

VISITOR STATISTICS FOR CONSERVATION AUTHORITIES IN ONTARIO: CURRENT STATUS AND METHODS

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SUMMARY

In an effort to quantify the importance of recreation in Conservation Areas in Ontario, a survey package with a standard set of definitions and instructions was sent to all 36 Conservation Authorities. One major goal was to compile a database of information on data ranging from the number of visitors received each year to the variety of recreation activities available at each Conservation Area. No such data province-wide was currently available.

All 36 Conservation Authorities submitted data. Results indicated that the Conservation Authorities in Ontario have responsibility more than 11.6 million hectares of watershed land, and have just over 10 million people living within their boundaries. In 2000 there were just over 5.7 million people visiting nearly 500 Conservation Areas that encompass almost 75,000 hectares of land. There are 21 Conservation Authorities that operate 61 campgrounds that contain over 8,000 primitive and improved campsites.

The survey revealed several problems. The definition for “Conservation Area” is not standardized, with many names used, such as wetlands, wildlife areas and forests. Other evidence suggests there are a large number of Conservation Authority owned areas and several thousand hectares of land not reported. Additionally, 286 Conservation Areas did not report any visitor statistics. Therefore, the database is incomplete.

Future studies will have to adjust the survey and the definitions in order to collect the missing data. One way to achieve this goal would be the widespread implementation in Ontario Conservation Authorities of a progressive public use measurement system and reporting system as developed by Hornback and Eagles (1). Each Conservation Authority could adapt the system to fit their specific needs and, in turn, produce data that is more accurate and beneficial for managers.

1. INTRODUCTION

Conservation Authorities are based on a watershed management unit, giving the Authorities unique ability to “develop comprehensive programs that work with nature to protect, restore, and effectively manage Ontario’s water resources,” (2). These agencies manage a system of parks that provides near urban outdoor recreation opportunities in addition to protecting and managing the province’s most important natural resource – water.

With a province-wide system of 36 Conservation Authorities and several hundred Conservation Areas, the influence of this network of parks can go beyond the watershed boundaries and impact the ecosystems, economies and communities of the neighbouring provinces and states. Despite their importance, Conservation Authorities sometimes do not get recognition as significant providers of recreation opportunities.

The World Conservation Union (IUCN) has global tabulations of the number and size of parks and protected areas. There are more than 30,000 parks and protected areas covering over 13.2 million square kilometres of the earth’s surface, or roughly the size of China and India combined (3, 4). The Ontario Conservation Areas are not included in these totals because these areas are not sufficiently documented and known.

Visitor activity within parks and protected areas is an increasing concern among outdoor recreation managers throughout the world (5). Currently in Canada there is no national or provincial institution that collects or standardizes park use data. The lack of such data means that park tourism is given a lower public profile than it deserves. As a part of the movement toward national data collection, the federal-provincial parks conference, cooperating with the University of Waterloo assembled the first national data set of park visitor statistics in 1997 when each of the 13 national, provincial, and territorial park agencies provided their visitor figures for each park for a ten year period (6).

2. CONSERVATION ONTARIO AND THE CONSERVATION AUTHORITIES

During the first half of the twentieth century, many countries, including New Zealand, England, the United States and Canada developed new water management legislation and management agencies. In the United States, Conservancy Districts were created in Ohio as a response to flooding in the Ohio Valley in 1913 (7, 8). Also in the United States, the creation of the Tennessee Valley Authority (TVA) represented a proactive approach taken by the U.S. government in 1933 to manage social, economic and environmental resources in the Tennessee River valley (8, 9). Consequently, the management practices in these two regions served as both an inspiration and guide for the creation of Conservation Authorities in Ontario.

The Parliament of Ontario passed the Conservation Authorities Act in 1946 (7, 10). The Conservation Authorities provided a new approach by which the provincial government and local municipalities could work together to create innovative programs to benefit and protect the natural resources of the province. The result was the inclusion of three fundamental concepts in the Act: local initiative, cost sharing and watershed jurisdiction (2).

Originally Conservation Authorities were primarily focussed on managing the province's water resources through flood control and improving water quality, as well as increasing the levels of conservation and management of natural resources within each watershed (7, 10, 11). Insofar as the initial focus was on water resources management, outdoor recreation has been an important component of Conservation Authority operation since the 1950s (12). More recently, the responsibilities and focus of Conservation Authorities became more all encompassing with the provision and maintenance of social and recreational resources such as camping, swimming, fishing and hiking opportunities.

