. Jack Robertson, Lower Thames Valley CA
2. Erin Jamieson, Ausable Bayfield CA
3. Bryan Hall, Kettle Creek CA
4. Anne Lennox Brindle, Grey Sauble CA
5. John Bittorf, Grey Sauble CA
6. Jim Coffey, Saugeen Valley
7. Brian McDougall, St. Clair Region CA
8. Patty Hayman, St. Clair Region CA
9. Kelly Montgomery, St. Clair Region CA
10. Ryan Smith, Catfish Creek CA
11. Paul Gagnon, Long Point Region CA
12. Rick Steele, Maitland Valley CA
13. Aaron Todd, MOE
14. Jennifer Vincent, Environment Canada
15. Karen Maaskant, Upper Thames River CA
16. Ted Briggs, Upper Thames River CA
17. Cathy Quinlan, Upper Thames River CA
18. Ian Wilcox, Conservation Ontario

Rideau Valley, Manotick, May 16th

1. Cliff Craig, Rideau Valley CA
2. Charles Billington, Rideau Valley CA
3. Patrick Larson, Rideau Valley CA
4. Jennifer Lamoureux, Rideau Valley CA
5. Lynn Preston, Rideau Valley CA
6. Mike Yee, Mississippi Valley CA
7. John Price, Mississippi Valley CA
8. Andrew McMaster, South Nation CA
9. Bill Warwick, Cataraqui Region CA
10. Rob McRae, Cataraqui Region CA
11. John Meek, Raisin River CA
12. Chris Critoph, Raisin River CA
13. Aaron Todd, MOE
14. Paul Hamilton, Canadian Museum of Nature
15. Sarah Desjardins, City of Ottawa, Env Branch
16. Jeff Kohl, Rideau River Roundtable
17. Karen Maaskant, Upper Thames River CA
18. Ian Wilcox, Conservation Ontario

Table 1: Continued...

Credit Valley, Missisauga, May 23rd

1. Paula Scott, North Bay-Mattawa CA
2. Adele Freeman, Toronto Region CA
3. Gary Wilkins, Toronto Region CA
4. Gayle wood, Lake Simcoe Region CA
5. Mike Walters, Lake Simcoe Region CA
6. Janet Wong, Hamilton Region CA
7. Hazel Breton, Credit Valley CA
8. Bob Morris, Credit Valley CA
9. Chris Jones, Nottawasaga Valley CA
10. Barbara Mackenzie-Wynia, Nottawasaga Valley CA
11. Suzanne McKinnes, Niagara Peninsula CA
12. Geoffrey Verkade, Niagara Peninsula CA
13. Barb Veale, Grand River CA
14. Brenda Axon, Halton Region CA
15. Wendy Leger, Environment Canada
16. Rob Read, Environment Canada
17. Christine Elwell, CIELAP
18. Ian Wilcox, Conservation Ontario
19. Karen Maaskant, Upper Thames River CA
20. Ted Briggs, Upper Thames River CA
21. Cathy Quinlan, Upper Thames River CA

Otonabee, Peterborough, May 30th

1. Glenda Rodgers, Lower Trent Valley CA
2. Dick Hunter, Conservation Ontario CA
3. Jim McColl, Central Lake Ontario CA
4. Perry Sisson, Central Lake Ontario CA
5. Scott Christilaw, MNR
6. Ian Wilcox, Conservation Ontario
7. Karen Maaskant, Upper Thames River CA
8. Cliff Craig, Rideau Valley CA
9. Judy Gibbens, Watershed Science Centre
10. Gord Earl, Otonobee Region CA
11. Meredith Carter, Otonobee Region CA
12. Tom Murphy, Otonobee Region CA
13. Kathy Reid, Otonobee Region CA
14. John Cottril, MNR
15. Julie O'Brien, Watershed Science Centre

Additional Expert Input Provided By:

Dr. Gary Parkin,
Department of Land Resource Sciences, University of Guelph
Jim Reffle,
Director of Environmental Health, London-Middlesex Health Unit
Dr. Jane Bowles,
Professor of Botany, University of Western Ontario

