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Toward A More Holistic Approach to The Conservation Management Of Southern Ontario's Small Protected Areas

By

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DISSERTATION

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Abstract

Within Southern Ontario's highly fragmented greater natural ecosystem, there remain numerous relatively small scattered areas which bear at least some resemblance to their former pre-European/Canadian settlement natural ecosystem. In their present state they serve as reservoirs of their particular ecoregion's indigenous plant and animal species. In proportion to their limited spatial areas, degree of isolation, existing ecological integrity, and long-term ecological carrying capacity they are stores of natural capital, which is beneficial to both nature and society. They co-exist with Southern Ontario's well developed socioeconomic/cultural system, on whose stewardship their long-term integrity is becoming increasingly dependent, which creates increased environmental stresses and demands on their natural.

During the nineteen-thirties, it became recognized that unless measures were put in place for checking the ongoing, non-sustainable, rate of natural resources extraction from the natural environment, and for checking the rate at which pollution was being injected into the environment, environmental disaster would be inevitable, as would be society's ability to participate, to an acceptable degree, in the benefits of the natural world. As a consequence, a number of individuals and organizations became active conservationists, and in essence, the forerunners to the present-day Southern Ontario protected areas' managers.

Protected area conservation management practices have slowly but continually evolved in line with the general perceptions, of a given time, about the various ecological and biophysical aspects of protected areas, about their cultural associations, and about the appropriate approach to their conservation management. By the late 20th century the traditional approach was typified as top-down selected species and single issues focused

(Franklin 1993, Meffe & Carroll 1997). Current perceptions have been becoming centered on advances made during recent decades in understanding natural ecological self-organizing processes, ecological self-organizing integrity, and humans' innate attachment to the ecosystems in which they exist, which together with ecosystem's abiotic and biotic entities are an integral part.

In unison with advances made in understanding, conservation management has slowly and steadily moved away from a top-down, selected species and single issues approach toward a holistic ecosystem approach, including integrative and adaptive management with the capacity for holistically managing the ecological and socio-economic components of regions and conservation areas. Not unlike conservation management, protected area management involves three basic components. In this case they are the ecological component, the socioeconomic/cultural component, and the institutional component. The various on-site management agencies consist of government agencies, non-government agencies, stewardship co-management groups, and private landowners, whose stewardship responsibility is dictated by the official policies of the greater socioeconomic/cultural component. In Ontario the main small protected area conservation management policies come under the administration of the provincial Ministry of Natural Resources, in combination with the various municipalities' bylaws, which are embedded within their provincially approved Official Plans.

This exercise was undertaken with consideration of the foregoing, and with the goal of investigating whether Southern Ontario's protected areas' on-site conservation management is, or could be, better served by taking advantage of the gains that have been made, during recent decades, in the understanding of the protected areas' various

biophysical and geophysical processes, about their cultural associations, and advances in conservation management. This research is based on review of the academic literature related to the development of protected areas management and science, a review of relevant management plans and policies for eleven southern Ontario small protected areas, and interviews with key managers and stakeholders for two in-depth case-studies of small southern Ontario protected areas. In an iterative process over the course of the research, several tools for assessment and management were developed: 1) a set of good small protected area management principles, on which evaluation criteria and sub-criteria of a protected area management practices framework are based, 2) testing the evaluation framework for evaluating the management policies of existing management plans of a sample of eleven Southern Ontario protected areas, 3) conducting case studies on two of the sample of eleven protected areas, and 4) conducting interviews with individuals with first hand practical experience in Southern Ontario protected areas conservation management, with emphasis on participants who have had firsthand involvement in the two detailed case studies'.

This research was based on a limited, though broadly based sample of small protected areas in southern Ontario. Many of the cases did not have current management plans and other policy documents, which lead to some challenges in applying the management evaluation framework due to clear, and to be expected, incompatibilities between current BMPs and thirty year old BMPs. Seeking the views of community members and other citizens involved less formally in small protected areas management would also be interesting. These cases were all government-agency run, and it could be interesting to explore the approaches and experiences of NGO and private sector protected areas

initiatives as well. A relatively standardized, closed ended set of questions and criteria were used in this study, and there is room for more in-depth and open-ended study of a range of additional cases.

The lessons of this research included the emergence of more holistic, adaptive conservation management of small protected areas, in spite of often limited policy and support for them. Application of these approaches is challenged by declining financial support for small protected areas management, and the often highly modified nature of such protected areas' ecosystems and landscapes. On the positive side, there is clear commitment and knowledge of these ideas among many managers and policymakers, and examples of innovative collaborative and co-management approaches to conservation management of individual and networks of protected areas.

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Chapter 1 – Introduction

The exact nature of Southern Ontario's pre-European/Canadian settlement era natural ecosystem is unknown. Remnants, that bear some resemblance to this former ecosystem, exist in the physical form of small, scattered, relatively natural areas. Whatever the exact spatial area of each remaining relatively natural area, within the context of Southern Ontario's greater ecosystem, they are all small. They exist among Southern Ontario's severely fragmented greater natural ecosystem and well developed socioeconomic/cultural system. Due to the high rate of private landownership in Southern Ontario, the majority of them are located on private lands. Fewer of them are located on public lands, and a relatively small number of them are located on a combination of private and public lands.

Existing as remnants of the former greater natural ecosystem, they serve as reservoirs of their particular ecoregion's indigenous plant and animal species, and the seed source that is required for their ongoing perpetuation. Despite being under various types of environmental stresses due to isolation, to being surrounded by various types of less than environmentally friendly cultural landuses, and culturally generated pollutants, they are in proportion to their spatial areas, degree of isolation, and natural ecological carrying capacity producers of natural capital, which is beneficial to both nature and society (Mader 1985, Noss 1987, Shafer 1990, Saunders et al. 1990). The importance of their existence also relates to the fact that by way of academic literature and professional experience it is increasingly becoming recognized that there is need of a network of small natural areas for ecological reasons (for conserving natural heritage), for the protection of specific features such as areas of natural and scientific interest (ANSIs), and for

preserving specifically designated cultural heritage. The loss of these relatively natural remnants of the former greater natural ecosystem, and the benefits to nature and society that they provide could not be replaced (Fabos 1995, Hoover & Shannon 1995, Merriam, 1999, Jalava 2001).

The benefits to Southern Ontario society that are obtained through human enterprise such as agriculture and harvesting of natural resources have consistently been evaluated in monetary units of measure. On the other hand, the benefits to both nature and society from Southern Ontario's natural ecosystem, for example, from its natural geophysical features, and in particular the natural capital that its biophysical (ecological) component produces, had for the greater part of the first two centuries of the Euro-Canadian settlement period been either misunderstood, undervalued, or ignored.

As a consequence, Southern Ontario's protected areas do not exist as deliberately planned entities among its severely fragmented greater natural ecosystem. Their existence is incidental to, and as a result of, the development of its now well developed Euro-Canadian socioeconomic and cultural system.

Increasing awareness, during the 1920s and 1930s, of the likely severe negative results, affecting both nature and society, of not changing the course of human activities resulted in the coming together of various government agencies, non-government agencies, and concerned private citizens and engaging in various types of conservation works. To begin with, they mostly concentrated on river flow and water pollution issues (Richardson 1974, Yu & Veale 1994). The fact that many of the remaining relatively natural areas have come under some form of protective conservation management by a diverse variety of management agencies, including government, non-governmental

organizations (NGO's), private landowners, and community co-management groups, can most likely be largely attributed to that early conservation movement, and its more recent continuations. The protected areas of concern to this particular exercise are the ones that have come under some form of protective conservation management. They are hereafter referred to as small protected areas, or for brevity, simply protected areas.

In the early days of Southern Ontario's conservation movement the accumulated practical experience of various aspects of protected areas, and their conservation management, was limited. Consequently, conservationists and conservation managers faced a lengthy period of protected area conservation management development, the evolvutiont of which is ongoing. In line with its evolution, it was not until the early 1970s that a more holistic ecosystem management approach became generally adopted in Ontario (Mitchell & Shrubsole 1992).

Between the 1970s and the present time major advances have been made in human understanding about natural ecological processes and natural geophysical processes, about the innate attachments that humans have to the ecosystems in which they exist, and are an integral part of. It has also been a time during which, in line with the advances made in understanding, and the advances that have been made in conservation management tactics, whereby the conservation management focus has shifted from selected species and single issues as they arise to focusing on natural self-organizing ecological communities, and the adaptive integration of associated abiotic and cultural issues directly into the management mix (Begon et al. 1986, Holling 1994, 1995, Grumbine 1994, 1997, Parker & Pickett 1997, Mitchell 1997, Meffe & Carroll 1997, Levin 1999, Holling & Gunderson 2002, Meffe et al. 2002). It is against this background,

and with acknowledgement of the foresight and conservation efforts of those who have played a major role in conserving Southern Ontario's protected areas in their current relatively natural state, that this exercise is undertaken.

Goals and Objectives

The goal of this exercise is to explore and evaluate the management of small protected areas in southern Ontario. A particular interest is to determine the extent to which management is, or could, follow a more holistic, integrative, adaptive, and collaborative ecosystem management approach. The advances that are of particular interest include: 1) those about how, through natural ecological self-organizing processes, ecological communities persist within ecological systems, 2) those made, according to current relevant literature, in understanding of the interests and role of humans in ecosystems, and the complex interactions which take place between the socioeconomic/cultural component and the ecological components, and 3) those made in conservation management tactics, and the evolution toward the application of a more holistic, integrative, adaptive, and collaborative approach to the conservation management of the protected areas.

Attaining that goal entails addressing the following four key objectives:

1) examining what is special about small protected areas from ecological, socioeconomic/cultural, and management perspectives,
2) identifying lessons gained from relevant ecosystem management literature,
3) Developing a set of best management principles for small protected areas management in southern Ontario to provide a framework for evaluating policies and practices, and
4) Evaluate current management policies and practices of a sample of southern Ontario small protected areas

Outline of the Thesis

To address the goals and objectives of this research, this thesis is organized as follows: Chapter 2 details the methods, a multiple part investigation process that is aimed at addressing the four key objectives of this thesis. The purpose of the investigation process is the assembly of information about the various aspects of current Southern Ontario protected area conservation management practices, from which general conclusions can be deduced about the extent to which the goal of the exercise is attained. Such an investigative process requires the development of a number of investigation tools, and employing them in order, as is outlined below.

Chapter 3 reviews the relevant academic literature in three areas of literature: Ecology and Ecosystem Science and Small Protected Areas, The Socioeconomic/cultural Context of Small Protected Areas, and Managing Small Protected Areas. It then develops a set of best management principles for small protected areas, followed by an evaluation framework. This chapter's literature review, including as it does an overview of current and recent advances, is instrumental in achieving Objectives 1, 2, and 3 of the thesis. This in turn plays an essential role in addressing the final, key objectives It provides the appropriate information on which to base the investigation tools.

Chapter 4 applies the best management principles and framework to eleven examples of small protected areas management plans and policies in southern Ontario. This is the first step toward addressing key objective 4.

Chapter 5 deals with case study No.1, the Lower Maitland River Project, which includes the Lower Maitland River Valley between the Huron County towns of Auburn and Goderich, where the river discharges into Lake Huron. Chapter 6 deals with Case study No. 2, the 104.5 ha Apps' Mill Conservation Area, located a short distance west of

the City of Brantford, in Brant County. These two case studies take us further along the road of addressing key objective 4. Chapter 7 adds to this objective by outlining the results of in-depth interviews with a range of individuals involved in management of the two in-depth case studies, as well as broader management of protected areas in southern Ontario.

Chapter 8 brings together the results of this thesis by: 1) summarizing information gleaned from the various steps of this investigation, 2) deducing conclusions about the current state of Southern Ontario's protected area conservation management policies and practices, 3) briefly discusses some limitations of this research and identifies options for future research, and 4) identifying possible priorities for advancing Southern Ontario protected area management practices.

Note that as this is primarily an exercise in understanding and improving management, rather than species-level biology or ecology; when a particular species is referred to in this thesis, the species is referred to by its local common name. Appendix 7 provides a list of common species in the case studies, their common names, and their binomial scientific names for reference.

Chapter 2 – Methodology

The goal of this research, as outlined in Chapter 1, is conducting an investigation into the current state of Southern Ontario's protected areas' conservation management practices, for determining whether Southern Ontario protected area conservation management is, or could be, better served by taking greater advantage of recent advances in theory and practice. The advances include advances in the understanding about protected area natural geophysical and biophysical processes, about the innate attachments that humans have to the ecosystems in which they exist, of which they are an integral part, and are not apart from, and about advances made in the approaches to protected area conservation management. The advances also include acknowledging that the ecological, socioeconomic/cultural, and institutional (the practical on-site management agencies) components constitute the three basic components of conservation management (Meffe & Carroll 1997, Meffe et al. 2002), that they are integral parts of their ecosystems, have intra- and inter-system relationships, and that the concerns of each and the combined concerns of all three are integral to conservation management (Begon et al. 1986, Bryant 1992, Miller 1994, Holling 1994, 1995, Christensen et al. 1996, Grumbine 1994, 1997, Parker & Pickett 1997, Meffe & Carroll 1997, Handel 1997, Mitchell 1997, Hobbs 1998, Primack 2000, Meffe et al. 2002, Holling & Gunderson 2002). In this context, the rest of this chapter outlines the methodology and methods of this research.

Methodology

Broadly, this thesis draws on a qualitative, multi-method, comparative case-study approach (Yin 2003). Such approaches are typical in resource and environmental

management research that seeks to combine theory and practice, with the aim of improving both. A synthetic, case-study based approach is also well suited to contexts of much variation, yet some fundamental similarity, and in which first-hand knowledge is needed to interpret and refine the application of theory experience from the wider, relevant academic literature. It is also useful in determining how best to improve practice and policy, within the inevitable constraints of government, funding, and politics. Multiple methods allow for the comparison of information from different sources, which is sometimes informative in and of itself, and at minimum allows for cross-checking of results and conclusions.

Methods

This thesis will utilize several methods. First is a literature review, and development from it of a set of principles for conservation management of small protected areas. Then these principles will be applied through an evaluation framework to several existing management plans and policies of small southern Ontario protected areas. And finally two in-depth cases of small protected area management will be examined drawing on documentary and interview data. These are discussed in turn in the following sections.

Literature Review

The types of literature that must be reviewed, and the sequence in which they are carried out, are dictated by the four objectives which must be addressed in order to attain the goal of the exercise. Three main areas of literature are examined: Ecology and Ecosystem Science and Small Protected Areas, The Socioeconomic/cultural Context of Small Protected Areas, and Managing Small Protected Areas. These were selected for their relevance to the currently held perceptions of the various aspects of protected areas and their appropriate conservation management. The three investigation tools that are

then developed in Chapter 3 are: 1) a set of small protected area best management principles, 2) a protected area management practices evaluation framework whose evaluation criteria and sub-criteria are based on the best management principles, and 3) a subsidiary set of guidelines by which to evaluate the self-organizing integrity of the protected areas' various types of self-organizing ecological communities. The investigation tools are based on the information that is contained under the three sub-headings of the Chapter 3 review literature.

In acknowledgement of the three basic components of conservation management, the small protected area best management principles are listed in accordance with which of the three basic conservation management components that they are more closely associated. In similar fashion, the individual evaluation criteria and sub-criteria of the conservation management practices evaluation framework, which are based on the best management principles, are outlined in Chapter 3.

Management Plan and Policy Evaluation

Key objective 4 begins to be is addressed in Chapter 4. It involves employing the evaluation criteria and sub-criteria of the management practices framework for evaluating the conservation management practices of the existing management plans of a sample of eleven Southern Ontario Protected areas. The sample plans were not randomly selected. They were selected on the basis of as a group being generally representative of the variation that exists among Southern Ontario's protected areas' geophysical and biophysical entities, cultural associations, on-site management agencies, rural versus peri-urban or urbanized locations, and spatial size. During the sample selection process it became apparent that several of the existing Southern Ontario protected areas' management plans have passed their rewrite dates. The sample's individual protected

areas are named and their Southern Ontario locations are illustrated in Chapter 4. Appendix 1 provides a brief description of the sample properties

The management practices of each individual management plan are evaluated in accordance with the individual evaluation criteria and sub-criteria of each of the three sections of the evaluation framework, the ecological component, the socioeconomic/cultural component and the institutional (the on-site management agency) component. The completed evaluation framework forms for each sample plan may be viewed in Appendix 2. A summary and review of the management practices evaluation, as they are recorded on the forms, along with critical observations and conclusions are dealt with in Chapter 4.

In-Depth Case Studies

Key Objective 4 continues to be addressed in Chapters 5 and 6 which outline two case studies based on documentary sources. The case studies were not randomly selected from the Chapter 4 sample of eleven protected areas. They were selected on the basis that in combination they would be representative of the broad range of diversity that exists among the various aspects of Southern Ontario protected areas, and that individually they would be representative of the uniqueness of each protected area within that broad spectrum of diversity.

Apart from evaluating of the management practices of the their existing management plans, per Chapter 4, the case studies involve 1) examining and comparing the two case studies' conservation management agencies' on-site conservation management adaptations and comparing their management adaptations relative to the standards of the Chapter 3 management practices evaluation framework, 2) Conducting sets of field observation exercises for the purpose of obtaining, within the somewhat limited in-depth

investigative scope of such exercises, insight into the on-site ecological integrity of the case study areas' ecological component, and 3) recruiting, as per Appendix 3, from among their on-site management agencies volunteers for participating in the related Interview Process.

The Chapter 5 case study, the Lower Maitland River Project, is not contained within arbitrarily set borders. It is simply defined by the public and private lands of the lower Maitland River Valley. Its area remains open to possible changes. It is managed by the Lower Maitland Stewardship Group (LMSG) in co-operation with the landowners and concerned citizens in accordance with LMSG's 2002 Strategic Watershed Plan for the Lower Maitland River.

The Chapter 6 case study, the Apps' Mill Conservation Area, is under the ownership and management of the Grand River Conservation Authority (GRCA). Its existing 1979 management plan is based on a 1970s in-depth study of the area. The prime management focus is on conserving the area's unique geophysical and biophysical entities in order for it to remain, for the benefit of the present and future generations, a place for learning about watershed processes and nature in general, with emphasis on educating school aged students, for which its Johnson Nature Center is well suited. Whiteman's Creek runs through the area's deep valley, and due to the ecological sensitivity of the valley portion of the area only very limited types of human activities are permitted.

Interviews

To supplement the documentary studies of the two case studies, interviews were held with a number of individuals with past or present experience in the management of small protected areas in southern Ontario. They came from a range of roles in governmental and non-governmental organizations, and were recruited through the process of initial

documenting and identification of case studies for this research. The interview protocols were approved by the WLU Research Ethics Board and informed consent was obtained (see Appendix 3). In order to obtain authentic, practical experience-based opinions about the current state of Southern Ontario protected area conservation management practices, recruitment was limited to individuals that had current Southern Ontario protected area conservation management experience. In order to obtain honest opinions, consenting participants were assured of their anonymity, and were asked to declare that they were free to express their personal practical experience based opinions, regardless of any affiliation with government or non-government agencies, or stewardship organization. The intent was to obtain a good number of qualified interview participants from individuals with first hand management involvement in the two case studies. Due to the small number of consenting participants that volunteered, from among a limited number of possible candidates (seven from LMSG and eight from GRCA), recruitment efforts were later extended to appropriately qualified individuals from among other Southern Ontario protected area management agencies. The extended recruitment effort resulted in an additional three individuals representing the Ontario Ministry of Natural Resources (MNR) and two representing a large, privately operated (non-profit) research reserve consenting to participate.

The one-on-one interviews were conducted in the absence of any third party, and at a time and in a place that was convenient for the individual participants. The individual interviews consisted of each participant voluntarily responding to, or refraining from responding, based on his/her personal practical experiences, to each option of a set of twenty-two multiple-option prepared questions, dealing with all three basic components

of conservation management (see Appendix 4). In like manner, individual participants also contributed their general experience-based comments regarding Southern Ontario protected area conservation management practices.

Analysis

Data analysis is undertaken through simple categorical representation of the results of framework evaluations of the sample plans, and simple numerical tallying of responses to the interview questions. More complex, qualitative data from the in-depth case studies and from general comments by interview participants, was interpreted in the light of all the source of information in this research, and especially in the context of the literature on related topics, as well as the researcher's experience with planning and management of rural properties in southern Ontario.

Chapter 3 – Literature Review, Management Principles, and Evaluation Framework

This chapter reviews the academic and technical literature in three main areas, each focused by relevance to small protected areas: Ecology and Ecosystem, Socioeconomic/cultural Context, and Managing Small Protected Areas. This review provides the basis, later in the chapter, for developing best management principles, and an evaluation framework for small protected areas.

The literature to be reviewed was selected for its likely relevance to current understanding of the various aspects of protected area management: biological and geophysical processes, socio-economic and cultural dimensions, and their conservation management. Southern Ontario's small protected areas exist in a number of different physical forms. For example, they exist as single patches, as a stretch of river valley, as a sub-watershed, etc. They are located on privately owned lands, on publically owned lands, or on a combination of publicly and privately owned lands. The protected areas may be host to a wide variety of biophysical and geophysical features of interest. They may come under a variety of cultural influences and environmental stresses, and in many instances they are confined within arbitrarily set borders that lack a basis in natural ecological self-organizing processes or systems (Jalava et al.2001, Schwartzel &.Miller 2001).

Particular attention is given to literature that explores the validity of, and approaches for applying a holistic approach to small protected area conservation management, which, with respect to the ecological component, focuses on ecological self-organizing systems, and the adaptive integration of any associated abiotic and socio-cultural dimensions into the management mix, as compared with the top-down, more traditional approach, which

focuses on biological organization at the level of a selection of species and on single issues as they arise (Begon et al. 1986, Meffe & Carroll 1997, Meffe et al. 2002, Berkes & Folke 2002). A relatively recent innovation in Southern Ontario small protected area conservation management, that of community co-management (Plummer & Fitzgibbon 2004, Plummer 2006), also receives consideration.

Ecological, social, and planning and management perspectives, as they relate to small protected area conservation management, are addressed throughout.

Ecology and Ecosystem Science

The ecological processes common to the interactions of living organisms with one another, and with the nonliving matter and energy of a given geographical space, drive the ecological self-organizing processes by which groupings (guilds) of co-operatively cohabitating plant and animal species become self-organized into ecological communities that have the structure and that function in a manner which has become recognized as an ecosystem. Thus, the self-organizing ecological community is the basic unit of ecological (biological) assembly to which a holistic ecosystem management approach can be applied (Mader1985, Begon et al.1986, Miller 1994, Holling 1994, 1995, Grumbine 1994, 1997, Parker & Pickett 1997, Holling & Gunderson 2002).