Conservation Ontario is the coordinating body that represents all the Conservation Authorities in Ontario. Conservation Ontario is governed by a council of 70 appointed members and elected municipal officials from the Conservation Authority board of directors and staff (2). There are 36 Conservation Authorities in Ontario, 31 in the south and 5 in the north (Figure 1) (8, 10), with 90 to 95 percent of the population of Ontario living within their boundaries (2, 11).

2.1 Public Use Measurement Studies

Beaman and Stanley (13) of the Canadian Parks Service (CPS) documented public use measurement in Canada's National Parks and provided recommendations for improvement. Wilkie (14) conducted a survey on Canadian Parks and produced a Canadian Park Visitor Use Database. The National Association of State Park Directors (NASPD) conducts a survey of all state parks in the USA each year (15).

An initial attempt was made by Baldin *et al.* (16) to develop such a database for Conservation Authorities in Ontario. Data was received from only 24 of the 38 Conservation Authorities and it became obvious more complete data collection was necessary.

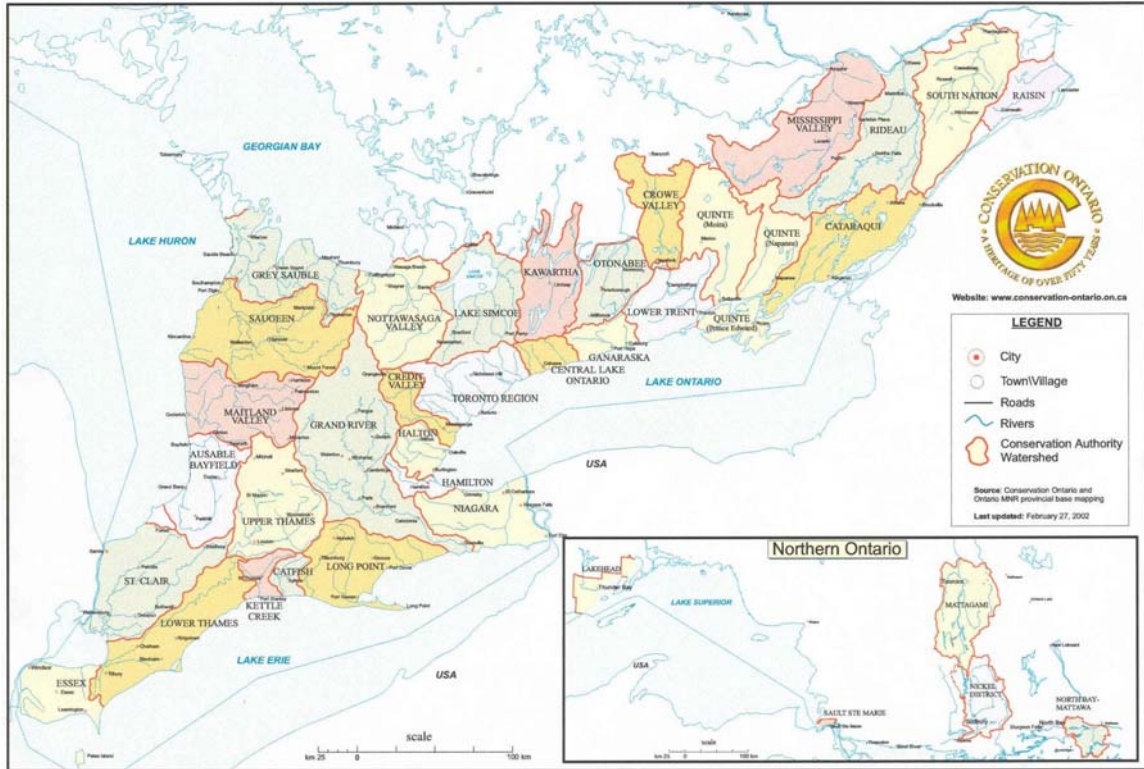


Figure 1. A Map of Conservation Authorities in Ontario

The World Commission on Protected Areas (WCPA) created a task force to standardize public use measurement techniques, resulting in a publication by Hornback and Eagles (1). This book outlined terms essential for compiling information regarding the public use of parks and protected areas. They presented standardized terms like visitor day and visitor night and distinguished them from similar terms like entrant and entry night. The book presented a progressive five level system for public use measurement programs. The five levels are: Initial Level (I), Basic (II), Intermediate (III), Developed (IV), and Advanced (V). Each progressive level requires more funding and staff, but results in a higher level of accuracy and detail even if they report the same type of statistics and use the same methods (Table 1). For instance, even though Level IV and V use the same methods and report the same type of statistics, the dedication of technical, monetary, and human resources is much greater at Level V than at Level IV. The specific benefits and shortcomings of each level will vary from Authority-to-Authority and area-to-area depending on their characteristics. Two general requirements for any program are funding and staff (Table 2). Monitoring devices designed to enhance the effectiveness of each public use reporting program were also outlined.

The guidelines presented by Hornback and Eagles were designed to be effective for parks of all sizes and locations, as well as for all levels of government. Consequently, these guidelines represent a framework for the survey developed here to ask Conservation Authorities about visitor use levels, data collection methods, park size, and other recreational activities provided for public use.

Table 1. Summary of Public Use Reporting Programs

| | Level I and II | | Level III | | Level IV and V | |