2.0 WATERSHED REPORTING COMPONENTS

Watershed reporting has been divided into nine components for the purpose of this discussion including:

1. **Purpose**
   - intended use of the watershed report
2. **Audience**
   - target audiences for the watershed report
3. **Scale**
   - geographic scope and scale of reporting
4. **Format**
   - recommended products
5. **Frequency**
   - recommended interval between reports
6. **Resource Categories**
   - environmental elements chosen as the focus of reporting
7. **Indicators**
   - surrogate health measures for each resource category
8. **Data Collection and Scoring**
   - the method of ranking relative environmental health
9. **Watershed Features/Stressors**
   - influences that affect and possibly explain the environmental health scores

3.0 WATERSHED REPORTING COMPONENTS AND STANDARDS

Each of the components described in Section 2.0 was examined during the regional workshops and additional technical input was provided through expert interviews. Consensus was reached regarding standards for each component. These standards are presented below.

3.1 PURPOSE

The two main purposes of watershed reporting are:

1) to serve as a management and evaluation tool for conservation authorities and other resource management agencies; and
2) to communicate an evaluation of watershed health.

Regular state of the watershed reporting should assist in the targeting of rehabilitation and protection programs and improve accountability to stakeholders.

3.2 AUDIENCE

Target audiences for watershed reporting include:

- CA staff and members
- municipalities
- provincial and federal government
- interest groups
- general public

In many ways the target audience determines the content of the reporting products. Different levels of technical detail and, therefore, different formats may be required to satisfy different groups. The standards suggested here were developed primarily for "non-technical audiences," including the general public and interest groups. It is these audiences that are driving the current demand for information.

3.3 SCALE

The subwatershed level is the most appropriate scale for CA watershed reporting. For a number of CAs, this includes reporting on individual smaller watersheds that drain independently to the Great Lakes - St. Lawrence River system. Reporting localized subwatershed information is a priority as it provides a means of understanding relative environmental health differences and allows targeting of rehabilitation and protection activities within a CA watershed. The actual size and number of subwatersheds chosen should be specific to each conservation authority. The key is to identify subwatersheds that are meaningful and identifiable to the intended audiences. For example, a watershed that is known by name and identified with by the local public would be an appropriate choice.

The number of subwatersheds should be practical to monitor on a long term basis given the available resources of the local conservation authority. For example, it is key to have a water quality monitoring site per subwatershed that represents the quality of water at the outlet. Where there is more than one water quality monitoring site in a subwatershed, information from the site closest to the outlet should be used for reporting.

This may not be an accurate reflection of water quality throughout the subwatershed but it will reflect the cumulative impact of the subwatershed on the receiving waters. Pragmatically, the number of subwatersheds would range from 10 to 20 for each conservation authority.

A number of conservation authorities have many lakes in their region. Monitoring and reporting for individual lakes is a priority in these areas. This guide provides a format for subwatershed scale reporting; however, some aspects may be applicable to standardizing lake-based reporting by CAs as well.

It is anticipated that subwatershed reports will be combined into whole watershed reports for broader federal or provincial reporting needs.

3.4 FORMAT/PRODUCTS

There are three formats that would best deliver watershed information to relevant audiences. These formats will serve the range of needs and technical detail demanded by the different target audiences.

1) Detailed Report

A detailed report should be completed that presents both raw data and summarized information. The detailed report is intended for resource management practitioners and should include:

- a background description of the process used to develop the watershed reports including subwatershed scale used, indicators used, and technical input and review;
- a chapter for each resource category that outlines raw data and the indicator grading system, data sources, grading result, additional information used, actions for improvement, and information gaps; and
- maps, figures, and tables outlining all relevant watershed features and stressors for each subwatershed (e.g. land use, soil type, soil erosion and delivery, stream flow, fishery resources, dams and impoundments, sewage treatment plant facilities, woodlot information, riparian cover, species at risk, significant natural areas and wetlands, spills).