The concept of ecosystem has evolved beyond earlier theories that associated it directly with the first and second laws of thermodynamics, by which natural ecological self-organizing assemblies were typified as being closed deterministic systems that progressed to a climax state of equilibrium (Parker & Pickett 1997). It has become acknowledged that they are dynamic, open, ecological self-organizing assemblies that may, through natural ecological and natural succession processes, experience multiple states of equilibrium, in which physical and biological components, often including

humans, interact within the limits of the available abiotic and biotic attributes, and the particular area's available spatial area. In such an environment material is cycled and there is an indeterminable amount of energy flow-through. Uncertainty and complexity are inherent in such a system, but change is itself variable: rarely continuous, sometimes progresses at a gradual rate, sometimes sudden and chaotic (Schneider &Kay 1994, Holling 1995, Mitchell 1997, Levin 1999, Holling & Gunderson 2002, Meffe et al. 2002). Evolution does not come about as a consequence of the system as a whole, but as a result of the interactions of its various parts and in the presence of tight feedback loops (Levin 1999).

In nature, ecological self-organizing processes naturally occur within a geophysical context which influences the development of ecological communities and the ways in which a community evolves and functions. There is a hierarchical order within ecological communities. One or a few species are dominant within the community and the others fall into hierarchical order. Certain key species may be critical to an ecological community's sustainability, but all species within the species mix are, to some degree, essential to the community's structure and function, including the in-ground fauna and microbes (Handel 1997). Thus, for example, a certain type of ecological community takes on the form and functions of a forest ecological community within a terrestrial ecological system. Another ecological community takes on the form and functions of a swamp within a wetlands ecological system, and so on (Begon et al. 1986, Holling 1995, Christensen et al. 1996, Handel 1997, Lee et al. 1998, Levin 1999, The Nature Conservancy 2000, Holing & Gunderson 2002).

One of the earlier, new contributions of theoretical ecology was to understanding of island biogeography and ecology. One or more of the following conditions most likely applies to most small protected areas, including restricted spatial area, isolation from other relatively natural areas, arbitrarily set borders that lack any basis in natural ecological processes, and a lack of internal habitat. As a consequence small protected area ecological processes are likely to be similar to those discussed in island biogeography. Common to island ecology are problems with niche availability and selection, intensity in intra- and inter-specific competition, a lack of natural selection opportunities, increased vulnerability to invasion by exotic species, disease, and pest infestation, and a lack of available in and out migrating species, which impacts species diversity and therewith biodiversity. In general, the causes of the isolation of land-based "island" systems present fewer obstacles to species migration than do the causes of the isolation of sea based island ecology. In some cases of land-based island - ecology the ecological situations may be modified through access to natural corridors or access to nearby metapopulations (Begon et al. 1986, Cairns 1998, Shafer 1990, Saur 1994, Shafer 1990, Schwartzel & Miller 2001, Whittaker 1998).

The number of ecological communities that become established and persist within the spatial area range of the small protected areas (small protected area ecological islands) may vary from a single one that requires very little space, e.g. a small prairie ecological community that supports an insect population and a few birds that nest near the ground and feed on insects, to, depending on community type, numerous ecological communities, existing within more than one type of ecological system (terrestrial,

wetland, aquatic) in the largest small protected areas (Lee et al 1998, Merriam 1999, The Nature Conservancy 2000, Primack 2000).

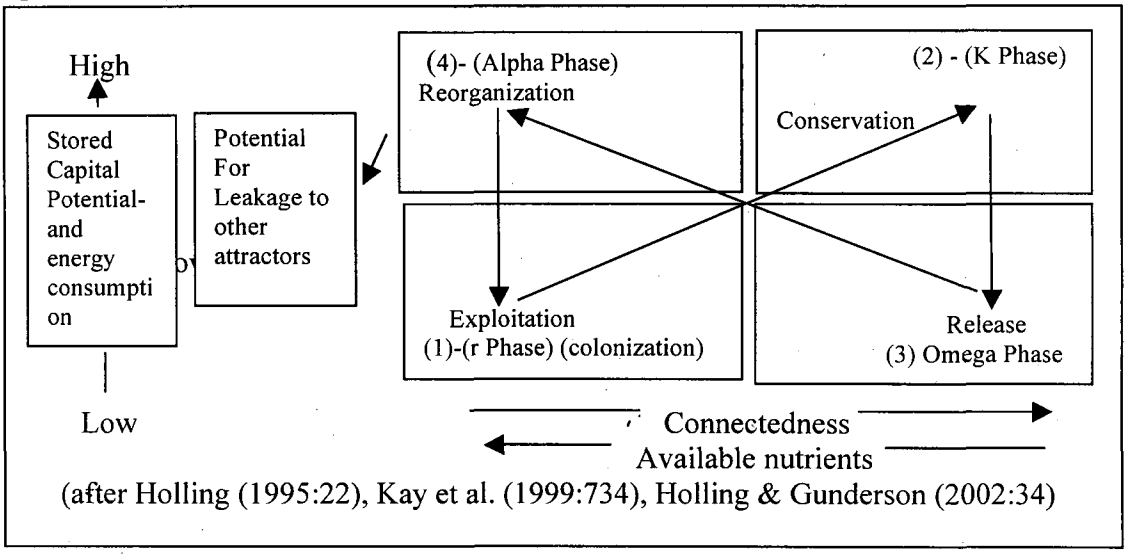
Naturally existing abiotic and biotic variations from ecoregion to ecoregion influence the types of species which become assembled through ecological self-organization into ecological communities. This is reflected in the ecological communities' species composition of Southern Ontario's two ecoregions, which are 6E, Hurontario (typically mixed coniferous and deciduous) and 7E, Erie (typically more deciduous, fewer coniferous, and a strong presence of Carolinian species (McKnight 1992, Lee et al. 1998, Detenbeck et al. 1999, The Nature Conservancy 2000).

In addition to the plant ecological communities and the ground fauna species that are directly associated with small protected areas' ecological communities, there is a wildlife component, which also has to adapt to the patchiness that is associated with island type ecology. As the biophysical and geophysical attributes of the small protected areas provide habitat for the ecological self-organized communities, so the self-organizing ecological communities, in their physical form, become the habitats for native wildlife species, which, by their presence, have influence on and are part of their ecosystem. Wildlife plays a particularly valuable function in small protected area biodiversity through wildlife's capacity as both short-distance and longer-distance seed dispersal agents (Bolen & Robinson 1995).

Ecological communities are composed of living organisms in the form of populations of various types of plant and animal species whose species-specific lifecycles (birth, maturity, death, regeneration) vary in accordance with the species' particular fast or slow life-cycling temporal scales.

Holling in his (1994, 1995) analysis of ecosystem functions within the four phase adaptive cycle illustrates the natural succession processes. Briefly, phase 1, the r phase of the adaptive cycle represents a renewal timeframe in which exploitation by "r" type pioneer species, aggressive colonizers, dominate in the exploitation of the space in an available niche. As the community evolves, it adds "K" type species, settles into the K phase, consumes more energy, accumulates natural capital, and becomes more static; the prime ecosystem function becomes that of natural capital accumulation and conservation.

Figure 1 – Ecosystem functions within Holling's adaptive cycle



(after Holling (1995:22), Kay et al. (1999:734), Holling & Gunderson (2002:34)

The K phase is a period in which slow acting variables are at work. System connectedness is high, and "K" species, the type of species that thrive in systems that are near carrying capacity, are dominant. Natural capital accumulates, and there is a high state of equilibrium. But system resilience decreases and the system becomes an accident waiting to happen. Some form of fast acting variable such as disease, pest infestation, fire, or harvesting is usually at hand to trigger release of the ecological community's stored natural capital and the nutrients that are embedded in it into the Omega (end)

phase, except in the case of harvesting, in which case the natural capital is removed from the system.

In the Omega phase the ecosystem function conveys the released natural capital and nutrients embedded therein to the Alpha (beginning) phase. The ecosystem function in the alpha phase is the reorganization of the released natural capital and nutrients and making them available for reintroduction into the Exploitation (r) phase. The alpha phase is a highly unstable phase. There is potential for the leakage of natural capital to other attractors. The quality of natural capital passed on to the r phase, from the Alpha phase, plays a determining factor in whether the renewal process will be the starting (regeneration) point from which an ecosystem evolves that has the same or nearly similar level of equilibrium state that the previous ecosystem had, or if it will flip to an ecosystem of lower level equilibrium state, e g, from a forest ecological community state of equilibrium to a scrub ecological community state of equilibrium (Holling 1995, Kay et al. 1999, Holling and Gunderson 2002).

Therefore, an ecological community, as an ecological self-organizing assembly, undergoes natural succession processes, and more complex dynamics, as a consequence of which its its biodiversity composition becomes re-composed in accordance with the types of species that dominate during the different phases, or transition periods between phases, of an ecological community's natural succession.

Thus, since an ecological community's species composition (its biodiversity composition) naturally varies during the various stages of natural succession, and since biodiversity is essential to ecological integrity, persistent variation in the types of species within an ecological community, which are appropriate, by a number of criteria, to

ecological community type and to the stage of natural succession that an ecological community is in, rather than a persistent high species count of a random selection of species within the ecological community, more accurately indicates ecological integrity (Western 1989, Meffe & Carroll 1997, Meffe et al. 2002). Also, since as stated by Meffe & Carroll (1997:353) "even small management areas contain hundreds of thousands of species interacting in a near infinity of ways", a sample of selected species, regardless of the sample selection criteria, can only represent a small portion of the various species within an ecological community's species guild. Appendix 7 provides a sample of the species that exist within the relatively small geographical areas of the in-depth case studies of this thesis.

Considered critical to the long-term sustainability of ecological communities are a necessary level of biodiversity, long-term availability of life-supporting abiotic proceses and systems, and sustained long-term natural ecological processes within the ecological systems in which the ecological communities reside and from which they obtain their sustenance. These are often a prerequisite for a high level of resistance to perturbation, along with the ability (resilience) to return to a state of equilibrium after perturbation, which may not necessarily be the exact pre-perturbation state of equilibrium (Holling 1995, Parker & Pickett 1997, Levin 1999, Holling & Gunderson 2002).

While within an ecological community species diversity is readily observable, providing insight into an ecological community's biodiversity and its structure, the functional aspects of biodiversity remain only vaguely defined (Martinez 1996). However, there is recognition that biodiversity has an influence on the interactions between organisms and ecological processes, such as between material and energy flow

through. There is also recognition that in a diverse ecological self-organizing assembly of species, the whole is greater than the sum of its parts. System robustness and enhanced resilience to perturbation are attributed to these biodiversity functions (Hollick 1993, Martinez 1996, Kay et al. 1999, Levin 1999).

Though it has been acknowledged that bigger is better (Noss 1987, Saunders et al. 1991, Primack 2002), small protected areas, which have one or more ecological communities that are large enough to have a natural disturbance regime (Noss 1987), and though existing within human dominated landscapes, are capable of producing environmental benefits (or natural capital) in proportions to their spatial areas, biophysical and geophysical conditions, and degree of their isolation. Interconnecting natural corridors or expansive greenways can, in many cases, greatly increase natural capital. On the negative side, corridors may provide easy access pathways for unwanted exotic invading species, pest infestation, and disease vectors (Baschak & Brown 1995, Niemela 1999, Miller & Hobbs 2002). The available natural capital directly benefits the environment and either directly or indirectly benefits culture (Quayle 1995, Fabos 1995, Hoover & Shannon 1995, Miller & Hobbs 2002).

The natural capital which benefits species and ecosystems and in the long-term humans, stems from such as natural soil formation, soil conservation, water infiltration and water conservation, waterborne pollutant buffering, airborne pollutant abatement, microclimate modification, and ecological stability as a result of vegetative ground cover. The biological parts of the system (plants and animals) benefit, for example, through the provision of habitat niches, and from the seed stores of indigenous species' seed, which are the seed sources required for the perpetuation of native plant and animal species.

Wildlife benefits from protection for seasonal propagation, from predator protection, and from a source of prey. Although isolation restricts species migration, biodiversity, natural selection opportunities, and evolutionary processes, due to long periods of isolation, some of the small protected areas may contain very pure strains of one or a few native species, from which a small number may be procured for ecological restoration elsewhere. There is also the possibility that, at least one or a few of the small protected areas' indigenous species may contain as yet unknown qualities which may be valuable to medicine or agriculture (Begon et al. 1986, Campbell & Campbell 1994, Harris et al. 1996, Wittaker 1998, Primak 2000).

The benefits to humans of the small protected areas' natural capital are more specifically detailed under the Socioeconomic/Cultural Context of Small Protected Areas sub-heading. The degree to which humans value the benefits of small protected area natural capital, to both nature and to humans, in all likelihood determines the effort to which humans will go to conserve them.

The Socioeconomic/Cultural Context of Small Protected Areas

The protected area review literature that relates to the socioeconomic/cultural component was selected on the basis of being relevant to: 1) how, during the European/Canadian settlement period, Southern Ontario's greater socioeconomic/cultural component has contributed to bringing about the current existing protected area situation, 2) the socioeconomic/cultural component, as an integral part of the greater Southern Ontario ecosystem, has the right to benefit from the protected areas' natural capital, within their natural long-term sustainable ecological carrying capacity, and 3) the socioeconomic/cultural component, as an integral part of the ecosystem within which it

exists has the responsibility for providing the protected areas with appropriate conservation stewardship.

The broad spectrum of cultural issues, such as private land ownership, stakeholder issues, access for recreational opportunities, that are commonly associated with protected area management are by nature site specific and must be evaluated as such, and adaptively integrated into the management mix.

The current situation

After approximately two centuries of Euro-Canadian settlement, socioeconomic/cultural development, and extensive natural ecosystem fragmentation, Southern Ontario's well-developed socioeconomic/cultural system, along with its cultural entities, and the remaining natural patches of its fragmented natural ecosystem are experiencing a co-dependent type of existence. An existence wherein sustaining the long-term existence of the protected areas, in combination with sustaining the long-term fulfillment of the socioeconomic/cultural component's innate affinity with nature, and its appreciation for the values which nature's natural capital brings to human life, now largely depends on the application of appropriate conservation management measures by the socioeconomic/cultural component. From the 1940s onward the socioeconomic/cultural component has brought many of the remaining natural patches under some form of protective conservation management. The likely reason for according protected area status to many of the small natural patches is the realization of the likely dire consequences of not reacting to their prevailing situations, and the prevailing situation of the greater ecosystem (Richardson 1974, Yu & Veale 1994).

The small protected areas' co-dependent existence is as a result of their fragmented geophysical and biophysical conditions, isolation, environmental stresses being exerted on them from surrounding environmentally unfriendly landuses, and from cultural intrusions directly into the small protected areas. Southern Ontario's continuing increase in human population, particularly in and around its cities and major towns is bound to add urban type development, and along with that, increased stakeholder demands for such as increased recreation opportunities. Many of the protected areas have also been confined within arbitrarily set borders that have no basis in natural ecological processes. Therefore, their long-term sustainable ecological self-organizing integrity depends on cultural conservation management inputs (Saunders et al.1991, Mitchell & Shrubsole 1992, Yu & Veale 1994, Hoover & Shannon 1995, Ramsey & Whitelaw 1997, Merriam 2001, Schwartzel & Miller 2001).

The socioeconomic/cultural benefits of protected area natural capital

The benefits to society of the small protected areas' natural capital are wide ranging. They include easy access to local natural areas and opportunities for living in or near natural areas, which humans prefer, and which makes lands, so located, more valuable. Protected areas that have, within certain limits, the ecological carrying capacity provide opportunities for participation in passive recreation activities such as appreciation of the aesthetic values of nature, scenic trail walking and skiing, canoeing, picnicking, sport fishing, birding, and swimming. Small natural areas are easily accessed, excellent places for the personal discovery of, and learning about nature, or for more formally learning about nature in areas where education facilities exist. Some humans simply visit natural areas for gaining physical and spiritual renewal. Established community trails and greenways of greater length, which interconnect other natural areas and small protected

areas, attract individuals who engage in walking, jogging, and cycling for greater distances. Some canoeists prefer still water, like small lakes, others are drawn to the excitement of rapidly flowing water and its natural challenges. Those small protected areas in which a more robust ecological carrying capacity exists, may permit more physically active types of sports participation, like field games and organized sports. Motorized recreation vehicles are not usually considered compatible with the environment of protected areas. Natural areas in which the natural geophysical and biophysical processes are being severely impeded by cultural landuses such as summer cottages and full season camping are here not considered to be managed as protected areas.

In a very few particularly special cases there may be financial gains to be accessed by tapping into some form of ecotourism. It can be speculated that protected areas, which have been isolated for long periods of time may actually contain one or a small number of species that are of species-specific purity, of which their value to medicine or agriculture are unknown. In certain cases, small protected areas serve as places for conserving, or preserving as conditions warrant, cultural heritage and non-biological natural heritage in such forms as designated special biophysical features (ANSIs), and rare or endangered species, all of which are valued by society (Begon et al. 1986, Strahler & Strahler 1987, Bryant 1992, Franklin 1993, Yu & Veale 1994, Hoover & Shannon 1995, Curthoys-Brown 1995, Fabos 1995, Bolen & Robinson 1995, Handel 1997, Noss 1997, Ramsay & Whitelaw 1997, Ontario Provincial Policy Statement 1997, Beak International Inc. 1999, Jalava et al. 2001, Merriam 2001, Scheffer et al. 2002).

Managing Small Protected Areas

The idea for providing, or perhaps more accurately, the realization of the need for providing protected conservation management stems from at least the 1920s and 1930s, when it became acknowledged that not taking remedial actions to change ongoing human activities would lead to negative environmental consequences that would be severely detrimental to nature's and society's wellbeing (Richardson 1974, Yu & Veale 1994).

There does not appear to have been some grand transforming vision. Instead, there appears to have been a slow transformation from humans seeing themselves as masters over nature, and the prime rightful benefactors of nature's endless bounty, to seeing themselves as integral parts of their ecosystems, with both natural capital rights and stewardship responsibilities (Watkins 1963, Vance 1970, Bryant 1992, Beak International Inc 1999, Scheffer at al. 2002).

A major provincial government initiative, in the 1940s and 1950s resulted in establishment, in accordance with the Ontario Conservation Act, of Southern Ontario's conservation authorities, the leading government conservation agencies at the river-basin level. Their founding principles and allotted powers do not specifically deal with protected area conservation management. However they did make considerable progress in protected area management until the mid-1990s. At that time, available resources for protected area management became scarce, and continue to be scarce. The conservation authorities do continue to provide protected area conservation management in some form or other as resources become available (Mitchell & Shrubsole 1992, Shrubsole1996)

Due to the large degree of private landownership in Southern Ontario, and although there don't appear to be any existing statistics, it may be assumed that at least a fair number of the numerous protected areas, which are located on private lands, are being

afforded protected conservation management, within the limits of the individual landowners' ability to bear the cost. During the selection process of the Chapter 4 protected area samples, it became apparent that there are numerous types of management agencies engaged in Southern Ontario protected area conservation management. A more recent entry into protected area management has been that of local co-management groups (Bryant 1992, Franklin 1993, Fabos 1995, Bolen et al. 1995, Ontario Provincial Policy Statement 1997, Ontario Conservation Act, Sections 28 & 29, Beak International Inc 1999, Scheffer at al. 2002, Curthoys 1998, 2002, Ontario Planning Act, Sect. 3, Plummer & Fitzgibbon 2004, Gutrich et al. 2005, Plummer 2006). Case study No.1 of this exercise involves a watershed project run by a co-management group.

Apart from the current prevailing small protected area situation, which places numerous stewardship responsibilities on the socioeconomic/cultural component, there is one which does not appear to have gained prominence among published literature. It has been a long standing tradition for societies to inform their citizens about the things which have a bearing on their lives, and in turn have the citizens pass the information on to others, in particular to succeeding generations. Therefore, the positive aspects of Southern Ontario's natural ecological component that are shared by its residents, or perhaps more profoundly, the negative aspects that would be shared by Southern Ontario's residents, if its natural ecological component were lost, is ample indication that the socioeconomic/cultural component's protected area stewardship responsibilities include, whenever ecological and cultural conditions make it possible, the utilization of the protected areas as places of learning about nature and about nature's importance to humans.

Small protected area management, like all conservation management, involves three separate components, and how the concerns of each component as well as how the combination of their concerns may be addressed at the appropriate scale of management. The three components are the ecological component, the socioeconomic/cultural component, and the institutional component, in this case the various types of on-site management agencies (Meffe & Carroll 1997, Hobbs 1998, Meffe et al. 2002).

While all aspects of small protected area conservation management are essential, the long-term continued viable existence of the small protected areas depends on the conservation, enhancement, or restoration, whatever the case may be, of their natural self-organizing ecological communities (forest, swamp, savannah, etc), and of the natural ecological processes of the ecological systems within which the ecological communities exist (terrestrial, wetland, aquatic, etc). Southern Ontario's small protected areas exist among a well developed socioeconomic/cultural system, whose socioeconomic/cultural component is an integral part of its ecosystem, with the right to benefit from the small protected areas' natural capital, within the long-term sustainable ecological carrying capacity. As well, the socioeconomic/cultural component and its organizations control the necessary social and monetary capital, which is required for carrying out conservation management. Therefore, the greater socioeconomic/cultural component has responsibility for a) developing and administering conservation management policies, based on a set of small protected area best management principles, which are aimed at sustaining, into the long-term, the small protected areas' self-organizing ecological communities, b) including within the management policies measures for assuring fair and equitable human access to the small protected areas' available natural capital, within the

long-term ecological carrying capacity, and c) establishing an institutional component (on-site management agencies) and providing them with the required resources for applying the on-site site small protected area conservation management strategies. Unfortunately, projections concerning the long-term sustainability of the ecological integrity of the natural self-organizing ecological communities, at small protected area spatial scales, appear to be less than encouraging (Saunders et al. 1991, Franklin 1993, Merriam 1999, Jalava et al. 2001).

However, the importance of Southern Ontario's small protected areas, to both nature and society, dictates that they be afforded conservation management in accordance with a set of Best Management principles. Despite the less than favorable projections, the fact that the ecological communities in Southern Ontario's small protected areas have managed to self-regenerate and survive, in a relatively natural state, through upward of two centuries of adverse conditions, bears evidence to their natural sustainability strengths, and provides a foundation upon which to build best management practices.

An Appropriate Conservation Management Approach

During recent decades, there have been a number of important knowledge based advances in conservation and park management understanding, e.g. that all abiotic, biotic, and cultural entities within a given geographical area are integral parts of an ecosystem and are integral to its conservation management, that there are observable characteristics of the physical composition of a self-organizing ecological community, which indicate the current state of its ecological self-organizing integrity, and which are the source from which to assemble the empirical evidence that is required for developing conservation management strategies (Franklin 1993, Begon et al.1986, Holling 1995, Lee et al 1998, Levin 1999, The Nature Conservancy 2000, Primack 2000, Meffe et al. 2002).

In parallel with these advances in understanding, the holistic ecosystem approach to environmental management has been developed, has gained acceptance, and has evolved into becoming a holistic, integrative, and adaptive approach to environmental management (Hollick 1993, Grumbine 1994, 1997, Parker and Pickett 1997, Mitchell 1997). The holistic, integrative and adaptive attributes of the ecosystem approach, unlike the attributes of the more traditional conservation management approach, which takes a top-down approach and focuses on selected species and single issues, has the capacity for adaptively integrating the abiotic, biotic and cultural management issues directly into the management mix (Grumbine 1994, 1997, Christenson et al. 1996, Mitchell 1997, Meffe & Carroll 1997, Meffe et al. 2002).