|------------------------------|----------------|---------------|----------------|-------------|----------------|-------------|
| | Reported | Method | Reported | Method | Reported | Method |
| Visits | YES | MC | Yes | MC | YES | AC |
| Corrected for Counter Error? | Not Applicable | | Not Applicable | | YES | |
| Adjusted for Excluded Use? | NO | | Yes | Survey | YES | Survey |
| Adjusted for Entries? | NO | | Yes | Survey | YES | Survey |
| Visitor Hours | YES | CS | Yes | Survey | YES | Survey |
| Entries | NO | | Yes | Survey | YES | Survey |
| Visitor Nights | YES | MC | Yes | MC & Survey | YES | MC & Survey |
| Visitor Night Hours | YES | CC-Reg. Forms | Yes | Survey Avg. | YES | Survey Avg. |
| Entry Night Hours | NO | | Yes | Survey | YES | Survey |

MC = Manual Count AC = Automated Count ES = Estimate (partial count) AD = Adjustment
 CS = Constant CV = Conversion CC = Calculation AP = Approximation

Source: Hornback and Eagles (1999)

Table 2: Summary of Program Development (Staff and Funding Requirements)

| Level | Staff | Time | Funding |
|--------------|------------------------------|-----------------|------------------------------------|
| Initial | 1 (other duties as assigned) | As time permits | None |
| Basic | 1 (other duties as assigned) | 10% allocated | Nominal |
| Intermediate | 2 (other duties as assigned) | 25% allocated | Same as small operating department |
| Developed | 1 (dedicated to program) | 100% | Same as any operating department |
| Advanced | 2+ (dedicated to program) | 100% | Enhanced |

Source: Hornback and Eagles (1999)

2.2 Methodology

The goal of the project is to create a statistical database for all Conservation Authorities in Ontario. A survey requesting data from the year 2000 was sent by mail to all 36 general managers of each Authority. The survey was to be returned to the University of Waterloo upon completion.

A set of definitions was given to each Authority to aid in clarifying the intent of the questions. Approximately half the definitions came from two sources – the NASPD in the U.S. (15) and the Guidelines published by Hornback and Eagles (1). The other half of the definitions was developed specifically for this survey.

Once the surveys were returned to the University of Waterloo, they were checked for accuracy and completeness and input into spreadsheets. Some additional data were received through personal communication with Conservation Authority staff.

3. RESULTS

Responses were received from all 36 Conservation Authorities, achieving a 100% response rate. The data show that the Conservation Authorities in Ontario have responsibility over 11,609,295 hectares of watershed land, and have 10,022,774 people living within their boundaries. Using the data obtained for this survey, the total population living within Conservation Authority boundaries is 85.8% of the Ontario's total population of 11,685,300 for the year 2000 (17). In 2000 there were 5,798,566 visitor days of activity in 487 Conservation Areas that encompass 74,800 hectares of land. These areas contain 5,972 primitive, and 2,631 improved campsites (Table 3).