2) Watershed Report Card(s)

The Watershed Report Card is designed for the broader public who want environmental information but are less interested in the supporting documentation. Sample watershed report cards are included in Appendices A and B.

3) Web Products

As a minimum, detailed reports and popular summaries should be posted to individual CA Web sites and linked to the Conservation Ontario Web site. Eventually, Web products could be further developed to include real time or constantly updated information (see LSRCA, 2002, Web-based Communications and Information Sharing Pilot Project, MOE Pilot Project).

3.5 FREQUENCY

There is need for a standardized time step in delivering watershed reports in order to allow for comparison among CAs. It is recommended that all three products be produced by all CAs every five years starting with the 2001-2006 period with printed reports in 2007. This time step coincides with the publication of census information which is an important element of the report. Using five-year blocks of data also minimizes seasonal variation and sampling error for surface water and groundwater sampling. Individual CAs may obviously produce reports more frequently as needed and local watershed conditions demand. However, the intent of this guide is that every five years all CAs will publish reports according to these standards.

3.6 RESOURCE CATEGORIES

Three resource categories were identified as priority for CA state of the watershed reporting. These relate to three CA business functions: protecting and enhancing water quality, preserving and managing natural areas, and providing recreation opportunities. The resource categories include:

1) **forest conditions**
2) **surface water quality, and**
3) **groundwater quality.**

It is recognized that groundwater flow is not limited to watershed boundaries and, therefore, reporting by subwatershed does not give a full assessment of this resource. However, this resource category is included because of the demand for groundwater information by the target audience. Air quality is notably absent from this list. This was justified because of the subwatershed scale resolution and a lack of expertise or any traditional role in air quality by CAs. This guide's recommendations also do not include social or economic information. It is recognized that comprehensive state of the watershed reporting should include aspects of environment, society and economy. However, it is agreed that this effort must be limited to measures of environmental health exclusively to ensure the product is practical and implementable by all CAs.

3.7 INDICATORS

Watershed indicators are measures that provide specific information on the state or condition of a watershed and provide a means to assess progress towards an objective or target. Several criteria were used for selecting the most appropriate indicators for each resource category, including:

- Is the indicator relevant and understandable?
- Is it responsive to change?
- Is it comparable? Can change be deemed good or improving versus getting worse?
- Is the indicator at an appropriate scale?
- Is long-term monitoring feasible?

The majority of the discussions during the regional workshops and most of the technical interviews were devoted to selecting indicators that were both credible and practical for CAs to measure. Indicators selected for each resource category are as follows:

Forest Conditions
1) % forest cover
2) % forest interior

Surface Water Quality
1) benthic invertebrates
2) phosphorus
3) bacteria (*E. coli*)

Groundwater Quality
1) bacteria (*E. coli*)
2) nitrates
3) chloride

Scores and grades for each indicator are reported. As well, an index approach is used whereby indicators within resource categories are combined to give a single score and grade for each category. This approach was used to simplify the information for the target audience. The remainder of this guide will focus on the application and presentation of each indicator. Sample report cards for the Tay River subwatershed (RVCA) and the Trout Creek subwatershed (UTRCA) are provided to show examples of the information in a report card format.

3.8 DATA COLLECTION, ASSIMILATION AND SCORING

3.8.1 Forest Conditions

Data Source for Forest Cover

- The most commonly available source of information on forest cover is the National Topographic Map Series or Ontario Base Maps (OBM). This information is available digitally through the MNR's Natural Resource Values Information System (NRVIS). Aerial photography may further enhance this information.

- Forested areas and treed swamps are shown as green patches on hard copy maps. Non-treed habitats such as cattail marshes and prairies will not be picked up, nor will narrow windbreaks.

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GIS Calculations for Forest Cover

1) Measure the area of each subwatershed in square kilometres.

2) Measure the forest cover in each subwatershed in square kilometres.

3) Divide the area of forest cover by the area of the subwatershed and multiply by 100. The result is the percentage forest cover for each subwatershed. Go to at least one decimal point accuracy.