There appears to be more than one interpretation of the meaning of holistic, as it relates to an ecosystem approach to environmental management. Here it is taken to mean that all abiotic, biotic, and cultural entities of a given geographical area are an integral part of its ecosystem, and the concerns of them all are basic to its management, while upholding that management must be applied to the natural ecological self-organizing units of assembly as a whole, i.e. the ecological communities and ecological systems. In these systems, in which by their nature, biodiversity and slow and fast variables operating at multi-temporal and multi-spatial scales are prominent features, holistic is taken to mean having the capacity for integrating into the management mix those issues that can readily be perceived as having effects on the whole ecological communities and ecological systems. It isn't possible to examine every detail of every possible issue, and in all likelihood would be an exercise in unjustifiable expenditure of scarce management resources (Mitchell 1997), but it is desirable to adapt into the management mix, local

knowledge, stakeholder concerns within common reason, and professional inputs, as well as site-specific associated abiotic and cultural issues. Beyond this, having the capacity for adapting to a process of learning by doing and for profiting from doing so, and for adapting to advances in knowledge concerning natural processes, and, importantly, adapting to advanced and innovative management approaches, such as community-based co-management, is essential (Franklin 1993, Grumbine 1994, 1997, Holling 1995, Mitchell 1997, Meffe & Carroll 1997, Lee et al. 1998, Levin 1999, Primack 2000, The Nature Conservancy 2000, Meffe et al.2002, Holling & Gunderson 2002, Plummer & Fitzgibbon 2004, Plummer 2006).

Community Co-management

Community co-management is a relatively recent innovation in small protected area conservation management. It may have potential for becoming common practice. It has been applied to such as conserving the natural features of sections of river valleys, a natural coastal area, and a Canyon Preserve (Curthoys-Brown 1995, Curthoys 2002, Margerum & Whithall 2004, Gurtrich et al 2005, Plummer & Fitzgibbon 2004, 2006,). Such a collaborative community co-management approach is being employed in one of the selected case studies included in this exercise. The following is a basic outline of what is entailed in such a collaborative program for it to succeed.

> (1) agreeing on a common purpose; (2) ensuring the process is both inclusive and transparent; (3) allowing the participants to design the process; (4) promoting joint fact finding and creative problem solving; (5) insisting on accountability; (6) developing an action plan; and (7) developing collaborative leadership (Margerum & Whitall 2004: 407; quoting Wondolleck & Yaffe 2000; McKinney 2001).

An account of an evaluation of the 1999-2005 field experiences of a partner of the co-management group that manages case study No. 1 of this exercise, the Maitland

Watershed Partnerships (MWPs), which is a co-management group engaged in the management of the terrestrial and water entities of the Maitland River Watershed, lists the following ten learned lessons:

1) Define both Technical and Collaborative Management Targets.
2) Integrate Different Types of Knowledge.
3) Develop Collaborative Advantage.
4) Build Inter-organizational Leadership.
5) Clarify Ownership of Actions.
6) Design a Communication Strategy.
7) Address the Differences between Outputs and Outcomes.
8) Negotiate Indicators for Evaluation among Stakeholders.
9) Consider the Individual and Organizational Levels of Social Outcomes.
10) Consider the Spatial Scale for Ecological Outcomes (Ferreyra & Beard 2007: 283-291).

The watershed wide operations of MWPs are an indication of the possible broad scope within which co-management can and does operate. The potential of the application of such a collaborative approach should not be underestimated. However, the GRCA (1995) annual report lists fifty-six small protected areas that come directly under its management. In all likelihood, within the Grand River Watershed alone, there are in existence similar or even greater numbers of small protected areas under the management of other organizations and private landowners. Thus when taking into consideration all of the watersheds in Southern Ontario, the number of small protected areas is almost certain to exceed the most optimistic number of community co-management groups, in their present day form, that could be assembled. However, the geographical scale at which co-management groups can operate makes it possible for them to take on the management of a number of small protected areas that are located within a fairly expansive local geographical area. It is also essential for the managers of those small protected areas, which fall outside of any co-management arrangement, to have available

to them the means for applying appropriate holistic conservation management, as it is described above.

Ecological Community Enhancement and Restoration

On occasion, when managing for conserving the natural self-organizing integrity of a small protected area's ecological communities and the natural ecological processes of its ecological system, it becomes necessary to manage for the purpose of enhancing or restoring their ecological self-organizing integrity. In such a case, it comes at a high cost to management's operating resources, which are most likely limited. The cost is particularly high when soil nutrient replenishment, wetlands restoration, or stream corridor restoration are involved. A shortage of conservation management resources is likely, in some cases, to lead to decisions which may defer to less than best management practice options in implementing one or more of the following which Bradshaw (1997:7-8) identifies: "remediation" implying to remedy, i. e. to make good, whereby the process receives more emphasis than the endpoint; "reclamation", which does not imply returning to a previous proper state, but rather to restore in a way that may involves substitution and results in something roughly similar to, but not exactly the same as, what was the former natural state; "enhancement" implying making something better that is already good: and "mitigation" implying to modify unsatisfactory processes, which may result in the development of a different type of system in the end than what had been intended. Whatever option may be brought into play, to be efficacious, the focus must be on the ecological communities and ecological systems as a whole (Moffat & Buckley 1995, Spencer 1995, Harris et al. 1996, Bradshaw 1997, Gilbert & Anderson 1998, Detenbeck et al.1999).

Establishing tree plantations has been the foremost Southern Ontario terrestrial restoration option during the past half century. Perhaps because of a combination of agricultural tradition and the idea that a certain type of human effort should produce a certain type of reward, some of what has been done in the area of terrestrial restoration has been the establishment of densely spaced monoculture or a limited selection of predominantly coniferous species, and not always native species, in tree plantations for the purpose of yielding a calculated type of marketable product. Unless follow up intermittent thinning is applied, such tree farming, as all agricultural type processes, lacks natural ecological self-organizing regeneration processes resulting in system collapse upon harvest. Since, the assumption is that the small protected areas are being conserved as relatively natural patches, which are representative of a former greater natural ecosystem, unless such tree plantations are being managed, which it appears that many of them are, in a manner by which incremental thinning encourages the regeneration of natural self-organizing ecological communities among the remaining plantation stock, the use of such densely stocked plantations appears to be inappropriate. Perhaps it would be more appropriate to imitate nature more closely by stocking plantations with a variety of randomly spaced native species and allowing natural ecological self-organizing processes free reign, which should, in the long-term, result in self-regenerating forest ecological communities, having a good level of biodiversity. Such plantations, along with selective harvesting, if producing marketable product is the incentive, would according to present day understanding of ecological structure, function, and spatiotemporal dynamics of forest ecology, in comparison with densely stocked plantations, yield equal value product (Allen & Hoekstra 1992, Strobl 1999). When stocking tree plantations with native

species, which in all likelihood means stocking with more highly valued, by humans, "K" type species, the r phase of Holling's (1995) natural succession adoptive cycle is effectively bypassed resulting in the advanced establishment of the more valued K phase. While the desired results are more quickly achieved there is a correspondingly extra expenditure of management resources (Lajeunesse et al. 1995).

Managing Wildlife

In other than perhaps the more northern reaches of the Hurontario ecoregion most of the larger wildlife mammalian species have pretty well become extirpated. The relative isolation of the natural vegetation patches places wildlife into conflict with cultural activities and with domestic animals. Wildlife Habitat Canada (Girt 1990) has been working on making the presence of wildlife compatible with cultural interests. Due to often complex and extensive wildlife habitat requirements, small protected area conservation management is more or less limited to managing for the provision of wildlife habitat, by managing for the continued self-organizing ecological integrity of the ecological communities, which provide wildlife habitat, and where possible establishing natural corridors between natural areas (Girt 1990, Jalava et al. 2001).

Conservation Agencies and Policies

In recognition of the need for conserving Southern Ontario's natural and cultural heritage (Richardson 1974, Yu & Veale 1994) provincial policies, administered by provincial government ministries, and various municipalities' bylaws, which are embedded in the municipalities' provincially approved Official Plans set the baseline standard for the conservation management of natural and cultural heritage (Ontario Planning Act Sect 3, Ontario Conservation Act Sections 28, 29, Ontario Provincial Policy

Statement 1997, Ontario Natural Heritage Reference Manual 1999). These acts are revised periodically. Undoubtedly due to the diversity that exists among the geophysical, biophysical and cultural associated diversities among Southern Ontario's protected areas, there are protected areas in which the baseline regulatory standards are too narrowly based. Therefore, the appropriate regulatory dictates of other types of regulatory bodies, such as the Ministry of the Environment for dealing with pollutant issues, The Clean Water Act for dealing with water quality issues, the Department of Fisheries and Oceans for dealing with fish habitat in navigable waters issues must be applied, for which consultants who engage in such matters most likely become involved.

With the exception of private landowners, various government and NGO conservation agencies, and community groups carry out the on-site small protected area conservation management. These various conservation agencies operate within their allotted powers, their stated mission, their organization's available resources, and with a certain degree of autonomy (Mitchell & Shrubsole 1992). Since Southern Ontario's protected area conservation management is being carried out by such a disparate array of conservation management agencies, and despite presently existing policies and bylaws, it is reasonable to assume that more efficacious conservation management could be achieved if all the agencies were working under the guidance of a uniform set of small protected area best management principles.

Small Protected Area Best Management Principles

This section outlines the development and identification of best management principles for small protected areas management. It begins by discussing the information base for principle development, and then discusses the ecological foundations in some detail.

The Information Base for Small Protected Area Best Management Principles

The information on which to base a set of small protected area best management principles is that contained in the review literature, which was selected for its relevance to the geophysical and biological aspects of protected areas, and their conservation management. Such a set of best management principles also forms the logical foundation for a framework for evaluating small protected area management practices.

Within the above literature review section there are indicators pointing to the importance of taking into account the following three themes in the development of a set good small protected area management principles:

1) the advances, during recent decades, in understanding of how natural ecological self-organizing processes work, particularly as they occur in limited spatial areas,
2) the development and general introduction of holistic, integrated approaches (e.g. an ecosystem approach) into conservation management, and
3) three basic components of conservation management, the ecological component, the socioeconomic/cultural component, and the institutional component,

Within the context of Southern Ontario small protected area conservation management, theme 1 concerns the ecological component, consisting of the small protected areas' various types of natural self-organizing ecological communities, about present day understanding of their form and function, and what is required for their long term sustainability, without the ecological communities having self-organizing integrity their protected area status would be meaningless (Begon et al. 1986, Noss 1987, Holling 1994, 1995, Parker & Pickett 1997, Mitchell 1997, Meffe & Carroll 1997, Handel 1997, Whittaker 1998, Lee et al. 1999, The Nature Conservancy 2000, Primack 2000, Meffe et al. 2002, Holling & Gunderson 2002).

Theme 2 concerns the advances made in understanding of natural ecological self-organizing processes and natural succession, in abiotic processes, and in the innate attachment, which humans have to the ecosystems in which they exist, and of which they are an integral part. It concerns the conservation management techniques, which have advanced in parallel with the advances in understanding, taking advantage thereof, and evolving into a holistic, integrative, and adaptive management approach with the capacity for managing the small protected areas' ecological component at the more holistic self-organizing ecological community level and adaptively integrating any associated abiotic and cultural issues directly into the management mix, attention is also drawn to the collaborative approach to small protected area conservation in the form of community based co-management (Hollick 1993, Grumbine 1994, 1997, Parker & Pickett 1997, Mitchell 1997, Meffe & Carroll 1997, Levin 1999, Holling & Gunderson 2002, Meffe et al. 2002, Margerum & Whitall 2004, Plummer 2006)

Theme 3 the literature recognizes three basic components to conservation management, the ecological, the socioeconomic/cultural, and the institutional, and that the concerns of each component, and the combination of their concerns are basic to conservation management (Meffe & Carroll 1997, Levin 1999, Scheffer et al. 2002, Miller & Hobbs 2002, Meffe et al 2002).

Thus, some management concerns, as is illustrated below, can be linked with the particular functions, which each of the three components fulfills within its ecosystem, in which the three components co-exist, and of which each of them is an integral part. However it can be assumed that among three such disparate components of the same ecosystem, not fully predictable intra-system inter-component relationships occur, as well

as among them and their ecosystem. The intra-system inter-relationships preclude associating some of the management issues solely with a particular one of the three management components. However, it may be assumed that each issue is more closely associated with a particular one of the components than with the other two. The principles must, of necessity, be compatible in accordance with which of the three basic conservation management components that the management practices can be more closely associated. Therefore, the best management principles, which are directly based on the literature review information, are arranged in accordance with the component with which each principle can more closely be associated (see Figure 2). The ecological component is in some ways the foundation of the other components and thus discussed in some detail next.

Ecological Foundations for the Principles

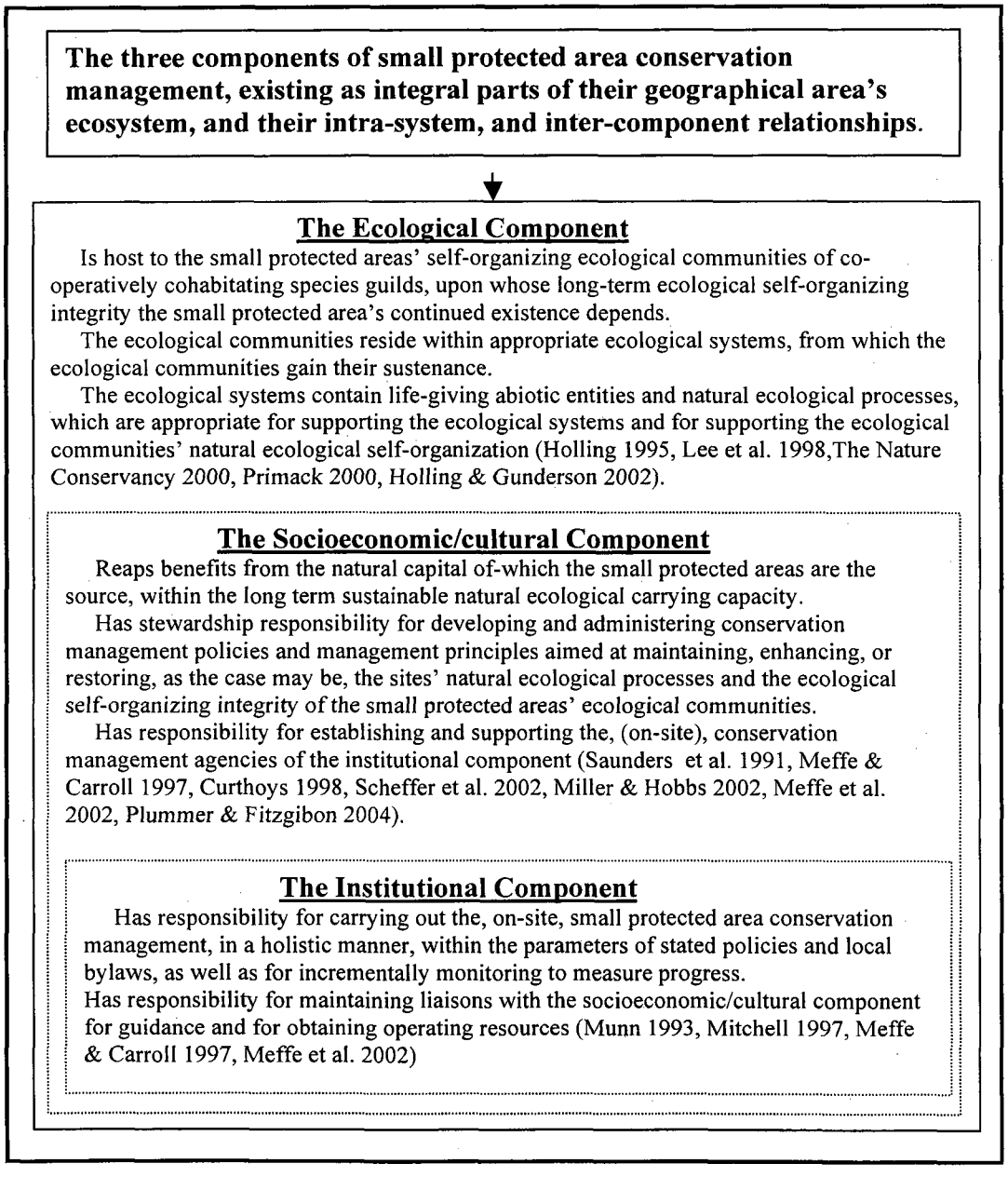
The following six small protected area ecological component characteristics derive from the Ecology and Ecosystem Science part of the literature review, and serve to inform the Best management Principles identified below.

1) A small protected areas' self-organizing ecological communities of co-operatively cohabitating plant and animal species guilds are the basic holistic units of ecological self-organizing assembly of its ecological component, and the long-term sustainability of its ecological component depends on the long-term self-organizing integrity of its ecological communities (Begon et al. 1986, Holling 1995, Handel 1997, Lee et al. 1998, Levin 1999, The Nature Conservancy 2000, Holling & Gunderson 2002).

2) In order to survive, a self-organizing ecological community requires, specific to its community type, an ecological system (terrestrial, wetland, etc) in which to reside, and

from which to obtain its sustenance. Thus, an ecological community's long-term persistence depends on the long-term availability of life-supporting abiotic attributes and

Figure 2 –Schematic of the Three Components of Conservation Management



natural ecological processes (Begon et al. 1986, Handel 1997, Lee et al. 1998, Detenbeck et al. 1999).

3) The long-term sustainability of a small protected area's ecological component depends on the long-term ecological self-organizing integrity of its ecological communities. As assemblies of living organisms, ecological communities experience natural succession processes (birth, maturity, death, and regeneration). An ecological community's species composition, its biodiversity, may be re-composed during the various phases of the natural succession cycle (Holling 1995, Kay et al. 1999, Holling & Gunderson 2002).

4) Biodiversity, availability of adequate life-supporting abiotic attributes and natural ecological processes, and resilience to perturbation are key indicators of ecological self-organizing integrity (Holling 1995, Parker & Pickett 1997, Levin 1999, Holling & Gunderson 2002). Biodiversity is readily gauged by observing the species composition within an ecological community. However, there is the matter of biodiversity being appropriate to its ecological community (Begon et al. 1986, Franklin 1993, Grumbine 1994, Lee et al 1998, The Nature Conservancy 2000), the ecological system that the ecological community is in (Lee et al. 1998, The Nature Conservancy 2000), the surrounding ecoregion (McKnight 1992, Detenbreck et al. 1999), the phase, or transition period between phases, of natural succession that it is in (Holling 1995, Kay et al. 1999, Holling & Gunderson 2002), and free from disease, pest infestation and/or natural or culturally caused perturbation which exceeds its natural ecological self-organizing resilience (Cairns 1998, Levin 1999, Primack 2000).

5) With respect to gauging the state of the life-supporting abiotic and ecological processes, the more common deficiencies, e.g., erosion, compacted soils, lack or excess of soil moisture content, and topographical anomalies are readily observable. The more difficult to gauge impediments, such as soil nutrient deficiencies, may require conducting tests (Press & Siever 1986, Strahler & Strahler 1987).

6) With respect to gauging ecological resilience, the readily observable common impediments to ecological resilience include lack of species diversity, and the presence of disease, pest infestation, invasive species, and undue naturally and culturally caused ecological disturbances (Saunders et al.1991, Munn 1993, Levin 1999).

These six characteristics are considered to be basic, essential elements in the understanding of and management of small protected areas' ecological component. These principles can be further synthesized into several guidelines by which to gauge the self-organizing ecological integrity of an ecological community in terms of physical and biodiversity condition:

1) Biodiversity: the self-organizing ecological community has a robust mix of species populations that are appropriate to: a) the particular type of ecological community, b) to the type of ecological system (terrestrial, wetlands, etc) in which the ecological community exists, c) the ecoregion in which the community exists, and d) the phase, or transition period between phases, of natural succession that the community is in.
2) Physical conditions: free from a) disease, b) pest infestation, c) from exotic invasive species, d) undue culturally and naturally caused perturbations, e) soil erosion, and f) environmentally unfriendly inputs from surrounding lands.

Outlining the Best Management Principles

This section outlines the principles for each of three components of small protected areas management: the ecological, socioeconomic/cultural, and institutional. The principles are phrased as necessary goals, actions, or approaches, and constitute an ideal set – unlikely to be found in their entirety anywhere. They are meant to be taken as a set, and to some degree at least are cumulative, i.e. later principles build on and modify earlier ones.

1) Ecological Component:

Management for the purposes of:

1a) conserving, enhancing, or restoring, as conditions require, the long-term self-organizing integrity of the small protected areas' natural self-organizing ecological communities of species guilds,

1b) applying any conservation management actions to the self-organizing ecological communities as a whole and not to a selection of species, or groups of species within the communities, except in cases when rare or endangered species are involved,

1d) giving consideration for how the ecological communities can provide adequate habitat for year-round native wildlife dwellers and for seasonal wildlife dwellers, e.g. neo-tropical birds, and

1e) taking advantage of any possible opportunities for expanding the small protected areas' ecological influence through establishing natural linkages, e.g. developing corridors to nearby natural areas, and tapping into any available metapopulations of native species, for increasing species movement and species dispersion, in order to improve biodiversity and the possibility of favorable natural evolutionary processes

(Holling1995, Bolen & Robinson 1995, Lee et al 1998, The Nature Conservancy 2000, Primack 2002, Holling & Gunderson 2002).

2) Socioeconomic/cultural component:

Providing and administering small protected area conservation management policies for the purposes of:

2a) providing convenient and equitable human access to the various forms of small protected area natural capital within the small protected areas' long-term natural ecological carrying capacity,

2b) providing appropriate conservation management for small protected area abiotic entities and natural ecological processes,

2c) providing and administering small protected area natural heritage and cultural heritage conservation management policies,

2d) providing nature education opportunities whenever protected area ecological conditions and cultural conditions make it possible, and

2e) co-operating with the institutional component by way of providing adequate technical support and conservation management operating resources for the various types of small protected area on-site management agencies, including local stewardship-conscious agencies, landowners, stakeholders, and local co-management groups (Meffe & Carroll 1997, Curthoys 1998, Sheffer et al. 2002, Miller & Hobbs 2002, Meffe et al. 2002, Shafer 2004).

3) Institutional component:

On-site management for the purposes of:

3a) carrying out the individual small protected areas' conservation management within the parameters of the socioeconomic/cultural component's policies and bylaws, in accordance with best management principles,

3b) applying conservation management in a holistic, integrative, and adaptive manner, through which abiotic, biotic and cultural issues are directly integrated into the management mix, instead of dealing separately with each individual abiotic issue, or dealing with the biotic issues at the species or selection of species levels or dealing with each socioeconomic/cultural issue separately, without regard for how the issues impact the entire small protected area.

3c) conducting incremental monitoring for evaluating conservation successes or failures and making on-site management strategy changes, if so indicated, and

3d) maintaining liaisons with the socioeconomic/cultural component for technical advice and technical assistance, and for obtaining operating resources. (Munn 1993, Grumbine 1994, Ramsey & Whitelaw 1997, Meffe & Carroll 1997, Mitchell 1997, Meffe et al. 2002).