Table 3: Summary Table of Survey Responses for all 36 Conservation Authorities

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Since the 1940s when the first Conservation Authorities were introduced, a large number of Conservation Areas have been created. What is often not clear is the date of establishment for each area and the distribution of creation. For the areas included in this survey, 318 of 487, or 65%, were created in the 1960s and 1970s. Those 20 years were, by far, the most active period for the creation of Conservation Areas and represent 42,960.88 hectares, or 57% of the total land contained within Conservation Areas. On the other hand, the 1940s saw the creation of only four areas. Similarly, only seven areas have been established during the first few years of the new millennium. Table 4 and Figure 2 show the number and size of Conservation Areas created by decade in addition to the cumulative total size of Conservation Areas progressing from the 1940s to the present.

It is clear Conservation Areas are important for both day use and camping. There are Authorities like the Upper Thames River and the Long Point Region that get greater than 90% of their total visitation from people using the campgrounds. On the other hand there are Authorities like the Hamilton Region, that, even though it operates 370 campsites, still receives 86% of its total visitation from people participating in day use activities. Therefore, even with a total of 8,603 campsites, visitor nights only accounted for 48% of the total visitation in all Conservation Authorities. Conversely, the 3,008,942 visitor days comprised 52% of the total visitation.

An important issue concerning these visitation statistics is the level of accuracy. There are 106 Conservation Areas that estimate their visitation data. Since 22% of 487 Conservation Areas estimate their visitation data, the results show that approximately 9% of the total visitation for all 36 Authorities is estimated. This estimated data accounts for only 519,025 visitors out of 5,798,566 total visitors for all of Ontario.

Although most Authorities have several Conservation Areas, the amount of land managed within these boundaries does not account for a significant portion of the watersheds they manage. For instance, the Hamilton Region Conservation Authority manages the highest percentage of its watershed at 6.61%, and the South Nation Conservation manages the smallest portion of a watershed at less than 0.01%. The total amount of land managed in all watersheds governed by Conservation Authorities in Ontario is just 0.64% (total size of all Conservation Areas divided by the total size of all watersheds managed by the Conservation Authorities). The size of Conservation Areas, combined with visitation figures, also allows for use-density level calculations.

Table 4: Date of Establishment of Conservation Areas by Decade

| Decade | Number of Areas | Percent of Total Areas | Area (ha) | Cumulative Area (ha) |
|---------|-----------------|------------------------|-----------|----------------------|
| 1940s | 4 | 0.82 | 5,660.25 | 5,660.25 |
| 1950s | 51 | 10.47 | 12,568.54 | 18,228.79 |
| 1960s | 136 | 27.93 | 22,405.45 | 40,634.24 |
| 1970s | 182 | 37.37 | 20,555.43 | 61,189.67 |
| 1980s | 50 | 10.27 | 3,934.26 | 65,123.93 |
| 1990s | 28 | 5.75 | 1,847.61 | 66,971.54 |
| 2000s | 7 | 1.44 | 218.31 | 67,189.85 |
| Unknown | 29 | 5.95 | 7,609.30 | 74,799.15 |
| Total | 487 | 100.00 | 74,799.15 | N/A |

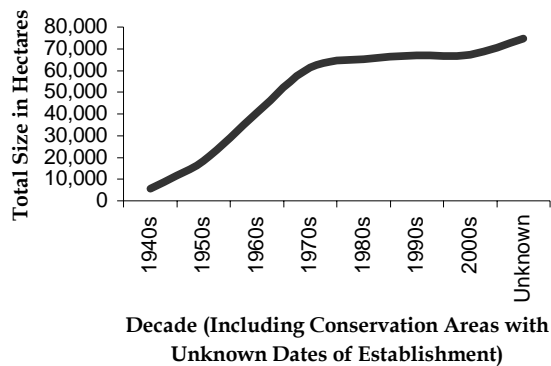


Figure 2 Cumulative Total Size of Conservation Areas by Decade (Hectares)

Catfish Creek Conservation Authority recorded the highest use-density level with 568.15 people per hectare per year on its Conservation Area lands, excluding the Authorities that did not report visitation statistics. Central Lake Ontario Conservation Authority has the lowest use-density level at 0.08 people per hectare. The use-density level for all 36 Authorities combined was 77.52 people per hectare (total size of all Conservation Areas divided by total visitation for all Conservation Areas).