GIS Calculations for Forest Interior

Forest interior is that portion of a woodlot which remains when a 100 metre buffer is removed from the inside perimeter (e.g. 100 metres in from the outside edge). The outer 100 metres of a woodlot is considered edge habitat.

1) Query the vegetation data to strip away/disregard the outer 100 metre perimeter of every woodlot.

2) Query the vegetation data to measure the area of the forest cover remaining.

3) Divide the area of the interior forest by the area of the subwatershed and multiply by 100. The result is the percentage forest interior. Go to at least one decimal point accuracy.

Tracking Changes over Time

- Since NTS/OBM maps are not updated often, changes in forest conditions may not be able to be calculated at five year intervals corresponding with the report card cycle.

- In the future, satellite maps or ortho imagery may be able to provide annual or bi-annual pictures of the watershed. It is assumed that technical advances will improve sampling frequencies in the future.

Score and Grade

- Assign a point score for % forest cover and % forest interior using Table 1 below.

- Calculate the overall score by adding the point scores together and dividing by two, then rounding up to the nearest whole number, and then assigning a letter grade, e.g. (2 + 3)/2 = 2.5 = 3 = C.

- Each of the two indicators is weighted equally since both are important and measure a different facet of forest health.

Forst Cover	Forest Interior (%)	Point Score	Grade
>25.6	>7.7	5	A
25.6 - 18.8	5.7 - 7.7	4	B
18.7 - 11.9	3.7 - 5.6	3	C
11.8 - 5.0	1.7 - 3.6	2	D
<5.0	<1.7	1	F

Table 1. Forest Cover and Forest Interior Scoring Grid

(Note: ranges based on ecological literature and consultation with biologists.)

- The grade ranges for forest cover in Table 1 were achieved by setting 25% as an A and 5% as an F and dividing the range equally between. The ecological literature suggests watersheds or regions should contain at least 25-35% forest cover to sustain native species, especially area-sensitive birds. Since the literature is not specific about an ideal % interior, Ontario averages were used as a guide. Across southern Ontario, forest interior values vary from 0.5 to 13.4% with the average being 4.5% (Ontario Hydro forest data).

Directional Arrow

- A directional arrow is shown with the letter grade to indicate the direction of change following each five-year reporting period.

- The arrow indicates improvement (pointing upwards), no change (horizontal), or declining conditions (pointing downwards).

- If historical information is available the calculation should be done for the previous five years to determine the direction of the arrow.

3.8.2 Surface Water Quality

Benthic Invertebrates Data Source

- Many conservation authorities are working independently or with partnering agencies to monitor benthic invertebrates. Efforts are currently underway through the Water Resources Information Project (WRIP) to develop and implement a standardized benthic invertebrate monitoring program for all CAs.

- There are currently two main techniques being used to sample and analyze benthic data: Biomap and Rapid Bio-Assessment.

Calculations

1) Calculate the average benthic value for the samples taken over the five-year period for the outlet of each subwatershed.

2) Refer to Table 2 to determine the point score and grade for benthic invertebrates for each subwatershed.

Total Phosphorus Data Source

- The Provincial Water Quality Monitoring Network (PWQMN) is the main source of total phosphorus data for most conservation authorities.

- Other monitoring programs by partner agencies may provide data for some watersheds.

Calculations

1) Calculate the 75th percentile for the total phosphorus data over the five-year period for the outlet of each subwatershed (units: mg/l). The 75th percentile is used to reflect the tendency for PWQMN data to be dry weather-biased.

2) Refer to Table 2 to determine the point score and grade for total phosphorus for each subwatershed.

Bacteria (*E. coli*) Data Source

- There is currently no province-wide program whereby conservation authorities collect water samples for *E. coli* (see recommendation #2, page 4).

- Other monitoring programs in conjunction with partner agencies (e.g. Health Units) may provide data for some watersheds.

Calculations

1) Calculate the five-year geometric mean for the *E. coli* data for the outlet of each subwatershed (units: # of *E. coli*/100 ml).