On account of the nature of protected area conservation management being subjective rather than objective, there is no doubt that accepted approaches to conservation management have changed from time to time and will continue to do so, along with changes in the perceptions of various aspects of protected areas, and the appropriate approach to their management. Therefore, the set of best management principles, which is based on current published literature, will certainly require being revised in step with any new gains in acquired knowledge, which influences the commonly held perceptions, and most likely in line with possible shortcomings that are revealed through practical

testing of them. However, taking into account that Southern Ontario's protected areas are being managed by a variety of conservation management agencies having various missions, allotted powers, etc, it is likely that a more uniform approach to protected area management would result from the general adoption of such a set of best management principles

A Small Protected Area Conservation Management Evaluation Framework

On occasion, as is required key objective 3 of this research, conservation management policies and practices as they are applied to actual management cases need to be evaluated according to a standard set of criteria. Despite the non-static nature of protected area conservation management, referred to above, the individual principles of the above set of best management principles, can be transformed into a more specific set of criteria and sub-criteria with which to evaluate specific examples of conservation management. The following evaluation framework, like the principles above, is organized by the three components of conservation management identified earlier.

1) Ecological component criteria

Criteria	Sub-criteria
1A) the self-organizing integrity of the ecological communities, which are the basic units of ecological assembly upon which holistic small protected area conservation management focuses	a) maintaining natural ecological self-organizing integrity, or b) enhancing natural ecological self-organizing integrity, if required, or c) restoring natural ecological self-organizing integrity, if required.
1B) applying conservation management to the ecological communities in a holistic manner	a) applying management strategies to the ecological communities as a whole, b) providing special conservation or preservation measures for rare or endangered species.
1C) holistically applying enhancement or restoration, when enhancement or restoration are required	a) apply enhancement or restoration measures to the ecological communities in whole and not to selected species or single

1C)* when the plantation restoration option is employed	issues, and b) restock with native species only, preferably with native stock from the local ecoregion, c)* avoid stocking with monoculture or few species types, d)* stock with native species exclusively,
1D) Managing with consideration for how particular types of ecological communities can provide wildlife habitat, through encouraging the natural development of;	a) understorey native vegetative growth for providing shelter and brouse, b) internal and edge habitat to accommodate species with different lifestyle habits, c) unobstructed pathways within aquatic/terrestrial ecotones for species whose lifecycles alternate between inundation and desiccation d) constructing or enhancing aquatic-life habitat.
1E) taking advantage of any possible opportunities for expanding the small protected areas' ecological influences	a) developing natural corridors to other natural areas, b) tapping into nearby native species metapopulations.

References: Holling 1995, Bolen & Robinson 1995, Lee et al 1998, The Nature Conservancy 2000, Primack 2002, Holling & Gunderson 2002.

2) Socioeconomic/cultural component criteria

Criteria	Sub-criteria
2A) providing and administering management policies for giving convenient human access to small protected area natural capital, which is directly beneficial to humans, within the long-term natural ecological carrying capacity	a) opportunities for viewing, first hand nature's beauty, b) opportunities for gaining physical and mental regeneration, c) opportunities for participating in environmentally friendly recreation, d) providing ground rules, e) assuring visitor safety, f) other site-specific natural capital, g) access to education about nature.
2B) providing and administering management policies for the purpose of conserving, enhancing, or restoring abiotic attributes and natural ecological processes	a) water filtration, b) water infiltration, c) water conservation, d) natural soil formation, e) soil conservation, f) waterborne pollutant buffering, g) wetland protection, enhancement, or

	restoration, h) surface-water systems protection, enhancement, or restoration, i) erosion prevention or remediation,
2C) providing and administering management policies aimed at the long-term sustainability of the small protected areas ecological communities' self-organizing integrity	a) conserving, or b) enhancing, or c) restoring the ecological communities' ecological self-organizing integrity, d) establishing natural corridors and natural networks.
2D) the socioeconomic/cultural component's co-responsibilities with the institutional component	a) making available , to the institutional component, the small protected areas conservation management objectives, by way of plainly worded management policies, b) establishing working relationships with the various types of on-site management agencies, whether they are government agencies, private landowners, or local stewardship co-management groups, and c) providing adequate operating resources to the on-site management agencies, and taking actions on feedback from them.

References:Saunders et al. 1991, Meffe & Carroll 1997, Curthoys 1998, Sheffer et al. 2002, Miller & Hobbs, 2002, Meffe et al. 2002, Plummer & Fitzgibon 2004.

3) Institutional component criteria

Criteria	Sub-criteria
3A) responsibility for carrying out the on-site small protected areas' conservation management, in accordance with the socioeconomic/cultural component's policies, and best management principles	a) managing within the parameters of the socioeconomic/cultural component's stated policies and local bylaws, and b) managing according to a set of best management principles.
3B) in conjunction with 3a), applying management in a holistic, integrative, and adaptive manner	a) focusing management strategies on the various types of ecological communities, as the basic management units of natural ecological component, instead of focusing on a selection of species and on single issues, b) holistically integrating all abiotic and cultural issues directly into the management mix, c) involving stakeholders in the

	management process, d) adapting and integrating professional input, e) adapting and integrating local knowledge into the management process.
3C) Monitoring	a) monitoring for evaluating the ecological state of the various types of ecological communities of species guilds, with respect to each community's biodiversity appropriateness according to its particular type of ecological community, e g, forest, prairie, etc), the type of ecological system it is in, e.g., terrestrial, wetland, etc, the ecoregion it is in, the phase, or transition period between phases, of natural succession that it is in, and the absence of disease, pests, and ecological perturbations, b) monitoring for abnormal geophysical processes, e g, erosion, compaction, etc, c) monitoring for abnormal biophysical processes, e g, loss of biodiversity, etc., d) taking action on monitoring results for making adjustments to management strategies, if so indicated.
3D) maintaining liaisons with the socioeconomic/cultural component	a) for technical advice and assistance, b) for obtaining operating resources.

References: Munn 1993, Grumbine 1994, Holling 1995, Meffe & Carroll 1997, Mitchell 1997, Ransey & Whitelaw 1997, Meffe et al. 2002).

The following chapter applies these criteria to eleven case-studies through examination of policy and management plan documents.

Chapter 4 – Evaluation of Eleven Case Study Management Plans

This chapter consists of the evaluation of management policies and practices as they are set out in the existing management plans of a selected sample of eleven Southern Ontario protected areas, in accordance with the evaluation criteria and sub-criteria of the Chapter 3 evaluation framework. The selection includes the existing management plans of the in-depth Chapter 5 & 6 case studies. The sample protected areas were not randomly selected. They were selected on the basis that in combination with each other they would be generally representative of the wide ranging diversity which exists among Southern Ontario protected areas' geophysical and biological characteristics, their cultural associations, the particular valued features which they are being managed to conserve, among their rural versus urban influences, and among their on-site management agencies.

The dates of their existing plans range from the late 1970s to the early 2000s, which is the time period during which most of the currently held views about protected areas management were formulated (Begon et al. 1986, Holling 1994, 1995, Christensen et al. 1996, Mitchell 1997, Parker & Pickett 1997, Handel 1997, Lee et al. 1998, Cairne 1998, Levin 1999, Merriam 2001, Jalava et al. 2001, Holling & Gunderson 2002, Miller & Hobbs 2002). During the sample selection process it became apparent that numerous existing Southern Ontario Protected area management plans have passed their rewrite dates, including some of those that are included in the sample.

The selected protected areas are:

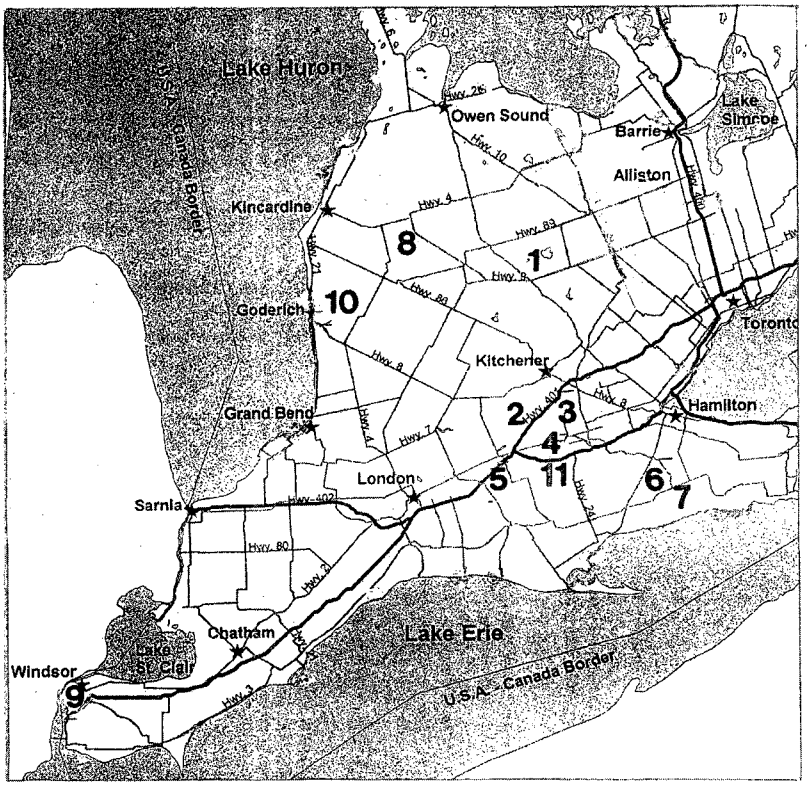
1- Damascus Conservation Area
2- Chesney Wilderness Area
3- Banister Lake Complex

4- Link Conservation Area
5- Cedar Creek Watershed Project (a GREEN initiative)
6- Taquanyah Conservation Area
7- Glennie Property
8- Jeffray Agro-ecological and Wildlife Farm
9- Ojibway Prairie
10- Lower Maitland River Project (Case Study No.1)
11- Apps' Mill Conservation Area (Case Study No. 2)

The locations of the eleven Southern Ontario sample protected areas are illustrated below. The brief description, in Appendix 1, of each sample protected area illustrates the wide ranging diversity among the sample properties, which is common to Southern Ontario's protected areas in general. The wide ranging disparities, and the fact that some of the sample plans have passed their rewrite dates presented some evaluation process challenges.

The wording of many of the sample plans strongly indicates that the plans were written to some set of standards other than those on which the Chapter 3 set of best management principles is based, and on which the evaluation framework's evaluation criteria and sub-criteria are based. Also, in most cases the plans are written in general terms, rather than in specific terms, leaving them open to more than one interpretation. Therefore, to deal with such an anomalous situation a three symbol evaluation code was used to signify the evaluation results for each particular sub-criterion of the evaluation framework. The "1" designation indicates that the written contents of the particular plan either directly address, or was interpreted as addressing, a particular evaluation sub-criterion in a positive way. The "0" designation indicates that the written contents of the plan either directly address, or was interpreted as addressing, a particular evaluation sub-criterion in a negative way.

Locations of the eleven sample protected areas



From Parks Ontario (not to scale)

Sample No.	Protected area name	Sample No.	Protected area Name
1	Damascus Conservation Area	8	Jefray Agro-ecological and Wildlife Farm
2	Chesney Wilderness Area	9	Ojibway Prairie
3	Banister Lake Complex	10	Lower Maitland River Project (Case Study N0.1)
4	Link Conservation Area	11	Apps' Mill Conservation Area (Case Study N0. 2)
5	Cedar Creek Sub-watershed		
6	Taquanyah Conservation Area		
7	Glennie Property		

Figure 3 – The Locations of the Eleven Sample Plans

The not applicable "N/A" designation was assigned when neither a "1", nor a "0" designation could be justified, based on an interpretation of the written contents of a plan. that is, the written contents of the plan did not indicate that the management practices, which a particular criterion evaluates, should or should not be fulfilled or that it was simply not applicable.

A copy of the completed evaluation framework form for each of the eleven sample protected areas' existing management plans is included in Appendix 2.

Summary of the Management Plan Evaluations

To facilitate the evaluation review process, a summary of results of application of the evaluation criteria and sub-criteria under each of the three conservation management components for the eleven cases, and as recorded in Appendix 2, are contained in the following sections and tables.

1) Ecological Component Criteria

Total by sub-criterion

Criteria	Sub-criteria	1	0	N/A
1A) The Plans' long-term scope for managing the ecological communities' long-term self-organizing integrity	a) management for their maintenance ----------	11		
	b) Management for their enhancement ----------	10		1
	c) management for their restoration ----------	9		2
1B) Holistic level of the approach to ecological community conservation management	a) conservation strategies based on whole communities ----------	9		2
	b) conservation management based on selected species----------		1	10
	c) provisions for preserving or conserving rare or endangered species ----------	3	1	7
1C) ecological community enhancement or restoration	a) (when required) whole ecological communities --	8	1	2
	b) a selection of species ----------	1	2	8
1D)managing with consideration for wildlife habitat within the ecological communities through	a) promoting understorey vegetative type growth ---	10		1
	b) conserving edge and internal habitat ----------	10		1
	c) maintaining easily navigable aquatic and terrestrial pathways for species that have alternating aquatic/terrestrial lifecycles----------	3		8
	d) enhancing or restoring aquatic wildlife habitat--	4		7
1E) establishing natural	a) establishment of natural corridors----------	6		5

interconnections	b) establishment of access to native populations-----	3		8

Results by Criterion and Plan:

		Sample Plan Numbers										
Criteria	Sub-criteria	1	2	3	4	5	6	7	8	9	10	11
1A)	a)	1	1	1	1	1	1	1	1	1	1	1
	b)	1	1	N/A	1	1	1	1	1	1	1	1
	c)	1	1	N/A	N/A	1	1	1	1	1	1	1
1B)	a)	N/A	1	1	N/A	1	1	1	1	1	1	1
	b)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	N/A
	c)	N/A	N/A	N/A	N/A	N/A	0	N/A	N/A	1	1	1
1C)	a)	1	N/A	N/A	1	1	1	1	1	0	1	1
	b)	N/A	N/A	N/A	N/A	0	N/A	N/A	N/A	1	0	N/A
1D)	a)	1	1	1	1	1	1	1	1	N/A	1	1
	b)	1	1	1	1	1	1	1	1	N/A	1	1
	c)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1	N/A	1	1
	d)	N/A	N/A	N/A	N/A	1	N/A	N/A	1	N/A	1	1
1E)	a)	1	N/A	1	N/A	1	N/A	1	1	N/A	1	N/A
	b)	1	N/A	1	N/A	N/A	N/A	N/A	N/A	N/A	1	N/A
Totals	(1)	8	6	6	5	9	7	8	10	6	12	10
	(0)					1	1			1	2	4
	(N/A)	6	8	8	9	4	6	6	4	7		

A review of the ecological component associated evaluation results distribution in the above illustration reveals a high number of N/A designations. A review of the descriptions in Appendix 1 of the sample properties and the goals for which they are being managed indicates that the limited number of protected area attributes for which samples 2 Chesney Wilderness Area, 3 Banister Lake Complex, 4 Link Conservation Area, 7 Glennie Property, and 9 Ojibway Prairie are being conserved and managed, accounts for much of this. Due to several of the sample plans being outdated there is no doubt, some of the excess (N/A) designations can be attributed to the improbability of obtaining fully credible results through an evaluation process, which evaluates the management policies and practises of plans that are based on the conservation management standards of an earlier time. This is especially so when the evaluation framework's criteria and sub-criteria are based on information that is representative of currently held perceptions about ecological processes, the socioeconomic/cultural

component's interactions with its ecosystems, and holistic conservation management of protected areas. By extension, some of the (1), and even more the (0), evaluations may also be suspect.

The range of diversity among their abiotic and, biotic entities, and cultural associations, as is illustrated in the Appendix 1 descriptions, of numbers 1 Damascus Conservation Area, 6 Taquanyah Conservation Area, and 11 Apps' Mill Conservation Area, place them into the class of complex, general purpose small protected areas. Though the reviewl dates of their management plans are overdue, it is reasonable to assume that, within the limits of probability, due to the earlier referred to anomalies, the evaluations as they are tabulated in the above tables produced reasonably credible results.

The sample plans 9 Ojibway Prairie, managed by Parks Ontario, and 10 Lower Maitland River project, managed by LMSG, which bear more recent dates than most of the other sample plans, contain some nomenclature that refers to the application of holistic management. For example, the stated goal of the Ojibway Prairie plan is "To preserve the integrity of the Ojibway Prairie tall grass prairie and oak savanna. It will be managed for the people of Ontario as a nature reserve, protected from the impacts of human activity" (Ojibway Prairie Park Management Plan, 2002:3). And the stated mission of LMSG is "to maintain and enhance the natural ecosystem of the Lower Maitland River Valley" (Strategic Watershed Plan for the Lower Maitland River Valley, 2002:4).

Thus, unlike the earlier dated species and single issues-focused plans, and in line with numerous recent authors (Mader 1985, Begon et al.1986, miller 1994, Holling 1994, 1995, Grumbine 1994, 1997, Parker and Picket 1997, Holling & Gunderson 2002), these

more recent plans give recognition of the protected area's natural self-organizing ecological communities, which act in the manner of ecosystem, and the basic unit of ecological assembly to which the holistic, integrative, and adaptive ecosystem management approach can be applied, along with the adaptive integration of any associated abiotic and cultural issues. This provides a strong indication that progress has been made toward the application of the holistic ecosystem management approach during the time span that is covered by the dates of the sample plans.

2) Socioeconomic/Cultural Component

		Total per sub-criterion		
Criteria	Sub-criteria	1	0	N/A
2A) management policies for cultural access to small protected area natural capital for:	a) viewing and benefiting from aesthetic values ---- b) gaining mental and physical renewal ---------- c) environmental friendly recreation ---------- d) ground rules for protecting the environment ------ e) hygienic facilities ---------- f) visitor safety measures ---------- g) other site specific natural capital, if yes specify -- h) provisions for nature education, if yes specify --	9 1 7 8 5 5 5 8	1 1 3 1	1 9 1 2 6 6 6 3
2B) management policies for conserving, enhancing, or restoring the abiotic attributes, and natural ecological processes	a) water filtration ---------- b) water infiltration ---------- c) water conservation ---------- d) natural soil formation ---------- e) soil conservation ---------- f) waterborne pollutant buffering ---------- g) wetland protection, enhancement, or restoration - h) Surface water systems protection, enhancement, or restoration ---------- i) erosion prevention or remediation ----------	10 10 10 10 10 9 9 8 7		1 1 1 1 1 2 2 3 4
2C) management policies for the ecological communities' long-term ecological self organizing integrity	a) conservation ---------- b) enhancement ---------- c) restoration ---------- d) establishing natural corridors and networks ------	11 11 8 7		 3 4
2D) policies for co-operating with the institutional component	a) Providing plainly worded management objectives---------- b) maintaining working relationships with on-site managing agency---------- c) providing institutional component with adequate operating resources----------	11 11 11		

Results by criterion and plan:

		Sample Plan Numbers										
Criteria	Sub-criteria	1	2	3	4	5	6	7	8	9	10	11
2A)	a)	1	1	2	2	2	2	2	N/A	1	1	1
	b)	N/A	N/A	N/A	N/A	N/A	N/A	0	N/A	N/A	1	N/A
	c)	1	0	1	0	1	1	0	N/A	1	1	1
	d)	1	1	1	N/A	N/A	1	0	1	1	1	1
	e)	1	N/A	1	N/A	N/A	1	N/A	1	N/A	N/A	1
	f)	1	1	1	N/A	N/A	1	N/A	N/A	N/A	N/A	1
	g)	N/A	N/A	N/A	1	1	N/A	N/A	N/A	1	1	1
	h)	1	N/A	1	1	1	1	N/A	N/A	1	1	1
2B)	a)	1	1	1	N/A	1	1	1	1	1	1	1
	b)	1	1	1	N/A	1	1	1	1	1	1	1
	c)	1	1	1	N/A	1	1	1	1	1	1	1
	d)	1	1	1	N/A	1	1	1	1	1	1	1
	e)	1	1	1	N/A	1	1	1	1	1	1	1
	f)	1	1	1	N/A	1	1	1	1	N/A	1	1
	g)	1	1	1	N/A	1	1	1	1	N/A	1	1
	h)	1	1	1	N/A	1	1	N/A	1	N/A	1	1
	i)	1	N/A	N/A	N/A	1	1	1	1	N/A	1	1
2C)	a)	1	1	1	1	1	1	1	1	1	1	1
	b)	1	1	1	1	1	1	1	1	1	1	1
	c)	1	N/A	N/A	N/A	1	1	1	1	1	1	1
	d)	1	N/A	1	N/A	1	1	1	1	N/A	1	N/A
2D)	a)	1	1	1	1	1	1	1	1	1	1	1
	b)	1	1	1	1	1	1	1	1	1	1	1
	c	1	1	1	1	1	1	1	1	1	1	1
Totals	(1)	22	16	20	8	20	22	15	18	16	22	22
	(0)		1		1			4				
	(N/A)	2	7	4	15	4	2	5	6	8	2	2

The disproportionate number of (N/A) and (0) designations for criterion 2A's sub-criteria, which deal primarily with policies about providing and controlling human access to the protected areas most likely reflects a time when the emphasis was directly aimed at the single purpose of conserving species. Also, the wording of most of the plans indicated that unlike the common practice whereby the greater socioeconomic/cultural component has full responsibility for providing appropriate conservation management policies, here it was just the various on-site management agencies, within the limits of any existing government policies and bylaws, that managed all three of the properties' conservation management components. Thus, the management policies in section 2, the socioeconomic/cultural component management policies are, in all likelihood, primarily a

reflection of the on-site management agencies' own management policies. Therefore, the particular on-site management agencies indirectly dictated the management policies, and it is to be expected that they would have had confidence that the on-site management practices would be carried out in accordance with the policies. (See section 3 for additional information).

3) Institutional Component

Criteria	Sub-criteria	Total per sub-criterion 1	0	N/A
3A) providing the on-site small protected area management in accordance with	a) existing policies and bylaws----------	11		
	b) according to best management principles--------	11		
	c) in cooperation with the socioeconomic/cultural component----------	11		
3B) applying management in a holistic, integrative, and adaptive manner	a) management focused on ecological communities as a whole, not on selected species and single issues	11		
	b) integtration of abiotic and cultural issues holistically----------	9		2
	c) integration of stakeholder issues----------	8		3
	d) integration of professional input----------	11		
	e) integration of local knowledge----------	8		3
3C) Monitoring for	a) ecological community self-organizing integrity--	11		
	b) geophysical conditions----------	9		2
	c) biological conditions----------	11		
	d) taking action, based on monitoring results---------	11		
3D) maintaining liaisons with the socioeconomic/cultural component for	a) obtaining technical assistance----------	10		1
	b) obtaining operating resources----------	10		1

Results by criterion and plan:

		Sample Plan Numbers										
Criteria	Sub-criteria	1	2	3	4	5	6	7	8	9	10	11
3A)	a)	1	1	1	1	1	1	1	1	1	1	1
	b)	1	1	1	1	1	1	1	1	1	1	1
	c)	1	1	1	1	1	1	1	1	1	1	1
3B)	a)	1	1	1	1	1	1	1	1	1	1	1
	b)	1	1	1	N/A	1	1	N/A	1	1	1	1
	c)	1	1	1	N/A	1	1	N/A	1	1	1	1
	d)	1	1	1	1	1	1	1	1	1	1	1
	e)	1	1	1	N/A	1	N/A	N/A	1	1	1	1
3C)	a)	1	1	1	1	1	1	1	1	1	1	1
	b)	1	1	1	N/A	1	1	N/A	1	1	1	1
	c)	1	1	1	1	1	1	1	1	1	1	1
	d)	1	1	1	1	1	1	1	1	1	1	1
3D)	a)	1	1	1	1	1	1	1	1	N/A	1	1
	b)	1	1	1	1	1	1	1	1	N/A	1	1
Totals	(1)	14	14	14	10	14	13	10	14	12	14	14

	(0)											
	(N/A)				4		1	4		2		

In this section it is primarily a matter of the manner in which the individual on-site management agencies carry out on-site management in order to fulfill the mandates of a particular sample plan. The high number of (1) designations that appear in the institutional component evaluation is likely, at least partly, attributable to the fact that the individual management agencies had the prime responsibility for all three sections of the conservation management process, and therefore, they would have had confidence that the resources for carrying out the dictates of the plans would be available.