Hornback and Eagles (1) discuss a wide variety of data collection methods that can be used at parks and protected areas of all sizes. Considering the unique characteristics of Conservation Areas, six methods were likely to be used by the Authorities to collect data, they are: sale of day-pass tickets, advanced or on-location campsite registration, road counters, magnetic counters, and visitor registers. However, only 126 of 487 Conservation Areas used any of the six data collection methods listed above, leaving 106 areas that estimate their visitation statistics and 255 areas that do not record any data at all. Table 5 shows that the sale of visitor day tickets at the gate is the most popular method with 119 Conservation Areas using this data collection method. The magnetic counters were the least popular method with no Conservation Areas using these tools to count their visitors. A total of 93 areas used the advanced or on-location campsite registration methods to collect their visitor data. One area used a road counter, 20 areas used visitor registers, and 14 areas had unknown methods of field data collection.

Table 5: Number of Conservation Areas Using each Data Collection Method

| Method of Data Collection | Number | Percent |
|-----------------------------------|--------|---------|
| Day Tickets | 119 | 24.44 |
| Road Counter | 1 | 0.21 |
| Magnetic Counter | 0 | 0 |
| Advanced Campsite Registration | 41 | 8.42 |
| On-Location Campsite Registration | 52 | 10.68 |
| Visitor Registers | 20 | 4.11 |
| Unknown | 14 | 2.87 |
| None | 372 | 76.39 |

The information gathered in this survey produced many statistics that were expected. The Authorities with campgrounds generally had higher total visitation figures. Most Authorities manage large watersheds but do not manage much of this land as part of Conservation Areas. Most of the province's total population lives within the boundaries of Conservation Authorities. Table 6 shows a summary of the largest and smallest

Authorities in regards to several key questions asked in the survey. There are just as many pieces of data contained in the database that illustrate some interesting shortcomings in the survey design as well as the statistical information provided by the Conservation Authorities. The number and total size of Conservation Areas, the number of areas with methods of data collection, and total visitation figures are just a few of the more interesting discrepancies that arise when comparing information from the database to information gathered from other publications and survey participants.

Table 6: Largest and Smallest Conservation Authorities Concerning 6 Key Questions Asked in the Survey

| | Smallest Authority | Largest Authority |
|----------------------------------|------------------------------|--------------------------------------|
| Watershed Size | Catfish Creek (49,000 ha) | Mattagami Region (1.4 million ha) |
| Watershed Population | Crowe Valley (10,000) | Toronto & Region (3 million plus) |
| Number of Conservation Areas | Nickel District (1) | Ausable-Bayfield (43) |
| Total Size of Conservation Areas | South Nation (11.73 ha) | Grand River (12,474 ha) |
| Number of Campsites* | Kawartha (1) | Grand River (2,454) |
| Total Visitation** | Cataraqui Region (1,450) | Grand River (1,016,224) |

* Excludes those Authorities that do not operate campgrounds.

** Exclude those Authorities that did not report any visitation statistics.

4. DISCUSSION

A survey of 36 Conservation Authorities produced a database of information. The results illustrated a large difference in the detail, accuracy, and usefulness of information from one Authority to the next. Many interesting facts and figures can easily be extracted from this database of information.

There is confusion over exactly what constitutes a “Conservation Area.” The definition provided as part of the survey defined a Conservation Area as “Land and water owned and managed by the Authority...can include operational areas...or non-operational areas.” This was a definition thought to be all-inclusive, but unfortunately it was not. Many Authorities own land that is managed by another interest group and visa versa. A number of Conservation Areas that fall into this category were excluded from the survey. Simple examination of some Authority web sites finds 119 areas from 17 Authorities that were not included in the survey. Thus, it is impossible to determine the exact number and size of Conservation Areas in Ontario. More importantly, under-reporting the amount of land owned and/or managed by a Conservation Authority can have an impact on the perceived value of the recreation resources within the Authority itself, especially if the amount of land in question is significant.

Concern arises over the 255 areas that do not record any data at all. Even more worrisome are the 31 areas that stated they use at least one method of data collection but did not provide any visitor statistics, increasing the total to 286 areas that do not report any data.