2) Refer to Table 2 to determine the point score and grade for *E. coli* for each subwatershed.

Score and Grade

- Each of the three indicators is weighted equally in determining the overall surface water quality score for each subwatershed.

- Using the point scores for total phosphorus, *E. coli*, and benthic invertebrates, calculate the average point score. Refer to Table 2 to determine the letter grade for each subwatershed.

Directional Arrow

- A directional arrow is shown with the letter grade to show the direction of change following each five-year reporting period. The arrow indicates improvement (pointing upwards), no change (horizontal), or declining conditions (pointing downwards). If historical information is available the calculation should be done for the previous five years to determine the direction of the arrow.

The scoring system in Table 2 was developed through a technical team in consultation with agency experts. Historical data from the Provincial Water Quality Monitoring Network was used in developing the ranges.Provincial water quality objectives (total phosphorus - .03 mg/l, *E. coli* 100/100ml)were also considered. Ranges for Biomap have yet to be developed.

Table 2. Surface Water Quality Scoring Grid

Benthic (Biomap)	Benthic (Rapid Bio-Assessment)	Total Phosphorus (mg/L)	*E.coli* (#/100 ml)	Point Score	Grade
to be developed	< 5.10	< 0.03	0-10	5	A
	5.10 - 5.75	0.03 - 0.10	11-100	4	B
	5.76 - 6.50	0.11 - 0.17	101-1000	3	C
	6.51 - 7.25	0.18 - 0.24	1001 - 10000	2	D
	> 7.25	> 0.24	10,000 +	1	F

3.8.3 Groundwater Quality

Bacteria (*E. coli*) Data Source

- There is currently no province-wide program whereby CAs collect groundwater samples for *E. coli* analysis.

- Other monitoring programs in conjunction with partner agencies (e.g. Health Units) may provide data for some watersheds.

Calculations

1) Calculate the five-year geometric mean for the *E. coli* data (units: # of *E. coli*/100 ml).

2) Refer to Table 3 to determine the point score and grade for *E. coli* for each sampling point.

Nitrite-N + Nitrate-N Data Source

- The Provincial Groundwater Monitoring Network is one source for nitrite/nitrate data.

Calculations

1) Calculate the 75th percentile for the nitrite-N + nitrate-N data over the five-year period. Units are mg/l.

2) Refer to Table 3 to determine the point score and grade for nitrites/nitrates for each sampling point.

Chlorides Data Source

- The Provincial Groundwater Monitoring Network is one source for chlorides data for groundwater.

Calculations

1) Calculate the 75th percentile for the chlorides data over the five-year period. Units are mg/l.

2) Refer to Table 3 to determine the point score and grade for chlorides for each sampling point.

Score and Grade

- Each of the three indicators is given a specific weighting in determining the overall groundwater quality score: *E. coli* (50%), nitrite-N + nitrate-N (30%), Chloride (20%).

- Using the point scores for *E. coli*, chlorides, and nitrite/nitrate, calculate the overall point score using the weightings. Refer to Table 3 to determine the letter grade.

Directional Arrow

- A directional arrow is shown with the letter grade to show the direction of change following each five-year reporting period. The arrow indicates improvement (pointing upwards), no change (horizontal), or declining conditions (pointing downwards).

- If historical information is available the calculation should be done for the previous five years to determine the direction of the arrow.

Table 3. Groundwater Quality Scoring Grid

The scoring system in Table 3 was developed by a technical team in consultation with agency experts.