The fact that a number of the sample plans have passed their review dates indicates otherwise. Personal visits to four of those sample properties, apart from the two case study properties, for which the plans have passed their review dates, all of which are under the direct management of a single management agency, revealed examples of ongoing management activity outcomes at all of them. For example, at site 1 Damascus Conservation Area the recreation area is being maintained. Most likely through a combination of natural processes and conservation management intervention, the flood control reservoir on the creek and the ecological component are in good condition. At sample 2 Chesney Wilderness Area the scenic trail and the lookout in the bog area have been maintained and the ecological component, particularly on the higher ground, appears healthy according to the Chapter 3 ecological integrity guidelines. At sample 3 Banister Lake Complex the public area was well groomed, the interpretive signage was in good condition, the trail showed signs of usage, there are indications that a small patch of prairie ecological community has undergone a controlled burn during recent years, and the wild bird breeding operation at Fairlake appears to be operating on a small scale. At

sample 6 Taquanyah Conservation Area the nature center is in good condition, its nature education programs are ongoing, and a former creek dam has been removed allowing the creek valley to return toward becoming a natural self-organizing creek valley ecological community.

Critical observations and conclusions

A number of the plans within the selected sample of eleven have surpassed their review dates which, as was discovered during the sample selection process, appears to be fairly common among Southern Ontario's existing protected area management plans. The plans with the earlier dates, in particular, were obviously written in accordance with protected area conservation standards other than those to which the Chapter 3 best protected area management principles were developed, and on which the evaluation criteria and sub-criteria of the evaluation framework are based.

Due to the many diversities that exist among the various aspects of the protected areas, no two of them are alike, and most likely no two of them are being managed for conserving the same valued protected area features, or for the same number of valued protected area features. Therefore, the management goals as they are stated in the Appendix 1 brief descriptions of the sample protected areas, indicate that the individual property management goals are aimed at conserving particular aspects of each area which the individual management agency deems to be of particular value to humans, and/or are essential for those particular entities perpetuation. Thus it is evident that the small protected areas are being managed in an individual protected area-management agency-centric manner.

Also a comparison of the differences in the manner in which the management strategies are directed among the various sample plans indicates that each of the various management agencies views the protected areas' geophysical and biological attributes, and in particular their cultural associations, as well as the appropriate approach to their conservation management in an agency-centric manner, which is reflected in the way its management strategies are directed. For example, the management strategies for the sample 5 Cedar Creek Watershed Project, under the management of Upper Thames Conservation Authority (UTCA), are indirectly aimed at area's ecological and socioeconomic/cultural entities in a reactive manner, based on the findings of an ongoing community driven monitoring program.

The management strategies for the sample 9 Ojibway Prairie, under the management of Parks Ontario, are shaped by MNR's 1994 Environmental Bill Of Rights (EBR), which aims: 1) to ensure the long-term health of ecosystems by protecting and conserving our valuable soils, aquatic resources, forest and wildlife resources as well as their biological foundations, 2) to ensure continuing availability of natural resources for the benefit of the people of Ontario, 3) to protect natural heritage and biological features of provincial significance, and 4) to protect human life, the resource base and physical property from the threats of forest fires, floods, and erosion (Ojibway Prairie Park Management Plan, 2002: 1).

The management strategies of the Lower Maitland River Project, under the management of LMSG, are directed as follows "Actions proposed in this Plan provide an opportunity for everyone with an interest in the environment to be involved in its

protection at a local level" (Strategic Watershed Plan for the Lower Maitland River Valley, 2002:2).

Due to such an array of protected area anomalies, evaluating the plans' management practices in accordance with the standards of the evaluation framework, which are based on the currently held perceptions about the various aspects of the protected areas and about their appropriate management, produced less than fully credible results. Apart from the anomalies it is necessary to question the appropriateness of a modern evaluation framework and the efficacy of its application, to much older plans.

The set of best management principles on which the framework's evaluation criteria and sub-criteria are based, are in turn based on the information that is contained in the Chapter 3 review literature, which was particularly selected for its relevance to currently held beliefs about the aspects of protected areas, and about their appropriate conservation management. Therefore the best management principles and the evaluation framework are well grounded in standards that are in accord with the currently held perceptions. Against that background, it is not out of the ordinary that the evaluation process yielded less than fully creditable outcomes for the older plans.

From a different point of view, applying the full range of the framework's evaluation criteria and sub-criteria, gives it the capacity for evaluating the management practices of complex general purpose protected areas, making the results if its application to the evaluation of the management practices of protected areas that are being managed for conserving one, or a small number of valued protected area features an exercise in redundancy or predictability. However, applying the holistic, integrative and adaptive ecosystem management approach in an integrative and adaptive manner, which takes into

account the particular existing situations of the property being managed, has become accepted practice (Hollick 1993, Grumbine 1994, 1997, Christensen et al. 1996, Mitchell 1997, Holling & Gunderson 2002). Thus the precedent exists for applying the best management principles and the evaluation framework's evaluation criteria and sub-criteria in a similar integrative and adaptive manner for dealing with whatever the situation happens to be.

In this case, and apart from any agency-centric traits, the underlying problem stems from outdated management plans and from management plans that were written to standards other than those on which the evaluation criteria and sub criteria are based. This brings to the fore: 1) Protected area conservation management, like all conservation management, is subjectively based on whatever the beliefs are of a given time, and changes with the changes in the beliefs. Therefore, the tools that are employed in conservation management, such as the good protected area management principles, and the evaluation criteria and sub-criteria of the evaluation framework, have to be reflective of the perceptions of a given time; 2) Many of the existing Southern Ontario protected areas' management plans are outdated, which indicates that they are either being managed according to the plans' outdated standards, or that the dictates of their existing plans are being ignored.

A limited amount of circumstantial evidence was gathered, which indicates that ongoing management intervention that is not covered by the four visited properties' existing management plans is taking place. Therefore, it can be speculated that: 1) whatever scarce conservation management resources do become available are being dedicated to dealing with issues as they arise over a greater geographical area instead of

to the proactive management of the individual protected areas, and 2) management agencies like GRCA, which manages the four of the sample protected areas that were included in the personal visits, and LMSG, which co-ordinates the co-operative management of the Lower Maitland River Valley, are shifting the conservation management focus away from the individual protected areas, and toward focusing conservation management on groups of protected areas. If so, it could indicate the beginning of a movement toward environmental management at a greater watershed level, which would of necessity entail the development of a watershed management plan of which LMSG's 2002 strategic plan, which involves a sizable stretch of river valley, is an example of applying conservation management at a greater watershed level.

Each of the numerous protected area anomalies, listed above, is bound to have some effect on the way that the individual protected areas are managed. The failure of keeping individual protected area management plans up-to-date does in turn fail in providing the protected area on-site management agencies with clear management directives, which are based on currently held perception about protected areas, and that are supported by currently appropriate official protected area conservation management policies. Thus, if the intent is to continue applying conservation management at the individual protected area level, it is imperative that the individual protected area management plans are kept up to date and in accordance with currently held perceptions about protected areas and their appropriate conservation management. The only protected area management constant, per Chapter 3, has been change. Ensuring management resources are expended in the best way under existing conditions and criteria likely requires adaptive changes to management policies and practices.

Chapter 5 – Case Study No. 1: The Lower Maitland Project

The geographic area of case study No 1 consists of the Lower Maitland River Valley between the Towns of Auburn and Goderich where the river discharges into Lake Huron in Huron County. It is not confined within specific delineating borders. It is referred to as the Lower Maitland Stewardship Project for the private and public lands of the Lower Maitland Valley. It is being co-managed by the Lower Maitland Stewardship Group (LMSG) in co-operation with the landowners and concerned stakeholders, in accordance with LMSG's 2002 Strategic Watershed Plan for the Lower Maitland River Valley.

LMSG had its beginning in 1998, under the organizational direction of a resource group consisting of representatives from the Maitland Valley Conservation Authority (MVCA), Ontario Ministry of Natural Resources (MNR), The University of Guelph, The Nature Conservancy of Canada, The Huron Stewardship Council, and the Huron County Planning and Development Department (Szczerbak 2000). Insight into the developmental formation, the administrative structure, and functions of such an organized co-management group can be gained by referring to Szczerbak (2000) and Plummer (2006).

In recognition of LMSG having been an early entrant into Southern Ontario protected area conservation management, this portion of the case study, in addition to the evaluation of the conservation management practices of its existing management plan, per Chapter 4 sample 10, and the participation of volunteers from its co-management group in the Chapter 7 interview process, involves an examination of the particular management adaptations that it employs for achieving the goals that LMSG has set for itself, as they are listed in its (2002) Strategic Watershed Plan for the Lower Maitland

River Valley. As well it also includes an account of the outcomes of a series of field observation exercises.

LMSG's Mission, Vision, and Values (key principles and goals) are outlined in its 2002 Strategic Watershed Plan for the Lower Maitland River Valley. The plan was developed and agreed upon by way of a process of research, professional inputs, and group investigation and discussion sessions during an approximately two year period (meetings and personal conversation with J. Wilson 2007 & J. Imhoff 2007). The plan was developed on the basis of adhering to the policies of the local municipalities' Councils, and of the Provincial Government as they are stated in an article by Szczerbak, University of Guelph (2000).

The local regulating policies include those that are embedded in the zoning bylaws, and the Official Plans of the Municipalities in which LMSG operates. These regulatory policies allow for non-intensive outdoor recreation uses, forestry and limited development on existing lots. The creation of new lots is not allowed, except where the policies do not rule out some small-scale development in locations where development already exists. Existing non-conforming landuses are grandfathered into the policies. The 1998 County of Huron Official Plan, in which Goderich and the involved townships are located, sets out the values and directions expressed by the community. Thus, its policies are aimed at maintaining and enhancing a healthy environment including the quality of the water and the air, and recognizing that the quality of life is dependent on a healthy ecosystem. The plan directs that an ecosystem approach to planning be followed. Planning decisions should take into account their effect on natural processes, cumulative effects, human health, etc. The Plan also directs that actions and decisions should

involve the community and be proactive, and that the environment should be protected and enhanced while pursuing economic opportunity (Strategic Watershed Plan for the Lower Maitland River Valley 2002).

On the provincial regulatory policies level, the plan is based on adherence to the Ontario Provincial Policy Statement (1996), under the authority of the Ontario Planning Act, re the Natural Heritage section, which states development is not permitted in wetlands and in habitats of endangered or threatened species. Development may be permitted in woodlands, valleylands, wildlife habitat, and areas of natural and scientific interest if it is demonstrated that that there will be no impact on the natural features or the ecological functions for which the area is identified. With advances in the understanding of the significance of the remaining natural areas and systems, greater onus is placed on municipalities or development interests to conduct environmental impact studies when proposals are being considered.

The plan's stated Mission, Vision, Values and Goals are as follows:

> **Mission**; "to maintain and enhance the natural ecosystem of the Lower Maitland River Valley."
>
> **Vision**: The long-term vision for the Lower Maitland River Valley is a healthy river system and valley which,
> sustains a natural ecosystem thriving on clean water and natural features and functions,
> supports limited human activities carried out with minimal impact; and
> is maintained by the co-operative efforts of the community; including lanadowners, users, and governments.
>
> **Values (Key Principles):**
> 1) We envision a community that enables owners to manage their land for the mutual benefits of themselves and the community
> 2) We believe that most landowners holding valley lands do so because they appreciate the beauty and the natural features of the valley and the adjoining landscape.
> 3) We believe that many non-landowners have an interest in actively

preserving and enhancing the valley's natural vitality.

4) We believe that landowners and non-landowners coming together as a community will assure the integrity of the valley for both their interests.

Goals;

1. to advocate responsible stewardship of resources by landowners and valley users through: encouraging a sense of community and cooperation among landowners and valley users through providing a forum for them to interact, share ideas and develop an understanding of each other's viewpoints, provision for information on natural features, their presence, status and management options, and
   provision for educational opportunities to learn about and develop an appreciation for the valley resources.
2. To encourage and direct research on natural features of the valley.
3. To profile existing protection measures, e.g. legislation, and encourage their appropriate enforcement.
4. To investigate other opportunities for protection measures, e.g. recommendations to regulators, special designations and learning about approaches taken in other areas.
5. To foster sustainable use of the valley and its resources (LMSG 2002: 4-5).

Unique among LMSG's management adaptations are the identification of the positive and negative aspects of the Lower Maitland Valley's nine key themes, which LMSG considers to be critical to the sustainability of its existing abiotic, biotic and cultural entities, and the delegation to appropriately qualified LMSG members and/or partners of the responsibility for carrying through on group determined, and strategically directed actions for dealing with the themes' specific positive and negative aspects.

The positive and negative aspects that are dealt with in the plan, under nine valley themes, are detailed in the following illustration.

LMSG Strategic Watershed PlanThemes

Theme 1: Agriculture	
Positive aspects	Negative aspects
If best management practices (BMPs) are adhered to: 1) Other forms of development are restricted.	If BMPs are not adhered to: Any or all eight of the positive aspects may be negatively impacted.

2) Additional fragmentation is prevented. 3) Water quality is protected. 4) Water is conserved. 5) Undue soil erosion is prevented. 6) Existing natural habitat is protected. 7) Clearing and drainage of natural areas is prevented. 8) Essential buffer zones are established and maintained.	
Theme 2: Development	
Positive aspects	Negative aspects
Properly managed development	Improperly managed development
1) It provides homes 2) It provides business opportunities 3) It provides recreation areas	1) Negatively impacts natural heritage 2) Negatively impacts natural environment processes 3) Cumulative effects of development negatively impacts the entire valley
Theme 3: Fish and wildlife habitat	
Positive aspects	Negative aspects
1) The river and river valley have significant areas of fish and wildlife habitat 2) There are opportunities for in season fishing 3) There are opportunities for in season hunting 4) There are opportunities for wildlife viewing	1) The fish and wildlife habitats are vulnerable to human activities and natural perturbations 2) There is need for greater habitat protection
Theme 4: Forest cover	
Positive aspects	Negative aspects
The existing above average forest cover: 1) Provides riverbank stability 2) Improves water quality 3) Provides wildlife habitat 4) Provides wildlife corridors 5) Provides forest product	1) Some existing fragile and marginal lands need to be reforested
Theme 5: Monitoring and Management	
Positive aspects	Negative aspects
In their present state, the geophysical and biophysical entities of the Lower Maitland River and River Valley are in above average condition	1) There is need for an ecological land classification (ELC) for determining the full extent of the existing development, for moving LMSG's ongoing progress forward 2) There is need for a monitoring

	regime by which to measure river valley change 3) There is need for a monitoring regime by which to measure the accomplishments of landowners and involved stakeholders
Theme 6: Other resources	
Positive aspects	Negative aspects
1) Availability of sand and gravel aggregates 2) Water is available for water taking	Aggregate and water taking need to be controlled within their long-term natural sustainability in order to conserve the natural state of the river and the river valley
Theme7: Recreation	
Positive aspects	Negative aspects
1) There are opportunities for participating in a variety of recreation activities 2) Landowners and stakeholders have taken a keen interest in the area's protection for the continued enjoyment of the Maitland for all of the community	1) Certain types of recreation activities negatively impact the environment 2) Certain types of recreation activities negatively impact other types of land uses 3) A recreation code of ethics is needed to minimize potential conflicts
Theme 8: Views and vistas	
Positive aspects	Negative aspects
The valley's scenic landscapes 1) add quality to the lives of the communities residents 2) are the prime reason for which people visit the area, and 3) the valley's high quality aesthetics are an indicator of a healthy river system	1) Vigilance is required for preventing any improper development, which would impact the valley's aesthetic values
Theme 9: Water and landscape (geomorphology/hydrology)	
Positive aspects	Negative aspects
1) Among Southern Ontario's river valleys, the Lower Maitland River Valley's landscapes are unique 2) The Lower Maitland river corridor is cut unusually deep into the bedrock 3) Its landforms are not readily altered by human activities	1) Human activities can negatively impact water quality and quantity 2) Continued water protection is fundamental to conserving the ecosystem's health

Compiled from information gleaned from LMSG's 2002 Strategic Watershed Plan for the Lower Maitland River Valley

The more conventional types of protected area management agencies operate as one of the three basic components of conservation management. As such they are cast into the role of dutifully, in liaison with the greater socioeconomic/cultural component, carrying out the dictates of a particular protected area's existing management plan. In contrast, LMSG, a co-management group, strategically directs delegated qualified members and/or partners to carry through on agreed actions for addressing the positive or negative aspects of the plan's nine valley themes that are detailed in the above table. A detailed outline of the agreed upon actions, delegation/responsibility, strategic directions, and themes involved is provided below. As the table shows, under the strategic directions heading, the delegated members and/or partners are directed toward informing their members, partners, and the entire community about theme specific issues, and the importance, to both nature and culture, of conserving the themes' entities (agriculture, forest, etc), with the purpose of motivating LMSG's membership, its various partners, private landowners, stakeholders, government agencies, and an undefined segment of the greater public, to work together on an ongoing basis toward achieving the LMSG's mission and its stated goals.

LMSG Strategic Directions, Actions, Themes, and Responsibilities

Strategic Directions	*Themes involved	Actions	Delegation/responsibility
Information and Education sub-heading.			
Public information and consultation process	Ag, Dev, F/W, For, Wat, Mon, Rec, Res.	Deliver a series of landowner, & interest group gatherings along the river valley	LMSG
Promotion and distribution of existing information	Ag, F/W, For, Wat,	Summarize the available information and resources	Partner HSC (Huron Stewardship Council)

materials	Rec, Res		
	"	Develop packages on specific topics for distribution (could be part of below communications	LMSG & available partners
	"	Periodic communication through mail and other means to maintain profile of LMSG and raise or maintain interest and awareness of natural heritage issues and topics by landowners and interest groups	LMSG
Develop educational and information items	"	Develop series of educational posters on natural heritage features (need to identify possible topics, number and cost,)	Partner (Jack Imhoff)
	"	Other information products that need to be developed (identify need and develop strategy to produce)	To be determined as needs are identified
Profile responsible stewardship activities, projects, etc.	"	Encourage local press to feature appropriate articles.	LMSG
	"	Access other opportunities such as the Ontario Stewardship Demonstration Catalogue, CWS awards, etc.	LMSG
	"	Develop an award and recognition system	LMSG
	"	Establish and profile demonstration sites to illustrate BMPs, e g, erosion, etc.)	LMSG
Encourage responsible management through educational opportunities, partnerships, etc.	For	Support Maitland Watershed Partnership's efforts toward promoting responsible forest management	Support partner MWP (Maitland Watershed Partnerships)
	"	Support local Woodlot Association efforts to promote responsible forest management	Support Partner [Woodlot Assoc.(OWA)]
	"	Look into delivering	

	"	workshops for forestry companies to encourage minimal impact logging Develop a code of practice to recommend during logging activities (use OWA code – distribute during communication activities)	" LMSG
Emphasize need for wildlife habitat protection and enhancement	F/W		LMSG & Partners
Emphasize significance of the valley in all activities	Ag, F/W, Dev, For, Rec, Wat, Mon, Res,		LMSG & Partners
Community Development sub-hdg.			
Continue with community based social and educational events along the river to continue to develop and maintain networking as well as a sense of community and cooperation among valley landowners and users	Ag, Dev, F/W, For, Wat, Mon, Rec, Res	Conduct several events per year (number, topic, location, speakers, etc. to be developed annually)	LMSG
	"	Sponsor or promote "Community Clean Up Days" or other community participation activities along the river	LMSG and available partners
Actively look for opportunities to work with other organizations or agencies having similar goals or interests	"	Identify potential partners and initiatives that may be appropriate	LMSG
	"	Investigate options, potential and benefits of designation (e g, Heritage River, Exceptional Waters. Etc.)	LMSG
Work with partners and local landowners to reduce potential for conflict and address land use conflicts	"	Options may include identifying needs for additional signage, dealing with issues like garbage etc.	LMSG & Partners

as they arise	"	Work with other interests to develop a code of ethics for addressing land uses, e g recreation, land management	LMSG
Restoration Sub-hdg			
Encourage reforestation and/or restoration of marginal lands	Ag, F/W, For, Wat, Rec, Res	Promote existing programs to landowners and interest groups	LMSG - part of communications efforts
	"	Investigate funding opportunities to support existing and new initiatives	LMSG
	F/W, For, Wat, Rec	Involve local groups and youths in annual tree planting days	LMSG & Partners (e.g. Ginn Creek Adopt a Creek initiative)
	F/W, For	Foster rescue of native woodland plants where disturbance is to occur	LMSG & Partners
Encouage maintenance and creation of buffer strips along the river	F/W, For, Wat, Rec	Same as above items?	LMSG &Partners
Influence Policy sub-hdg.			
Influence "Decision Making" through political processes (e g, Official Plans, Bylaws, management plans	Ag, Dev, F/W, For, Wat, Mon, Rec, Res	Input into Official Plan policies to encourage recognition and protection of natural heritage features and prevent excessive non-compatible development	LMSG & Partners
	"	Ensure Municipal Council members are provided opportunities to learn about the valley, its features and their role in protecting them	LMSG & Partners
	"	Foster an ecosystem approach to planning	Partners (Huron County)
	"	Influence content or development of bylaws (e g, Zoning Bylaws to ensure building is kept back from the river. Forest Conservation Bylaw to	LMSG & Partners

	"	maintain or enhance forest cover, etc.)	LMSG
	F/W, Wat	Input into the Master Plan for Falls Reserve	Partners (Huron County)
	"	Ensure new development addresses water quality issues	Partners (Huron County)
	"	Ensure adequate surface water management in residential settings and on agricultural lands	LMSG & Partners
		Check current regulations, monitor water taking	LMSG & Partners
Promote development of, or facilitate access to grants/incentives that promote responsible stewardship	Ag, F/W, For, Wat, Rec, Res		LMSG
Study/Research sub-hdg.			
Examine or research similar river based community efforts (case Studies)	Ag, Dev, F/W, For, Wat, Mon, Rec, Res	Investigate initiatives from other rivers	LMSG
	"	Obtain reports, study materials, web site information	LMSG
	"	Access speakers or have LMSG members attend events in other jurisdictions	LMSG & Partners
Assess carrying capacity of the valley	"	Determine environmentally acceptable level of recreation use	Partners (agencies)
	"	Level of acceptable use for other activities?	Partners (agencies)
Keep up-to-date on local natural environment / resource studies	"		LMSG & Partners

After LMSG's 2002 strategic management plan

*The theme abbreviations used in the above table are: Ag. = agriculture, Dev. = development, F/W. = fish & wildlife, For. = forest, Wat. = water & landscape, Mon. = Monitoring, Rec. = recreation, Res. = other resources.