A number of Authorities use sophisticated methods of data collection such as vehicle multipliers. One Authority even uses money in donation boxes to extrapolate the visitation level by combining vehicle multipliers with willingness to pay rates. If all areas used at least one method of data collection and report some level of visitation, it is possible that the total visitation for all 36 Authorities could increase to 6.5 or 7 million per year.

The Conservation Authorities with the 5 highest total visitation figures (Grand River, Upper Thames River, Hamilton Region, Toronto & Region and St. Clair Region) account for 4,067,017 visitors, 70% of the

total, meaning the other 31 Authorities contribute only 1,731,549 visitors, or 30% of the total. Conducting a similar comparison for the total number of Conservation Areas provides an interesting contrast. The 5 Authorities that account for such a large portion of the total visitation account for only 66 of the total number of Conservation Areas. Remarkably the other 31 Areas with only 30% of the total visitation, account for 86%, or 422, of the total number of Conservation Areas (Figure 3). These facts show the important role of campgrounds in the success of Conservation Authorities' visitor use, especially in terms of exposing large numbers of people to Conservation Areas. With millions of visitors using these areas, it is obvious that managers need to focus their management efforts accordingly. There should be appropriate levels of funding, marketing activities should focus their attention on these highly used areas, and managers should employ more intensive management techniques to ensure the long-term viability of these areas.

5. RECOMMENDATIONS AND CONCLUSIONS

The survey conducted for this study was a good initial evaluation of the current status and methods for the 36 Conservation Authorities in Ontario. It is now up to the managers of each Conservation Authority to determine where they stand and which program best suits the needs of every Conservation Area within their jurisdiction.

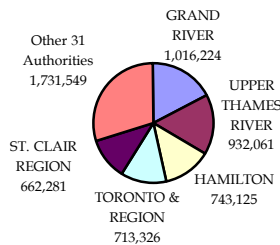
However, it is important to note that the methods used for this survey and the results they produced should be adapted for the specific needs of each Authority. Before either of these steps can be implemented, it is necessary to consider several recommendations concerning the database of information presented in this study as well as the various public use reporting programs available to managers of the Conservation Authorities. The following is a list of recommendations designed to improve the current database:

- First and foremost, the database must be continued, refined and updated annually.
- Verifying that all information contained in the database is indeed correct is essential.
- Every Conservation Authority must submit visitor data for their Conservation Areas to Conservation Ontario on an annual basis.
- Each Authority should designate one staff member to be responsible for the collection and submission of visitation data on an annual basis.
- A group of selected Conservation Authority staff should meet annually to discuss requirements, criteria, and methodological approaches that could be included in future studies.
- The database must be made widely available.

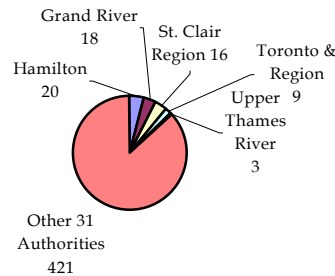
Of the 5 progressive levels described by Hornback and Eagles (1), the Intermediate program (Level III) is most desirable for most Conservation Areas because it produces more precise statistics while operating within a relatively limited budget. All Authorities can start with a Level I program initially, and work up to a Level III program over time. It is important for each Authority to have at least one staff person assigned to the responsibility of public use recording and reporting. This person can gain expertise over time and be the agency's focus to keep the program operating.

Figure 3. Comparing the 5 Conservation Authorities with the Highest Total Visitation to the Other 31 Authorities for Total Visitation and Number of Conservation Areas

Total Visitation for the Top 5 Authorities Compared to the Other 31 Authorities



Number of Conservation Areas for the Top 5 Authorities (Total Visitation) Compared to the Other 31 Authorities



The knowledge base established by this survey provides a solid foundation on which to build an extensive database of information concerning all aspects of Conservation Area management. With standardized data and the first tabulation of public use figures for Conservation Areas, it is now possible to illustrate the importance of Conservation Areas to local and regional communities. The continued success of similar projects will give Conservation Area recreation and tourism based activities the recognition they deserve.