E. coli (# / 100 ml)	Nitrite + Nitrate (mg/L)	Chloride (mg/L)	Point Score	Grade
< 1	0 - 3.0	0 - 50	5	A
1 - 5	3.1 - 7.0	51 - 100	4	B
6 - 10	7.1 - 10.0	101 - 150	3	C
11 - 20	10.1 - 20.0	151 - 200	2	D
> 20	> 20.0	> 200	1	F

3.9 WATERSHED FEATURES AND STRESSORS

Watershed report cards should include a summary of watershed features and stressors that helps to describe the subwatershed and explain why scores and grades are what they are. This additional information may also assist in directing rehabilitation and protection activities. These features and stressors will vary locally but can include:

- area of the subwatershed
- land use (% agriculture, % wooded, % urban, etc.)
- soil erosion/delivery
- physiography
- stream flow
- groundwater aquifer sources
- water level
- number of wells
- fishery resources
- dams
- sewage treatment plants
- woodlot size distribution
- riparian cover
- rare species
- significant natural areas (e.g. Provincially Significant Wetlands, ANSIs)
- other

3.10 EXPLANATION OF RESULTS

An important section of the watershed reports, and especially the report cards, is a paragraph explaining the results for the indicators of surface water quality, groundwater quality and forest conditions. The information outlined in the 'watershed features' section should provide some context that helps to explain the grades and trends for each subwatershed.

3.11 OTHER INFORMATION

State of the watershed reports are intended, in part, as a communication tool. Additional information may enhance the usefulness of the reports locally. Examples include recommended "Actions for Improvement" and a summary of "Watershed Projects" (see sample report cards, Appendices A and B).

4.0 SAMPLE REPORT CARS

Two sample report cards are included in Appendices A and B to further clarify these recommendations. These report cards were developed for select subwatersheds of the Upper Thames River and Rideau Valley Conservation Authorities. They have been developed using the standards described here and, therefore, are comparable.

Appendix A
UTRCA Sample Report Card

Appendix B
RVCA Sample Report Card

Appendix C
A Case Study Summary of State of the Watershed Reporting

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GLOSSARY

Aquifer: a saturated permeable geologic unit that can transmit significant quantities of water under ordinary hydraulic gradients.

Benthic invertebrates: small aquatic organisms that live in stream sediments and are a good indicator of water quality and stream health.

***E. coli*:** bacteria found in human and animal waste (manure). Their presence in water indicates fecal contamination.

Forest Cover: the percentage of the watershed that is forested.

Forest Interior: that portion of a woodlot which remains when a 100 metre buffer is removed from the inside perimeter (e.g. 100 metres in from the outside edge).

Groundwater: water below the earth's surfaces that lies in the area of total saturation. Groundwater can exist in rock or granular material.

Physiography: study or description of landforms

Riparian: relating to or located on the bank of a watercourse.

Sub-watershed: a geographical area defining a single drainage zone within the watershed.

Watershed: a region or area bounded peripherally by a water parting and draining ultimately to a particular watercourse or body of water.

WATERSHED REPORTING:
Improving Public Access to Information

ACRONYMS

ABCA	Ausable-Bayfield Conservation Authority
AOC	Area of Concern
CA	Conservation Authority
CVC	Credit Valley Conservation
COA	Canada-Ontario Agreement
EMAN	Ecological Monitoring and Assessment Network
ERCA	Essex Region Conservation Authority
GIS	Geographic Information System
ICLEI	International Council for Local Environmental Initiatives
IMP	Integrated Monitoring Program
IWI	Index of Watershed Indicators
MNR	Ontario Ministry of Natural Resources
MOE	Ontario Ministry of the Environment
MVCA	Maitland Valley Conservation Authority
NRVIS	Natural Resource Values Information System
NTS	National Topographic Map Series
NVCA	Nottawasaga Valley Conservation Authority
OBM	Ontario Base Maps
ORCA	Otonabee Region Conservation Authority
PCBs	Polychlorinated biphenyls
WRIP	Water Resources Information Project
PWQMN	The Provincial Water Quality Monitoring Network
RVCA	Rideau Valley Conservation Authority
SOE	State-of-the-Environment
SOLEC	State of the Lakes Ecosystem Conference
STP	Sewage Treatment Plant
TRCA	Toronto and Region Conservation Authority
TVA	Tennessee Valley Authority
U.S.EPA	The United States Environmental Protection Agency
UTRCA	Upper Thames River Conservation Authority