The table illustrates in detail how LMSG'S conservation management practices are concentrated on: 1) the determination of appropriate actions for dealing with the positive and negative aspects of the nine key valley themes, 2) strategically directing the actions, under five sub-headings, toward addressing particular strategically directed elements of each action, 3) delegating the responsibility for carrying through on the particular action-elements to the appropriately qualified LMSG member(s) and/or partner(s). Unique to LMSG's management practices approach, which sets it apart from the more conventional types of protected area management agencies, are: 1) The geographical area that is under its management exceeds the spatial area of a single protected area, 2) It manages in a co-operative collaborative manner, actively involving the area's landowners and stakeholders in the entire management process, 3) The above table of actions, delegation of responsibility, involved themes, and strategic actions illustrates how its management practices deviate from those of the more conventional type of protected area conservation management agency. Whereas the more conventional agencies management practices' actions are strategically directed at maintaining, enhancing or restoring, as the case may be, the self-organizing integrity of a protected area's ecological communities and ecological systems, The actions of LMSG's management practices are strategically directed toward informing the area's citizens for the purpose of maintaining an informed public about the benefits to nature and to humans of the nine management themes, and therefore, the importance of maintaining, the themes' sustainability, on an ongoing basis,

being everyone's responsibility, and 4) LMSG does not have set timeframes for achieving definite management success milestones. It relies on the general community's well informed citizens to, in co-operation with the efforts of its members and partners, at some undefined time achieve the five stated objective elements of its management plan.

The field observation exercises

The objectives of the field observation exercises, within the general scope of such exercises, were: 1) gaining a general understanding of the study area's geophysical and biological entities, its natural biological component, and its cultural component, and 2) assembling observational data for the purpose of evaluating, in the context of the Chapter 3 framework, LMSG's management practices as they are outlined in its schedule of actions, delegation of responsibility, involved themes, and strategic directions. In order to gain more generally representative perceptions of the study area, one-day field observation exercises were conducted at sporadic intervals at different times during the 2006 and 2007 growing seasons. The dates of the field visits were not set according to a predetermined schedule. They were conducted approximately a week after sporadic intervals of heavier or lighter than average precipitation, and periods of hot and cool temperatures, in order to gain insight into the effects of local weather fluctuations on the area's ecological component.

The geophysical features

The orientation of the observed portion of the lower Maitland Valley is illustrated below in the general physiography of the Lower Maitland Watershed (Figure 4). From Auburn to the Holmesville area the river flows along the eastern side of the Wyoming Moraine, in a glacial spillway. From there, it flows in a northwesterly direction toward the Benmiller area, where it cuts through the moraine and continues in a westerly

direction toward Lake Huron at the northern limits of Goderich. The riverbed of the river's western leg, west of Benmiller, particularly beyond the Falls Reserve Conservation Area, which is an area of rapid post-glacial isostatic rebound, is deeply down-cut into the bedrock. Though, the river flows through a gorge type corridor along its western leg, the actual bankfull flow channel width appears to be wider than is typical for Southern Ontario Rivers that have comparable bankfull discharge volumes. Perhaps, the reason is that the energy which, in other Southern Ontario Rivers has gone into natural pool and riffle, and meander bend evolution, has been expended by the Lower Maitland, for thousands of years, in weathering of and wearing away of the river channel's bedrock. There are several small islands within the river channel at average flow rates. The creek beds of several of the small creeks that discharge into the river are cut down to, or nearly to, river level. In a number of locations, upstream from Benmiller, the river, also, flows directly on top of bedrock. The pool and riffle type river morphology, which is more common to Southern Ontario's rivers, is more evident along the eastern side of the moraine than it is farther downstream.

Despite the width of the channel, on a late July 2007 field trip, after a prolonged period of much below average rainfall, there appeared to be sufficient pool depth for maintaining an adequate aquatic life habitat. The flow volume over the riffles appeared to be sufficient for assimilating, into the stream flow, adequate dissolved oxygen content, and the water temperature, in the area of the moraine, appeared to be low enough for maintaining a moderately cold coldwater fish habitat. The consistent low water temperature in the area of the moraine is likely attributable to continuous groundwater migration from the moraine to the river.

The ecological component

Over most of it length, the Lower Maitland River Valley has good natural vegetation cover, as is illustrated in the Profile of the Lower Maitland Valley Distribution of Vegetation Types (Ecological Communities; Figure 4). With some limited exceptions, the illustration is a fairly accurate depiction of what actually exists. The in-stream aquatic life ecological community is not labeled in the illustration.

In general the valley's natural vegetation is typical Southern Ontario Hurontario 6E ecoregion mixed coniferous/deciduous with good understorey ground cover. An exception exists on the thin soils in the cliff areas, where the Eastern White Cedar species are considerably more dominant than the deciduous species. A small number of established coniferous tree plantations occupy what appear to have been former open spaces.

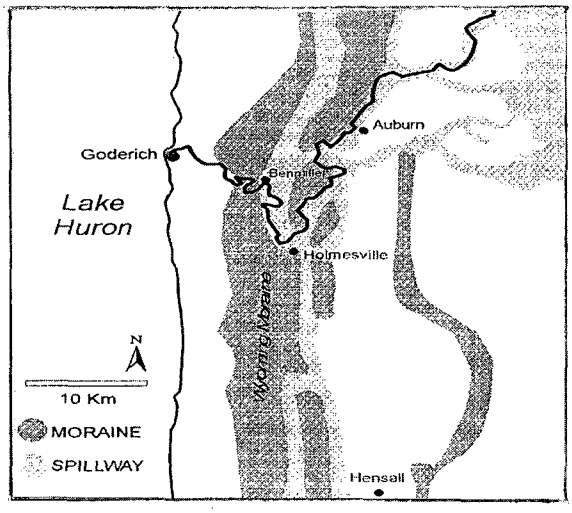
Field Observations Related to the Nine Valley Themes

Agriculture

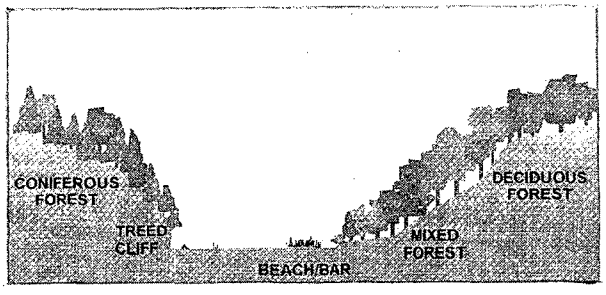
The high quality and variety of the domestic agricultural cereal grain and legume crops, and of the domestic agricultural livestock, were evident along the entire Lower Maitland Valley. That wide range in types of crops and healthy appearance of crops during the growing seasons, regardless of what was, at times, less than good growing weather, are an indication of good agricultural soils, and good farming practices.

Only a very limited number of locations were observed where there was a less than an adequate buffer zone between actively cultivated lands and the river.

General Physiography of the Lower Maitland Watershed



Profile of Lower Maitland Valley Showing Distribution of Vegetation Types (Ecological Communities)



(taken from LMSG 2009)

Figure 4 – General Physiology and VegetationTypes of the Lower Maitland Valley

On field visits in both 2006 and 2007 a few cases of green algae in the river were observed, which likely indicates that in limited cases land-based nutrients are entering the river.

Though, a shift toward larger individual farm units that consist of acreages that are not in a single block is not readily observable through this type of field observations, there are some indications of a shift to large farm units in some parts of Huron County. It is not readily evident in the Lower Maitland Valley area. Outward appearances indicate that the individual farm unit is sustainable.

Development

The existing, lower river valley, urban development and non-agricultural families' homes on individual land holdings are concentrated in the Auburn, Holmesville, Benmiller, Goderich, and, Saltford areas. Urban type development is essential for accommodating the continuing increase in the area's population. It is also essential that ongoing development be well planned in order to forestall undue environmental degradation. The continuation of valley's vibrant farming community likely helps to dampen any possible major urban type development ventures.

Fish and Wildlife Habitat

The good natural vegetation cover of the valley affords good habitat, protective shelter, and a travel corridor for terrestrial wildlife. The valley combined with a nearby Provincial Nature Reserve, the Morris Tract, form an impressively large, for Southwestern Ontario, wildlife-friendly area. Though the field notes make reference to only a single sighting of one doe and its fawn, it can most likely be attributed to the density of the understorey vegetation during the growing seasons. Wildlife droppings

and wildlife tracks were abundant, particularly upstream of the Holmesville area to a short distance south of Auburn. The better habitat for fish and other aquatic life forms appeared to be located along the eastern side of the moraine. Field notes for each field trip make reference to people fishing for Smallmouth Bass, in the area near Little Lakes Rd. The notes also record that eight of the people that were fishing offered a time of-day greeting, and indicated that the fish caught averaged seven to nine inches (approximately 18 to 23 cm), which is small for a mature fish of that species, an indication of overfishing, and an indication that fishing regulations may be required. It was somewhat unexpected that six of the eight, who identified themselves, stated that they were American citizens.

Forest Cover

In general, the valley profile, illustrated above, is an authentic illustration of the types of forest ecological communities and their orientation. An exception exists in a limited number of locations, where due to less severe gradients between the river elevation and that of the outlying higher lands, a limited number of agricultural landuses have been extended onto what appears to be the upper reaches of the long-term high-water floodplain. Reforestation in at least some of these locations would be a wise alternative to the agriculture option. A number of limited size relatively dense coniferous plantations do exist. The general lack of mature deciduous trees is an indication of lumbering having taken place in the past. It does appear that there is potential for selective hardwood timber harvesting on a small scale. According to the Chapter 3 guidelines for gauging self-organizing ecological community integrity, the forest ecological communities along with their high-grade understorey vegetative ecological communities are in a good state of ecological self-organizing integrity. They provide

excellent soil erosion protection on an erosion prone topography, good wildlife habitat, and potential for human life enhancing natural capital.

Monitoring and Management

Measuring monitoring and management achievements requires an evaluation of the progress made, within a given period of time, toward fulfilling certain predetermined objectives within a set timeframe, which is beyond the scope of this type of general field observation exercises. However, general field observation may be useful for observing and informing about existing conditions that need monitoring and management attention. For example, the lower Maitland River runs through, or alongside, a small number of urbanized areas. Therefore, it is essential that an up-to-date inventory exists of the lower valley's cultural developments in order to develop management strategies for controlling excessive culturally caused negative impacts on river's water quality, on various types of recreation opportunities, on fish and wildlife populations, and on the landscape in general.

Other Resources

Only two relatively small sites, where sand or gravel extraction is taking place, were observed. Neither one is located within a critical distance from the river. There do appear to be other potential aggregate extraction sites. Indication of past small-scale limestone quarrying exists along the eastern riverbank near the bridge at Little Lakes Rd. Experiences with aggregate extraction and quarrying in other Southern Ontario locations, e g the Niagara Escarpment, have demonstrated the necessity for enforcing environmental protection guidelines in areas of aggregate extraction.

Though the potential does exist, the field notes do not refer to having observed any active taking of river water for crop irrigation. Urban type developments, in particular

those located along the river, e.g. Benmiller, have the potential for relying on river water for many purposes, as well as the potential for excessive pollutant input.

Recreation

The Lower Maitland area provides a wide range of recreation opportunities. The Maitland Trail runs the full length of the river between Goderich and Auburn. It is located on the northern and western sides of the river. The trail is well marked and has posted signage at regular intervals, upon which are printed a code of conduct. The only observed code infractions were a small but noticeable number of lunch wrappers and refreshment cans litter, and one case of bank erosion, which appeared to have begun along the ruts left behind by an all terrain vehicle. A number of sightings of horseback riders, cyclists, trail hikers, and individuals fishing near Little Lakes Rd. indicate that the area's recreation opportunities are made use of and are valued by the general public. A few short conversations with a small number of the individuals that were fishing revealed that Smallmouth Bass averaging between seven and nine inches (approximately 18 to 23 cm) were the most common catch, which is small for that species, indicating a need for setting catch limits. The river along the east side of the moraine appears to be a good place for recreational canoeing and non-motorized row-boating. Such recreational activities were observed during four field visits.

The Reserve Falls Conservation Area, located on a peninsular shaped area of land within an extensive river inside meander bend, a short distance west of Benmiller, on the northern side of the river, is a fully equipped and serviced camping and outdoor recreation area. It has a 185 campsites capacity. It is serviced with potable water, electricity, and hygienic facilities. Though, it may contribute little if anything to conservation within the space that it occupies, it does fulfill a much needed and

appreciated recreation and nature experience purpose. It most likely also indirectly helps to ease the pressures which would otherwise be directed toward the establishment of private recreation and camping facilities along the banks of the Lower Maitland River, which possibly would be operated with less concern for the environment than is being adhered to by the conservation area's managing agency.

Views and Vistas

The relatively unaltered natural uniqueness of the of the Lower Maitland Valley's geomorphology, along with the extent and quality of the valley's natural vegetation are obviously unique among Southern Ontario river valleys. Such attributes indicate a healthy river system. They also add to the quality of the lives of the general area's residents. When observing the natural views and vistas of a particular geographical area's ecosystem, it is easy to overlook society's right to exist within it, to be an integral part of it, and to have stewardship responsibility for it. Society's stewardship responsibilities include both the making of positive contributions to its ecosystem's views and vistas, and for refraining from degrading them. Though, the views and vistas that are projected by society's constructs, in which society lives and around which it operates are unlike those of nature, if they are well planned, well designed, well constructed, and well maintained they blend well with nature, if poorly planned, poorly designed, poorly constructed, and poorly maintained they detract immeasurably from their surrounding natural views and vistas, which is a prime reason for enforcing controlled development.

It may be worth noting that those cultural constructs, which may be classified as cultural heritage, are important to individuals who have an interest in their society's local history, and are committed to its preservation. For the residents of the Lower Maitland Valley who have such interests, a good example of local cultural heritage exists in the

form of the cast iron truss type bridge that spans the river on Little Lakes Rd. It has endured beyond the cast iron period, through the period of the steel girder bridge and well into the period of steel reinforced concrete bridges. It stands as a good example of local 1800s engineered cultural heritage.

Water and Landscape

A visual observation of the Lower Maitland Valley's landscape captures a view of its unique river corridor, parts of which have been deeply down-cut into the bedrock, along with the picturesque mosaic that is projected by the valley's various types of natural self-organizing ecological communities of co-operatively cohabitating plant and animal species guilds, which, in accordance with specific habitation traits of their species guilds, have adapted to and persist within the various types of ecological systems that the valley's unique geomorphology and biophysical processes support. The natural stability of the valley's geological substrate is relatively resistant to many types of culturally caused alterations. However, due to its imperviousness it is also less resistant to the migration, toward the river, of culturally generated waterborne pollutants.

Analysis of LMSG's on-site management

This analysis of on-site management adaptations within the context of the Chapter 3 evaluation framework is based on the field assembled data. It recognises that LMSG's management practice adaptations, as illustrated in the above schedule of actions, delegation of responsibility, themes, and strategic directions, differs from the management practice adaptations of the more conventional protected area management agencies. They differ in the following four ways: 1) Its management actions are structured in the form of a series of initiatives, which are aimed at generating specific parcels of information, that are strategically directed under four strategic directions sub-

headings of Information and Education, Community Development, Restoration, and Influence Policy. 2) The strategic directions, under the four sub-headings, are not directly applied to the maintenance, enhancement, or restoration, as the case may be, of the management themes' abiotic, biotic, or cultural attributes, which is the more traditional manner of strategically directing the management actions. They are directed toward the development of an informed process, by which the actual management functions will be accomplished through the joint efforts of LMSG, its various partners, private landowners, involved stakeholders, government agencies, and an undefined segment of the general public. 3) Responsibility for carrying through on the various management actions and strategic directions is delegated to various LMSG members, or/and partners presumably on the basis of matching their qualifications with the specific management action and specific strategic direction. 4) The efforts of LMSG's members, its partners, and the voluntary efforts of the well informed community's residents at large are relied upon for achieving the goals of the plan, at some undefined future time.

Thus, analyzing the LMSG non-conventional adaptations of its on-site management practices, compared to those of the more conventional types of protected area management agencies, within the context of the outcomes of the Chapter 3 evaluation framework, as they are recorded for sample No. 10 case study No. 1 in Chapter 4, requires an adaptive analysis approach.

This approach takes into account: 1) The manner in which LMSG's management practices actions are strategically directed, per the above schedule of actions, delegation of responsibility, and the involved themes. 2) Although LMSG's approach does seem unconventional, the development of its actions and strategic directions schedule was a

group effort that took advantage of inputs from a variety of participants who could contribute diverse knowledge, based on experiences that have roots in a variety of disciplines, participants who could contribute local knowledge, and participants with interest in stakeholder issues and in conservation (personal conversation with Imhoff 2007, and with Wilson 2007).

Thus, the above schedule is based on a broad range of well informed knowledge, along with a measure of compromise, and as a consequence thereof, it is most likely a good vehicle by which the management actions were strategically directed toward each of the concerned themes, within the responsibility of the most qualified co-management members and/or partners.

Thus, the following analysis is based on how the on-site situation, as it is recorded in the above data, that was assembled during the on-site field observations, falls into line with LMSG's management plan's practices criteria and sub-criteria evaluations, as they are recorded in Chapter 4 for sample No. 10 case study No.1.

With regard to the Chapter 4 tabulations concerning the ecological component for LMSG, which deals with what is actually happening on the ground, an analysis of the above field assembled data indicates that the data is in concurrence with the tabulations, which indicates that the intent is that all of the on-site ecological component management practices be holistically applied to the ecological component's self-organizing ecological communities of co-operatively cohabitating plant and animal species guilds, and providing, within reasonable limits, wildlife habitat and accommodation for wildlife migration routes.

With regard to the Chapter 4 socioeconomic/cultural component tabulation outcomes for LMSG, an analysis of the field assembled data must take into account the role of private landownership. In the case of the more conventional types of protected area management agencies, within the limits of individual agency inherent autonomy (Mitchell & Shrubsole 1992), there is a fairly distinct separation between the duties of the greater socioeconomic/cultural component, which has responsibility for providing appropriate protected area management policies, and co-operative liaison with the institutional component, which is responsible for carrying out the on-site management duties. In LMSG's case, its community involved co-operative management approach, which along with adhering to any existing official policies and any municipal bylaws of the municipalities within which it operates, adheres to the dictates of its community agreed upon Mission Statement and its Vision, as they are detailed in its 2002 Management Plan as shown above. Because most of the Lower Maitland Valley lands are under private landownership, and because LMSG and landowners operate under a co-operative management arrangement, and even though LMSG's management policies have received community wide approval, private landownership rights, except for any existing land easement agreements as is the case with the valley's nature trail, mean that access to private lands remains at landowner discretion.

Thus, within the limits of landowner discretion, an analysis of the above field observations assembled data indicates that LMSG's policies are in concurrence with the Chapter 4 tabulations for the socioeconomic/cultural component regarding LMSG's policies providing for human access to protected area natural capital, for conserving enhancing or restoring abiotic attributes and natural ecological processes, for conserving,

enhancing or restoring ecological community natural self-organizing integrity, and for promoting co-operation between its socioeconomic/cultural component and its on-site management component.

Doing an analysis of the on-site management practices, within the context of the Chapter 3 evaluation framework, in comparison with Chapter 4 tabulations concerning the Institutional (on-site management) component evaluation outcomes for LMSG, dealing with how the on-site management component fulfills the dictates of the management plan, requires taking the following into consideration. LMSG, in line with the adaptation of its above management practices implementation schedule, does not strategically direct the management actions directly at fulfilling the on site management strategies, and doesn't set achievement timelines. Within those limits, an analysis of the above assembled field observations data indicates that it is in concurrence with the Chapter 4 tabulations with respect to providing on-site management in accordance with LMSG's management policies, according to best management principles, and in co-operation with its socioeconomic/cultural component, in complying with focusing management holistically on the self-organizing ecological communities, and integrating associated abiotic, and cultural issues into the management mix, as well as maintaining liaisons between its socioeconomic/cultural and institutional components. Because, the management actions are not strategically directed on a first hand application basis, and because there are no achievement timelines, the assembled field observation data do not provide for deducing an evaluation of achievements in accordance with predetermined achievement milestones. The data does indicate that ongoing monitoring of the various valley themes, in particular the development theme, is essential.

At this point in the undeterminable time period that may be required for achieving the goals of LMSG's mission, the field data indicates that the greater community's interest and involvement which this entails, gives LMSG the capacity for managing more extensive spatial areas than is the case with agencies that manage individual small protected areas. Also, the greater community's interest and involvement increases the potential for exerting greater influence, for the benefit of the environment and indirectly for the benefit of humans, on those who develop various types of government policies, such as recreation planners, natural resources extraction operators, private landowners, and stakeholders in general.

LMSG's decade of ongoing active co-management experience, whatever obstacles it may have had to overcome, has demonstrated that community driven co-management is a viable Southern Ontario protected area conservation management option. By actively operating as a viable co-management group for such an extended period of time, during this prolonged period of scarce availability of monetary and human resources, it has demonstrated that such a co-management organization with the constant backing of an interested and involved community has the capacity for undertaking, financing, and carrying through on sizable community-enhancing projects. To whatever degree it does or does not eventually achieve all of the five stated goals of its mission, it has demonstrated its community's confidence in community driven, bottom-up environmental management for the benefit of the community's greater ecosystem and its residents.

Chapter 6: Case Study No. 2: Apps Mill Conservation Area

Case study No. 2 consists of the 104.5 ha Apps' Mill Conservation Area, located a short distance west of the City of Brantford in Brant County. It came into the ownership and under the direct management of the Grand River Conservation Authority (GRCA) by way of the incremental assembly of nine separate parcels of land between 1967 and 1974 (GRCA 1979). This Chapter 6 portion of the case study, apart from the evaluation of the management practices of its existing management plan, per Chapter 4 sample 11, and the voluntary participation by GRCA representatives who are directly associated with the management of the Apps' Mill Conservation Area, in the Chapter 7 interview process, includes an examination of GRCA's Apps' Mill Conservation Area's conservation management adaptations, as well as a series of field observation exercises.

Plans, Policies, and Goals

When developing the Apps' Mill Conservation Area's (1979) management plan, GRCA, operating in accordance with the conservation authorities' allotted powers, per Sections 28 and 29 of the Ontario Conservation Act, adhered to the then existing regulations of the Township of Brantford's land zoning bylaws. Apparently, no County of Brant Official Plan existed at that time. Within the Township of Brantford's zoning bylaws the Apps' Mill Conservation Area lies within an area of hazard land, rural, and estate residential designations. This hazard land designation includes all lands having inherent environmental hazards such as poor drainage, organic soils, flood susceptibility, erosion susceptibility, steep slopes or any other physical condition that may lead to environmental deterioration or degradation. These lands are intended for preservation and conservation of the natural landscape but there are exceptions for other uses

including agriculture, outdoor recreation, including public and private parks or golf courses, nursery gardening, forestry, and conservation of soil or wildlife.