REFERENCES

- Hornback, K. E. & Eagles, P. F. J. (1999). Guidelines for Public Use Management and Reporting at Parks and Protected Areas. IUCN, Gland Switzerland. Iv + 90 pp.
- Conservation Ontario. (2002). Conservation Ontario: Corporate Profile. Available: HTTP: <http://www.conservation-ontario.on.ca/profile/profile.htm> (2002, July).
- Eagles, P. F. J. (1999). International Trends in Park Tourism and Finance. Presented at, The Future of Conservation: The A. D. Latornell Conservation Symposium, Nottawasaga Inn, Alliston, Ontario, Canada.
- IUCN. (2002). World Commission on Protected Areas: About Protected Areas. Available: HTTP: <http://www.iucn.org/themes/wcpa/wcpa/protectedareas.htm> (2002, November 17).
- Dearden, P., & Rollins, R. (1993). The Times They are A-Changin'. In P. Dearden and R. Rollins (Eds.), Parks and Protected Areas in Canada (pp. 1-16). Toronto: Oxford University Press.
- Eagles, P. F. J. (1998). Proposal: The Development of a Visitor Database of Conservation Areas in Ontario. University of Waterloo, Waterloo, Ontario, Canada.
- Mitchell, B. & Shrubsole, D. (1992). Ontario Conservation Authorities: Myth and Reality. University of Waterloo: Graphics Services.
- Mitchell, B. (1997). Resource and Environmental Management. England: Longman Limited.
- Patterson, J. H. (1994). North America: A Geography of the United States and Canada (9th ed.). New York: Oxford University Press.
- Eagles, P. F. J. (1993). Parks Legislation in Canada. In P. Dearden and R. Rollins (Eds.), Parks and Protected Areas in Canada (pp. 57-74). Toronto: Oxford University Press.
- Hind, D., et al. (1995). Golf Course Development in Floodplains: Status and Planning Implications in the Province of Ontario, Canada. The Environmental Professional. 17(4), 331-341.
- Eagles, P. F. J. (2001). Personal Communication.
- Beaman, J. & Stanley, D. (1991). Counting Visitors at National Parks: Concepts and Issues.
- Wilkie, K. (1993). The Canadian Park Visitor Use Database. Unpublished Undergraduate Thesis, University of Waterloo, Waterloo, Ontario, Canada.
- National Association of State Park Directors. (2000). State Park Statistics. Available: HTTP: <http://www.indiana.edu/~naspd/statistics.html> (2000, March 21).
- Baldin, E., et al. (1999). Conservation Authority Database Survey. Unpublished Undergraduate Thesis, University of Waterloo, Waterloo, Ontario, Canada.

17. Statistics Canada. (2002). Provincial Populations. Available: HTTP:
<http://www.statscan.ca/english/Pgdb/Rcable/Population/demo02/htm> (2002, August 13).

Baldin, Eric. 2003. Visitor Statistics for Conservation Authorities in Ontario: Current Status and Methods. M. E. S. thesis, Department of Geography, University of Waterloo, Waterloo, Ontario, Canada. 155 pp. (Thesis Supervisor along with Peter Deadman). Campbell, Karen M. 2003. An Evaluation of the Earth Schools Environmental Education Program. B. E. S. thesis, Department of Environment and Resource Studies, University of Waterloo, Waterloo, Ontario, Canada. (Thesis Supervisor). Ignatov, Elena. 2003. The Canadian Culinary Tourists: How Well Do We Know Them? M. A. thesis, Department of Recreation Management, University of Waterloo, Waterloo, Ontario, Canada. This paper examines the current status of ESA-protection planning in Ontario and the problems encountered by municipalities in adopting and implementing ESA programmes. Using a questionnaire survey, data were collected concerning 66 municipalities, and a review was carried out of the ESA policies in 36 Official Plans. The results show that an additional 11 municipalities have adopted ESA programmes since 1981, and that most of these have been designated cities.Â Preserving Natural Areas in Ontario: Private Ownership and Public Rights. Occasional Paper No. 1, Canadian Environmental Law Research Foundation, Toronto, Ontario, Canada: 64 pp., illustr. Vrancart, R.J. (1980). Recent papers in Freshwater Biodiversity: Importance, Threats, Status and Conservation Challenges. Papers. People. Early life history and spatiotemporal changes in distribution of the rediscovered Suwannee moccasinshell *Medionidus walkeri* (Bivalvia: Unionidae). Accurate distribution data are critical to the development of conservation and management strategies for imperiled species, particularly for narrow endemics with life history traits that make them vulnerable to extinction. *Medionidus* more. Accurate distribution data are critical to the development of conservation and management strat