In compliance with the above landuse zoning policies and with the exception of current conservation management that is based on current standards, (refer to the outcomes section of the Chapter 7 interview participants' general comments), the Apps' Mill Conservation Area's conservation management continues to be based on the five key objectives of its 1979 management plan. The five objectives were determined on the basis of the findings of a comprehensive 1970s investigation into the area's abiotic and biotic entities, and its culturally associated entities, and are as follows: 1) Due to the area's ecologically sensitive geophysical and biophysical entities, cultural activities are limited to such as the appreciation of the area's natural aesthetic values, scenic trail hiking, birding, supervised educational programs and group picnics within certain limited areas of the property. 2) The ongoing maintenance of the historic Apps' Mill (the area's cultural heritage) and the Millers House. The intent of restoring the mill as a showplace of a nineteen-twenties water-powered general purpose feed and flour mill has, at least until the present time, been stalled due to a variety of technical obstacles. 3) The portions of the conservation area that were formerly under some type of active agricultural uses have been reforested. 4) The conservation management of the conservation area's geophysical and biophysical entities, and its foremost culturally associated management objective, which is based on the conservation area's S. C. Johnson nature center, are coordinated for the purpose of maintaining the conservation area's geophysical and biological attributes in their natural state for the purpose of maintaining the conservation area as a place of public learning about watershed processes and nature in general, for the

benefit of the present generation and future generations, with particular focus on educating elementary and secondary school-aged students. 5) A year-round boy's camp, located above the north valley wall near the conservation area's western border, is owned, maintained, and operated by the Brantford Kiwanis Club, under a long-term land lease agreement with GRCA (GRCA 1979).

Geophysical and Ecological Features and their Uses

The more prominent geophysical features of the property include a deep valley through which Whiteman's Creek flows in a southwesterly to northeasterly course toward the Grand River, a short distance downstream. A steep north valley wall, up to 30 meters high, where the north shore of the post-glacial Lake Warren once was located, defines the dividing line between the valley topography and that of the higher lands to its north. The east-west Robinson Rd. running between Rest Acres Rd. on its eastern boundary, and Cleaver Rd. near its western limits divides the property into approximately 60/40 north/south proportions.

The north valley wall is also where a transition takes place between the area's longer established natural self-organizing ecological communities, and, except for a prairie-savannah-treed patch, the culturally established various tree plantation ecological communities, on the higher northern uplands.

Whiteman's Creek serves as the conservation area's soil drainage, fluvial processes, and surface hydrology mechanism. Due to the creek's steep gradient, in the area of the Apps' Mill property, its high energy along with the readily erodible substrate of the creek bed, and the fluvial process prone valley soils, there is rapid stream bed down cutting; approximately two meters in the location where the creek bypassed the dam, which diverted creek water to the former millpond, during a 1954 flood, and meander bend

evolution that is accompanied by ongoing stream bank erosion at outside meander bends, stream bank accretions at inside meander bends, and stream course re-alignments. A number of ravines in the valley mark the locations of former stream courses.

Six types of soil have been identified within the conservation area including: Alluvium, Burford, Caledon, Fox, Stayner, and Styx (Soils of Waterloo County Report No. 44, Soils of Wellington County Report No. 35, Soils of Wentworth County Report No. 32). In a large portion of the lowlands there is poor soil drainage.

The orientation of the conservation area's eleven types of ecological communities, which also serve as wildlife habitats, and the conservation area's cultural landuse locations are shown in the color-coded illustration below (Figure 5). In the valley lowlands, the terrestrial ecological component exists of two small medium density coniferous tree plantations, that appear to be forty to fifty years old, in zones 1 and 2, a marsh patch in each of zones 1, 6, and 7, old field patches, one each in zones 2 and 3, and two in zone 0, and eleven stream bank ecological communities. The various types of terrestrial self-organizing ecological communities that are shown in the illustration are within various phases of the full range of natural succession. The creek functions as an open at both ends flowing water ecological community. The northern valley wall has forest cover. On the northern uplands (zone 8), except for the irregular prairie-savannah-treed self organizing ecological community, and in a limited area adjacent to the boys camp, the ecological communities consist of culturally established forty to fifty year old, medium to high density, coniferous tree plantations.

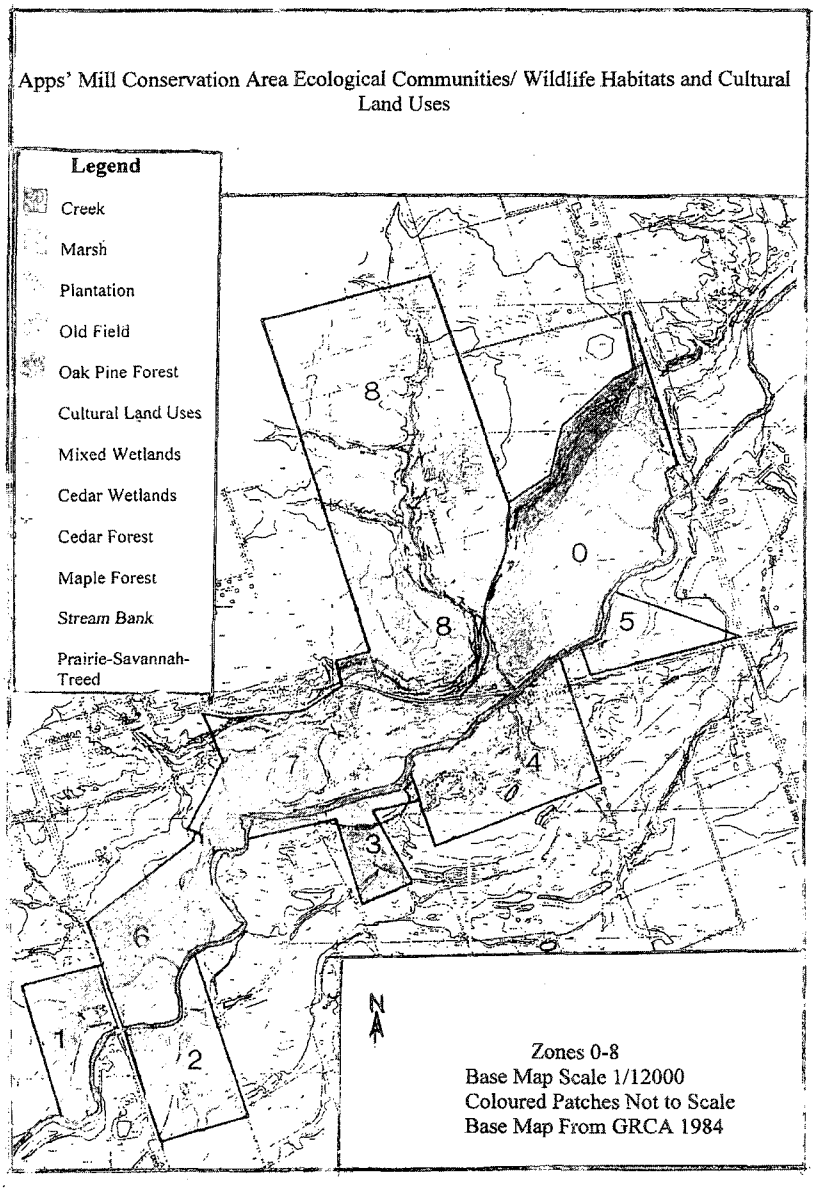


Figure 5 – Apps' Mill CA Ecological Communities and Cultural Landuses

The field observation exercises

The data from the field observations exercise was assembled during numerous field visits, carried out at irregular intervals during the early spring to late autumn seasons, and one wintertime observation exercise, during each of 2004, 2005, 2006 and 2007, and one field visit in June 2008. Though no two Southern Ontario protected areas are alike, the exercises were undertaken over an extended period of time for the purpose of gaining some insight into some natural Southern Ontario protected area geophysical and biophysical processes during a greater than one year period.

The field exercises also included several conversations with sometimes one, and sometimes two, of the nature center's interpreters through which information was assembled about the nature center's educational programs, and about the part that the nature center's interpreters play in the on-site conservation of the conservation area. The Chapter 3 set of guidelines for gauging ecological community self-organizing integrity were applied when observing the self-organizing ecological communities.

The creek's in-stream aquatic ecological community

The creek functions as an open at both ends flowing water aquatic ecological community. It provides high quality medium cold to cold-water habitat for fish, reptiles, amphibians, water seeking mammals, and water seeking avian species. Examples of all of the above water seeking types of species were observed at one time or another during the observation period.

Even during summer dry periods, when upstream water taking for agricultural irrigation was at its peak, there was sufficient stream flow volume for maintaining good quality aquatic life habitat, and on account of the boulder strewn rifles sufficient oxygen assimilation into the water. There are a number of downed trees in the creek, due to bank

erosion. Before their removal is undertaken and unless their presence is hindering normal stream flow and pool and riffle evolution, an investigation into whether their presence is improving aquatic life habitat is called for.

The Marsh Ecological Communities

Each of the three marsh communities is in a different phase of natural succession. The marsh in zone 1 is in transition toward becoming a wet meadow ecological community. Coarse graminoid and forbs species that are common to wet meadows are prominently present. The small marsh community in zone 6 appears to be in the process of being overtaken by species from the surrounding mixed wetland ecological community. Any lowering of the groundwater level, in its location, would accelerate the process. The marsh community in zone 7 occupies the area in which the former millpond existed. Limited numbers of herbaceous and woody-stemmed species are becoming established along its perimeter. The groundwater appears to be right at the surface level. The saturated, thick layer of fine clay, which settled out of the former millpond's water, will likely retard vegetative growth.

The Tree-Plantations

These culturally established ecological communities in zones 1, 2, and 8 appear to have been established between forty and fifty years ago. All except a portion of one, located in the northwestern sector of zone eight, north of the more northerly west-east ravine, were stocked with coniferous species. The exception was stocked with a mixture of species, including small numbers of European Linden, European Birch, Poplar, and a larger patch of Scots Pine. The Scots Pine has almost been eliminated, by disease and Christmas tree harvesting. A small number of non-native second growth, offspring of the non-native species of the original plantation, are present in this area, and will likely

spread outward. There are also numerous native hardwood saplings present, an indication of its slowly becoming a mixed hardwood forest ecological community.

The medium to low density mixed coniferous plantation in zone 1 appears healthy and has a dense lush understorey groundcover. The medium density White Pine plantation in zone 2, and the one in the northeastern sector of zone 8, both appear to be healthy. They have low to medium density understorey vegetative groundcover. The high density White Spruce plantation, located inside the eastern border of zone 8, north of the valley wall, appears to be healthy. Due to its density it is nearly devoid of understorey groundcover. The nature center's educational program's predator/prey lessons are conducted in this plantation patch. Regardless of its intended end purpose, if its stand is not thinned in the short-term, its full potential will likely not be achieved. The low to medium density plantation that occupies the western sector of zone 8, south of the more northerly west-east ravine, was stocked with a mix of Spruce and Pine species. It has a healthy appearance, and has good understorey groundcover. Its lower density has provided for the accommodation of the self-regeneration of a number of native hardwood species, indicating a slow transition toward becoming a mixed coniferous/deciduous forest ecological community. The more southerly west-east ravine is becoming populated with Black Locust, most likely as a result of seeds being carried in by wildlife, from a grove of Black Locust, located along a fencerow on neighboring farmland. Some of the medium density coniferous plantations, and in particular, the high density White Spruce plantation in zone 8 may present a dry season fire risk.

The Old Field Ecological Communities

The old field communities in zones 2 and 3 have been in existence long enough to have passed the time when annual and biannual weed type species that are common to

discontinued agricultural landuses, have largely been replaced by perennial species. Numerous native herbaceous and woody-stemmed species, including tree species are well established. It appears that the old field ecological community in the western portion of zone 0 occupies the location of a former pioneer homestead. It has a lower tree species presence than the ones in zones 2 and 3. Perhaps this is so because it appears that some surface alterations have taken place in the past. The small spring fed stream, which has its source in the deep central ravine in zone 8, traverses this community and is the likely reason why species that are common to areas with high soil moisture content are more dominant. The old field community, located in zone 0, inside the eastern border along Rest Acres Road, has during the five year observation period, experienced the most rapid natural succession progression of all the ecological communities. The old field classification has become inappropriate. The rate at which it is progressing justifies a re-classification to an early K phase mixed coniferous/deciduous forest ecological community.

The Oak Pine Forest Ecological Communities

A small patch of this type of ecological community is located in the southwestern corner of zone 8, and a larger patch is located in zone 0. They are located on the steep northern valley wall. The communities appear healthy. They contain an all-ages mix of deciduous and coniferous species. The greater prominence of young deciduous species is likely an indication that the deciduous species will become dominant. The communities have a species diverse medium density understorey ground cover. That, along with the prominent presence of Black Oak species, a Carolinian zone type species, may be attributed to the north wall's microclimate, and the conservation area's location within the northern reaches of the Carolinian Zone.

The Mixed Wetlands Ecological Community

One mixed wetlands ecological community exists in zone 6, adjacent to Cleaver Rd. It surrounds a small marsh community, which it appears to be overtaking. Any lowering of groundwater level would accelerate the process. Among the conservation area's tree dominated ecological communities, it appears to have the highest level of species diversity, and thus likely the highest rate of bioproduction (natural capital accumulation). The species populations contain individuals of different ages. However, the community as a whole displays the characteristics of an ecological community that is in the early K phase of natural succession, and thus, having a long period of natural capital accumulation ahead of it, provided that there is no severe change in ground water level, and provided, it doesn't experience any major perturbations.

The Cedar Wetlands Ecological Communities

Cedar wetland ecological communities exist in zones 0, 1, 2, 3, 4, and 5, plus a very small one in zone 8. Except for areas directly below the steep valley wall, where water migrating from the higher uplands toward the creek has a tendency to pool, the communities exist on reasonably well-drained soils. White Cedars of mixed age are highly dominant in all of the communities. There is a limited presence of White and Black Ash, White Pine, Willow, Tamarack, Hob-hornbeam, and Staghorn Sumac in most of these ecological communities. In most of the communities the understorey ground cover is relatively sparse, and a limited number of woody-stemmed shrub type species are represented. Regardless of the season, there were many small birds present in these communities.

The Cedar Forest Ecological Communities

There is a small old-growth White Cedar forest community in zone 4, and a larger one in zone 0. The old-growth cedars are in the late K phase, and past their prime. Most of

them appear to be hollow. There are no signs of ecological community regeneration. The understorey is almost devoid of any ground cover. In zone 0 the surrounding ecological community's hardwood species are moving into its space, which is likely due to the lowering of the groundwater's migration route from the higher uplands to the creek, caused by the down cutting of the creek bed. The hollow trees do provide good habitat for cavity dwelling wildlife species.

The Maple Forest Ecological Communities

These communities, in which the Maple species are the dominant hardwood species, exist in zones 0, 2, 4, 5, 6, 7, and in the southwestern corner of zone 8. Except in the more advanced age (late K phase) Maple dominated communities, in zone 4, and in the eastern part of zone 7, the communities do contain a range of hardwood species. In the highly Maple dominant communities, the shade tolerant Maples appear to be inhibiting regeneration of the less shade tolerant species. Most of the communities appear healthy and have at least a medium density understorey ground cover. The Elm and the American Beech species are not present, which appears to be common within the greater general geographical area

The Stream Bank Ecological Communities

There are eleven stream bank ecological communities within the conservation area. Nine of the stream bank ecological communities are located within presently-existing creek inside meander bends. The one in zone 1 appears to exist within a formerly existing creek inside meander bend, which has been bypassed by creek re-alignment, as does the one in zone 3. The one in zone 1 is in advanced transition toward becoming a wet meadow ecological community. There are numerous coarse grass and forbs species, common to wet meadow communities, present in this community. The stream bank

community in zone 3 contains a number of typical old field community characteristics, containing numerous terrestrial type species. The other nine stream bank ecological communities display the normal accreted to stream bank community under unstable ecological conditions. Only very aggressive, primarily annual type "r" colonizer species exist at or near the stream-flow level. At slightly higher levels, some biannual and a limited number of perennial species are present. At the higher level adjacent to the former stream bank herbaceous and woody-stemmed perennial species have become established in most of the communities. Plant colonization of any type is tenuous at the lower elevations of the stream bank communities which are frequently under ecological stresses due to flooding and slow but constant natural stream evolutionary processes through which, particularly in the case of high energy streams, stream pools and riffles, and meander bends slowly but steadily migrate downstream (Press & Siever 1986).

The Prairie-Savannah-Treed Community

This ecological community is interspersed among the forest plantation ecological communities in the area northward from the upper portion of the valley wall on the higher ground of zone 8. There is an intermingling of prairie savannah and treed areas in this relatively large irregularly shaped self-organizing ecological community. The trees are not dominated by the Oak or Red Cedar species, which are the species that are common to Southern Ontario savannah ecological communities. Mostly, they are other hardwood species, likely indicating a long-term transition toward becoming a mixed hardwood ecological community. The Burford and Fox calcium-rich sesquioxide soils of this location are ideal prairie and savannah supporting soils. However, for long-term sustainability these types of ecological communities require incremental controlled burning or severe to the ground grazing. There is no evidence of either of the two having

occurred, and without such action in the very short term, this ecological community will cease to exist. It has already taken on a number of characteristics that are common to old field communities, along with the establishment, in appreciable numbers, of native hardwood species, particularly along its margins.

Wildlife

The conservation area's wildlife habitats exist within its various ecological communities. The habitats' negative aspects stem from a number of factors. The area's limited spatial extent is confined within its very irregular configuration precluding the possibility for the existence of deep internal habitat. The wildlife-unfriendly heavily traveled Rest Acres Road defines its eastern limits. The east-west Robinson Road divides the area in two. Cleaver Rd. cuts zone 1 off from the rest of the conservation area. It is surrounded by open lands, which are under intensive agricultural landuses. There are a number of domestic household animals kept at private homes along Robinson Road, beyond the conservation area's borders.

On the positive side, the relatively narrow creek valley has natural vegetation cover for short distances upstream and downstream from the conservation area. There are a small number of farm-field fencerows in the general area, as well as a small number of small treed patches. The in-creek ecological community, and the conservation area's various terrestrial ecological communities provide a variety of niche type habitats, suitable for several wildlife species.

Alhough the times of day when the observation exercises were carried out were not the ideal times for observing many types of wildlife, there were numerous sightings of wildlife, of wildlife droppings, and evidence of well used wildlife pathways, as well as an indication of a deer wintering location in zone 0. There were several Whitetail Deer

sightings, and there was evidence of their presence throughout the entire conservation area. Many small birds were present in the cedar-dominated ecological communities, at all times during the field observations. Neo-tropical migrating birds were abundant during migration and nesting seasons, in the areas north of Robinson Road, in particular in the areas near the north valley wall. There were sightings of amphibians and reptiles in zones 1, 2, 6, and 7, and of fish in sizes of up to 20-24 cm. Beavers were sighted in the creek a short distance downstream from where the Creek crosses Robinson Rd. Turkey Vultures and hawks were sighted in 2005. Evidence was observed of the important role that wildlife fulfills as seed dispersal agents (agents of biodiversity in the service of perpetuating the presence of native plant species in small protected areas), at a number of locations within the conservation area, where regeneration of native plant species is occurring at distances from their seed sources, which almost certainly had to be as the result of wildlife seed carriers.

Summary comments on the conservation area's ecological component

Comparisons between the ecological communities' visually observable mosaic patterns, which are a reflection of the diversity of their species populations, indicate that the more complex mosaic patterns are associated with the ecological communities that display the characteristics, which according to the Chapter 3 guidelines are ecological communities that have natural ecological self-organizing integrity. For example, the mixed wetlands ecological community in zone 6, which projects visually complex mosaic patterns, does have a diverse mix of robust species populations within its species guild composition. Except for some species intermingling, due to inter-species competition along its margins, the species types within it species guild, are appropriate for its type of ecological community, for the semi-wetlands ecological system in which it exists, for the

7E Erie ecoregion where it is located, for its presently being in the early K-phase of natural succession, and within the capacity of its natural self organizing resilience, it is free from disease, perturbation, and invasive species. Thus by the criteria of the Chapter 3 self-organizing ecological community integrity guidelines, this mixed wetlands ecological community is presently in a high state of natural ecological self-organizing integrity.

Applying the same scrutiny to the maple forest ecological community in zone 4, of which the mosaic patterns are less complex, reveals a predominance of shade-tolerant species, and a lack of natural regeneration of the less shade-tolerant species. However, according to the same guidelines' criteria applied to the zone 6 mixed wetlands ecological community, the species population mix within the composition of this maple dominated ecological community's species guild, though less diverse than that in the zone 6 mixed wetlands ecological community, is appropriate for its community type, for the terrestrial ecological system in which it exists, for the 7E Erie ecoregion within which it is located, for the advanced K phase of natural succession that it is in, and, within the capacity of its natural self-organizing resilience, it is free from disease, perturbations, and invasive species,. Its lack of mosaic pattern complexity denotes a lower range in its species diversity, which in turn is attributable to the predominance of its shade-tolerant species, suppressing the regeneration of the less shade-tolerant species. However, according to the applied criteria, its species guild composition and self-organizing integrity is appropriate for an ecological community dominated by shade-tolerant species that is in the advanced K natural succession phase. Creating patches of open canopy in this shade-tolerant species dominated ecological community could encourage the

regeneration of more of the shade-intolerant Carolinian zone species like Shagbark Hickory and White Walnut (Butternut). It provides a good example of the decisions that small protected area managers are confronted with when such conditions exist. They must decide whether to let natural succession processes run their natural course, which would result in a transition toward becoming a self-organizing ecological community consisting of shade tolerant species, or whether to intervene by creating patches of open canopy in order to encourage the regeneration of the less shade tolerant species for the ecological community to be representative of its ecoregion's wider range of common species.

There are a number of reasons why the conservation area's numerous predominant coniferous plantations clash with the assumption that the prime purpose for providing protected status to Southern Ontario's remaining small, relatively natural areas is for management which focuses on conserving their natural geophysical and biophysical features. These comments are made along with the acknowledgement that at the time of the plantations' establishment, densely spaced coniferous plantation reforestation was the accepted method for rehabilitating lands, which formerly had been culturally altered. As well, there does not appear to be a written record outlining the manner in which they were to be managed beyond the short-term.

Within the context of their present existence, the following comments appear to be appropriate. Except in the southern one-third of the western half of zone 8, and in zone 1where some natural regeneration of native species is occurring, the other plantations' density either somewhat inhibits, or completely eliminates native plant-life regeneration. Tree plantations (tree farming) like any other agricultural undertaking, in order to be

successful, requires ongoing management inputs. Regardless of what the original management end-goals were, the plantations' presently existing ecological state indicates that the resources for carrying through on those intensions have not been available. The second generation of non-native species, the offspring of non-native species, which were planted in the northwestern sector of zone 8, do not have a rightful place in the conservation area, nor do the invasive Buckthorn and Manitoba Maple species, which are present in relatively low numbers in most zones of the conservation area. Also, due to a large portion of the conservation area's space being occupied by the dominantly coniferous species plantations, the deciduous species lack representation in comparison with the general area's common predominantly deciduous and deciduous/coniferous mix. Whatever the intent was, thinning the plantations, particularly the more-dense plantation patches, would have been part of the management regime. The most opportune time for doing so has likely passed.

Field observations relating to the conservation area's cultural landuses

The Apps' Mill and the Miller's House

The intent of restoring the Apps' Mill as a functioning working model of a 1920s water powered flour and feed mill (GRCA 1979) has not been accomplished for a number of reasons. Among the reasons are: 1) The creek's physical transformations after it bypassed the dam which diverted creek water to the former millpond, during a 1954 hurricane, precludes, within practical limits, the possibility of diverting creek water to power the mill's water turbines. The only apparent practical source for waterpower, would be constructing a sump in the area of the former millpond, where the natural groundwater level is at, or just below the surface, and recirculating mechanically pumped water from the sump through the turbines. 2) Much of the original milling machinery has

been dispersed, and there does not appear to be a source from which to obtain equivalent milling machinery. 3) Present day health regulations do not permit milling flour for human consumption and preparing animal feed within the same enclosure.

The rental proceeds from the Brantford Kiwanis Club's boys' camp are dedicated to the maintenance of the mill building. The mill's roof and external cladding have been well maintained and its internal air is being conditioned by an automatic ventilation system. However a more recent discovery, that its timbers are infested by what is locally referred to as the powder post beetle, very likely of the Cleoptra Order and Amobiidae Family of beetles, and likely either of the *Xestobium rufovillosum* or *Anobium punctatum* species, could eventually lead to the mill building's demise. This means that, better sooner than later, critical decisions should be agreed upon about taking the appropriate practical measures for dealing with the situation. The apartment rental proceeds from the miller's house are also dedicated to, and appear to be successfully applied, to its ongoing maintenance.

The boys' camp

The Brantford Kiwanis Club's boys' camp operates on a year-round basis on conservation area land, under a long-term land-lease arrangement with GRCA (GRCA 1979). It shares the upkeep maintenance of a small parking lot, located opposite the entrance to the mill.

On two brief observation visits, a year apart, the camp's main permanent building, and the auxiliary structures appeared to be in excellent condition. The grassy areas of the campground were well groomed. Except for access to a short groomed trail, in the south-western corner of zone 8, all of the camp activities were being conducted within the camp compound.

The Nature Center

The nature center complex consists of a parking lot for the accommodation of school buses and private vehicles, the modern S.C. Johnson nature center, a groomed grassy area surrounding the nature center that is equipped with outdoor furniture and is suitable for conducting outdoor classes, and as well access is provided to some natural areas for practical outdoor nature education instructions. The S. C. Johnson building contains two regular classrooms, washrooms, storage space, an auditorium, a common room, a general purpose office, and limited kitchen facilities for the staff.

Through a number of encounters with one or the other, or both, of the nature center interpreters, in combination with general observations, the importance of and complex role that is fulfilled through the nature center became evident: 1) As the conservation area's prime on-site conservation agency, all cultural activities within the conservation area, with the exception of, for example by those who do not obey signs, and do things like run their dogs, sometimes unleashed, or deposit litter, are directed through the nature center. The interpreters act as GRCA's on-site monitoring agents. They draw attention to and offer suggestions on the conservation area's conservation management needs. 2) It is through the nature center that the conservation area's prime management objective is met: conserving, for the benefit of present and future generations, the conservation area's unique geophysical and biophysical entities in order to maintain the conservation area as a public place for learning about watershed processes and nature in general, with particular emphasis on educating the students of Brant County's Public and Separate School Boards, is directed (GRCA 1979). 3) Elementary school education is delivered in the form of an age-comprehension sensitive, grade two through grade six, five day per week nature education program, which is complementary to the regular school

curriculum. It is conducted throughout the school year by a qualified and dedicated staff. School vacation season youth programs are also conducted. 4) Under the direction of the nature center staff there are opportunities for arranging family and group environmentally friendly outdoor gatherings and nature demonstrations. A nature trail system, located in the valley lowland area south of Robinson Road, provides opportunities for the public to engage in nature self-education and the appreciation of the aesthetic values of the area's natural environment. 5) Those portions of the education program which require practical in the field experiences are conducted in a manner that avoids impacting sensitive ecological features.

The conservation area's unique geophysical and biophysical features and processes, along with an extension of the present ecologically sensitive management practices could be taken advantage of for critically observing, for teaching, learning and researching such as the effects of micro-climates, as well as typical Southern Ontario natural geomorphologic processes, in which running water and natural ecological processes are involved, at levels beyond that of the elementary and secondary school systems.

Analysis of LMSG's on-site management

This analysis, based on an analysis of the field observation data, is aimed at determining to what extent, within the context of the Chapter 3 management practices evaluation framework, the implementation of the existing Apps' Mill Conservation Area's management plan, including the Chapter 4 Apps Mill plan evaluation outcomes, appropriately addresses the conservation area's three basic conservation management components.

The analysis of the field observations, with respect to the Chapter 4 tabulations concerning the ecological component for Apps Mill CA, which deals with what is

actually happening on the ground, is based on taking into account that, as the existing plan states, the conservation area's geophysical and biophysical entities' and its nature center's educational program conservation management strategies are interlinked. Within that context, the analysis outcomes of the above field assembled data indicate that the data is in concurrence with the plan regarding 1) on-site management practices being applied to the on-going maintenance, enhancement, or restoration, as the case may be, of the ecological communities integrity, within the limits of available management resources, 2) on-site management is being focused on the self-organizing ecological communities, and not on a selection of, or on individual species, and 3) on-site management includes enhancing wildlife habitat, but apart from the natural corridors that do exist within a creek valley a short distance upstream and downstream from the conservation area, no additional corridors have been established.

The Chapter 4 evaluation tabulations for the socioeconomic/cultural component for Apps Mill CA concern the extent to which the provision of appropriate protected area conservation management policies, the establishment of an institutional component (an on-site management agency), and providing it with appropriate technical assistance are being addressed. The analysis of the field data reveals that concurrence exists between the data and the intent of the plan's policies with regard to managing with the purposes of providing controlled human access to the area's natural capital, for conserving, enhancing, or restoring the area's natural abiotic entities, conserving, enhancing, or restoring the area's self-organizing ecological communities, and maintaining co-operative working relationships between the socioeconomic/cultural and the institutional

components are, within the limits of whatever management operating resources can be procured, being addressed.

The Chapter 4 evaluation tabulations, for the institutional (on site management) component for Apps Mill CA, concern the manner in which the on-site management agency fulfills the socioeconomic/cultural component's policies as they are embedded in the protected area's existing management plan. The analysis of the field data indicate that the on-site management actions that have been enacted are in accord with the plan's dictates for applying on-site management for the purposes of 1) enacting the on-site management actions in accordance the plan's stated policies, and in co-operation with the socioeconomic/cultural component, 2) holistically focusing management on the area's self-organizing ecological communities of co-operatively cohabitating plant and animal species guilds, 3) on-going monitoring of the area's various geophysical and biophysical entities by the nature center's on-site interpreter(s), 4) maintaining working relationships between the institutional component's various agencies, and 5) management for fulfilling the 5 key objectives of the outdated management plan is being applied in accordance with up to date management practices.

As was referred to above, the analysis of the field assembled data identified some shortfalls regarding some of the required on-site management actions. Those management action shortfalls include management actions that are required for maintaining, enhancing, or restoring certain types of the area's existing self-organizing ecological communities in a holistic manner. For example, 1) the most opportune time for thinning the area's more densely stocked tree plantations for encouraging natural regeneration has passed, 2) the incremental controlled burn regime for the prairie-

savannah ecological community in zone 8 has fallen behind, and 3) the second generation of non-native species of the former tree nursery in the northwest sector of zone 8 has not been kept under control.

Although an analysis of the assembled field data does not directly identify the ongoing scarcity of, and difficulty of obtaining, any of the resources that may become available for enacting the actions that are required for addressing the shortfalls, the conversations with the nature center interpreters indicate that if and when the required resources become available, and the technical obstacles that are associated with conducting controlled burns are solved, the shortfalls will be addressed.

While the analytic outcomes of the field data indicate the existence of the referred to management action shortfalls, they also indicate that in general the area's ecological component, composed of its eleven types of self-organizing ecological communities, its ecological systems natural functions, and its natural geophysical entities are in good condition, and that interlinking the management of the conservation area's educational programs and the management of biotic and abiotic entities has become a demonstrated success. All of which, during recent years, appears to have been carried out in accordance with up to date holistic ecosystem management standards

With regard to the preservation of the area's prime cultural heritage, the historic Apps' Mill, the outcomes of an analysis of the field data indicate that despite the numerous appropriate preservation steps that have been taken, the present pest infestation of its timbers requires a general rethinking about how to proceed with its preservation, or perhaps pondering whether its long-term preservation may turn out to be an exercise in futility.

Chapter 7: Case Study Interviews and Analysis

The objective of the interview process was, in conjunction with the two case studies, to obtain from interview participants who are or were directly involved in the management of one or the other of the two case studies, authentic and individual experience-based opinions about the current state of the two case study areas' on-site current management practices, and to further evaluate their management practices in accordance with the standards on which the Chapter 3 evaluation framework is based. However, as was pointed out in Chapter 2, due to the small number of participants that volunteered from among an admittedly limited number of possible candidates, seven from LMSG and eight from GRCA, the recruitment efforts were extended to appropriately qualified individuals from other Southern Ontario protected area on-site management agencies. The extended recruitment effort resulted in three individuals from MNR and two from a charitable research reserve (CRR) volunteering to participate. As a consequence, the expressed opinions of the participants are likely reasonably reflective of the broader current state of Southern Ontario protected area on-site conservation management practices than of just the two case studies.

An assembly of information about the recent trends in, and current practices of Southern Ontario on-site protected area conservation management, which is directly based on the opinions of protected area management practitioners' practical on-site protected area conservation management, is in all likelihood the most reliable information from which to deduce conclusions about the current state of on-site management practices in Southern Ontario's protected areas. The evaluation outcomes of such practical, experience-based information is required for determining whether the goal of this exercise, as it was outlined in Chapter 1, has been or is being achieved. Therefore,

this Chapter 7 interview process was aimed at assembling and evaluating information which, according to the respondents' expressed opinions, and regardless of what official regulations and policies do exist, about what is actually currently going on with respect to on-site Southern Ontario protected area conservation management practices, in relation to the three basic components of conservation management.

The interview process was conducted in accordance with the Information Letter/Consent Statement (Appendix 3), in which the various steps employed in the recruitment of voluntary participants, assurances of the individual consenting participant's anonymity, and the requirement that consenting participants must have current practical Southern Ontario protected area conservation management experience are outlined. As well, it includes a general outline of the makeup and nature of the interview questions and of the manner in which the one-on-one, interviews with each individual consenting participant will be conducted, in the absence of any third party.

Thus, by limiting recruitment to individuals that have current protected area conservation management experiences, and are free to express their personal opinions, regardless of affiliation with any government or non-government organization, each participant's responses are an expression of his/her practical experience regarding the particular protected area management practices for which the responses are given. Likewise, the assurance of individual participant anonymity, in all likelihood, provides the incentive required for obtaining the individual respondents' genuine expression of their opinions.

The interview process with each consenting interview participant involved a prepared set of twenty-two questions (Appendix 4), which are aimed at obtaining the individuals'

on-site management experience-based information about the current state of protected area conservation management as it relates to each of the three basic components of protected area conservation management, the ecological, socioeconomic/cultural, and the institutional. Each participant was asked to respond to each option of each question, or to refrain from responding, based on his/her on-site practical personal experiences. Each participant was also encouraged to offer general comments about the general state of Southern Ontario protected area on-site conservation management. Appendix 5 provides a tabulated summarization of the respondents' responses, by organizational affiliation. The participants' responses were recorded in hand written form and kept in safe keeping for the duration of the execution of this thesis exercise.

Introduction to the Participants' Responses

The purpose of this review is to assemble information, gleaned from the participants' responses to the questions and from their general comments, from which, according to the opinions of the participants, conclusions can be deduced about: 1) Whether the current management practices of the two case studies, in particular, and on a more general scale, Southern Ontario protected area conservation management practices in general, are in line with the goal of this exercise, progressing toward the application of the holistic, integrative, and adaptive ecosystem management approach, as it is described in Chapter 3 under the Managing Small Protected Areas sub-heading; 2) Whether Southern Ontario's various types of protected area on-site management agencies have available to them a) adequate management support in the form of ready access to technical assistance, b) ready access to appropriate official protected area conservation management policies, in readily interpretable form, which is the responsibility of the

greater socioeconomic/cultural component, c) ready access to protected area best management principles, and d) ready access to sufficient human and monetary management resources for maintaining, enhancing, or restoring, as the case may be, the ecological component's self-organizing ecological communities, and the ecological systems in which they exist; and 3) Despite the diversity of the various agencies, whether all of them are capable of, and dedicated to, managing in accordance with the holistic ecosystem management approach, and in accordance with the standards on which the Chapter 3 evaluation framework is based.

It merits being highlighted that it became clearly evident during the individual participant interviews that: 1) each respondent is highly dedicated, 2) regardless of which agency a respondent is associated with he/she has strongly held opinions about the present state of Southern Ontario protected area management practices, which were, no doubt, shaped by his/her particular protected area conservation management experiences and 3) each participant indicated that the protected areas' plants, animals, and humans are an integral part of the protected areas' ecosystems. But a number of participants projected a certain degree of preference regarding the importance to conservation management of one or another of the three.

Therefore, as is to be expected, and as the Appendix 5 tabulations of the respondents' responses to the interview questions, and the hand written individual participant's general comments indicate, there are numerous differences of opinion about protected area conservation management issues, even among participants from the same agency. For those reasons, the information that is assembled in this review is that which was interpreted as being representative of the information that is contained in the majority of

the responses from each of the four agencies. While the summaries in Appendix 5 do record a quantitative summary of the responses of each of the four agencies, it is the respondents' general comments that brought out the individual respondents' basic, practical, experience-based opinions.

With regard to the opinions expressed by the GRCA respondents, in line with the way in which GRCA is structured and the manner in which it functions, the individuals that are directly involved in the management of the Apps' Mill Conservation Area are also involved in a general way in the conservation management of GRCA's numerous other protected areas. As well, they contribute, in accordance with the degree of their expertise to the benefit of GRCA's general conservation activities. The Apps' Mill Conservation Area's existing management plan has passed its review date, which seems to be beyond the capability of those that are engaged in its management at the practical on-site management level to remedy. Therefore, based on an interpretation of the evidence contributed by a majority of the GRCA respondents, the objective of those who are directly involved in the area's management is to fulfill the five objectives of the existing plan as they are listed in Chapter 6, in accordance with up-date protected area conservation management standards. Thus, their opinions, as they expressed them in their responses, are reflective of GRCA's current management practices for the Apps' Mill Conservation Area, as well as for its numerous other conservation management involvements, regardless of the dates of any management plans. 2) Among MNR's numerous responsibilities is the responsibility for the administration of a set of appropriate official provincial protected area management policies. Therefore, much of its on-site protected area management activities, (per personal discussions with the MNR

participants), except on Crown Lands, involve acting in the capacity of a consulting agency investigating critical issues, determining solutions, offering advice for enacting solutions, and in many instances providing help for accessing the required resources for the successful completion of the solutions. Thus, the opinions expressed by the MNR participants are representative of their general broad ranging protected area on-site management practices, and are reflective of the general protected area management trends during recent times, and of the current protected area management practices, at the on-site management level, on a broader Southern Ontario scale than is the case with an agency that manages a single, or even several regional, protected area.

The following summaries of information, gleaned from the recorded responses of the participants from the four agencies, are arranged first by conservation management component, and second by management agency.

Ecological component

The section 1 questions were aimed at obtaining information about what is currently taking place at the on-site conservation management level.

LMSG responses

Based on the opinions expressed by the LMSG respondents, LMSG's intent is, in line with their 2002 management plan, to aim management, in co-operation with the community, holistically at maintaining or enhancing the Lower Maitland Valley's naturally existing ecosystem Focusing on selected species and single issues is still practiced in some cases due to such as the limited resources that become available to private landowners, and their limited financial capacity, which compels them to deal with single species issues and other single issues as they arise. Sometimes it is due to the

available management resources having been dedicated at the species level by the donor of the resources.

Depending on existing ecological conditions, some protected areas are managed for both ecological benefits and for producing natural capital for human benefits, others are managed for the sole benefit of the ecosystems and natural processes.

Because most of the Lower Maitland River Valley lands are privately owned, self-organizing ecological community maintenance, enhancement, or restoration, and tree plantation establishment are for the most part at the discretion of the landowners. There is some indication that non-native non-invasive species are sometimes substituted for native species.

One respondent replied that "in some locations of the Lower Maitland Valley microclimates exist, due to its unique geomorphology, which support plant species that may not be common to the ecoregion. However, LMSG has not been made aware that because of the microclimates, there are rare species, which require attention. LMSG would take appropriate action if called for".

Regarding wildlife, except for in a few limited areas the dense vegetative cover along the river corridor provides good wildlife habitat and a good migration route. Ready access to nearby natural areas, the Morris Tract in particular, provides additional terrestrial wildlife habitat. The river provides good in stream aquatic life habitat and opportunity for aquatic life migration. The river habitat ranges from coldwater to medium coldwater fish habitat. There are some indications that fish stocks are under stress due to over fishing.

GRCA responses

Based on the GRCA respondents' expressed opinions, GRCA's on-site Apps' Mill Conservation Area management is aimed at fulfilling the five objectives of its management plan on the basis of applying management in accordance with its current practice of managing according to the holistic ecosystem management approach. It does deviate from holistically focusing on the ecological self-organizing ecological communities if the available management resources have been dedicated to specific species and specific issues, or when rare or endangered species are involved. At the present time 8 bird species, 2 fish species, 1 mollusk species, 1 toad species, 1 snake species, 1 squirrel species, 1 salamander species, and 1 fern species are under such protection within the Grand River Watershed. At the individual protected area level, GRCA applies protected area conservation management, based strictly on an area's existing ecological conditions, for the benefit of the area's ecological processes, in some of the protected areas, and in more ecologically robust areas for a combination of ecological benefits and human benefits.

A considerable amount of GRCA's ecological community restoration has involved the establishment of tree plantations. The earlier established plantations often consisted of densely stocked coniferous species, not all of them native. Incremental thinning for encouraging natural forest regeneration was not always followed through on, or has been delayed due to the lack of the required resources. The practice has shifted back and forth toward and away from establishing less dense mixed native species plantations, depending on who was in charge during a particular period. Currently GRCA's restoration work mostly consists of converting unsuitable former agricultural lands to natural mixed grassland and forest ecological communities. With respect to ecological

community enhancement and restoration in general, two GRCA respondents expressed concern about Southern Ontario's remaining natural prairie ecological communities, which have been overlooked for too long. They are now receiving conservation management attention on some of GRCA's lands. One respondent suggested that reactivating the former, now dormant, MNR, conservation authority, and municipal nurseries for propagating some dwindling types of indigenous species for restocking purposes could greatly advance the restoration efforts of such as wetlands and intensely managed watercourse fisheries.

With respect to managing wildlife in general, in the densely populated central region of the watershed, wildlife management is limited to managing the natural areas in order to provide suitable habitat and providing access to natural corridors, where possible. Managing wildlife for compatibility with the activities of the cultural component, and managing wildlife overstocking due to lack of natural predators, is dealt with on a location by location, and on an issue by issue, basis.

MNR responses

MNR's expressed opinions are a reflection of its broad based role in Southern Ontario protected area management, which provides it with the opportunity for observing, on a broad scale, protected area conservation management trends, and current on-site conservation management practices. Thus, its participants' responses affirm that protected area management focus has primarily been on species and single issues until relatively recently. During recent decades, the focus has shifted toward the more holistic ecological communities approaches, which MNR practices whenever public lands are involved. However, at the present time there are instances when the focus is on certain species or issues, for example cases in which rare or endangered species are involved,

and when management resources become available on the basis of being dedicated for benefiting certain species, or for dealing with certain issues, e.g. stream bank erosion, and soil or water conservation measures. When MNR becomes involved in issues on private land, it can only operate in an advisory role. When MNR becomes involved in issues concerning ecological communities in which there is a lower than normal species diversity MNR directs the management actions toward maintaining and/or enhancing a community's broad spectrum of appropriate species types (community biodiversity) by such as providing patches of open canopy for encouraging the natural regeneration of the less shade tolerant species within the ecological communities.

On public lands, depending on the existing ecological conditions some areas are managed for a combination of ecological and socioeconomic/cultural purposes, others are managed for ecological purposes only. On private lands, MNR can only advise and help to find the required resources for achieving the desired outcomes.

When enhancing or restoring ecological communities, the aim is to maintain them in or restore them to their former natural state. However, it is not uncommon to find cases in Southern Ontario where conditions have changed to the point where native species are no longer a viable option. In such cases the aim is to restore the communities to a state that resembles their former state as closely as possible. In Southern Ontario most reforestation activity occurs on private lands. MNR encourages the use of a mixture of native species, which has become its common practice on public lands. On private lands it is mostly at the discretion of the landowners, whose financial situations often require them to plan for future monetary gain within the shortest possible time.

MNR operates on the basis of, wherever possible, making provisions for wildlife's total lifecycle habitat, along with appropriate wildlife control measures.

CRR responses

Based on the responses of CRR, which operates as a community special interest organization, its conservation management objectives are directed toward the fulfillment of three prime purposes: 1) conserving, enhancing, or restoring, as the case may be, the reserve's naturally occurring native plant and animal species populations that make up its self-organizing ecological communities, 2) providing opportunities for researching nature, and for providing nature education, in a manner that causes no environmental harm, and 3) blending the management actions of the other two purposes for the purpose of benefiting the reserve's natural ecological conditions.

Socioeconomic/cultural component

The section 2 questions were aimed at assembling information about how, based on an assessment of the consenting participants' expressed opinions, the dual role of the socioeconomic/cultural component in Southern Ontario's protected area conservation management is currently being fulfilled. Its dual role consists of: 1) as an integral part of the ecosystem(s) the socioeconomic/cultural component exists and has the right to benefit from protected area natural capital within the protected areas' long-term natural ecological carrying capacity, and 2) at the greater socioeconomic/cultural component scale it has responsibility for providing appropriate stewardship. Within Southern Ontario's well developed socioeconomic/cultural system that stewardship responsibility includes: 1) establishing and supporting an institutional component for carrying out the practical on-site protected area conservation management, 2) providing and administering

a set of protected area conservation management policies that are appropriate to the currently held perceptions of protected area management, and 3) appropriately disseminating the contents of the policies among the numerous different types of management agencies.

The interview participants were recruited on the basis of their current on-site practical protected area conservation management experiences. At that level of involvement in protected area conservation management they don't have the level of responsibility that the greater socioeconomic/cultural component has for developing official protected area conservation management policies. Thus, the intent here was not the compilation of a list of the greater socioeconomic cultural component's official policies that exist at the various levels of regulatory organization, and evaluating their efficacy. instead it was to, based on the consenting participants' expressed opinions, determine whether, for the purpose of advancing Southern Ontario protected area conservation management practices, the existing policies: a) are readily accessed and readily interpreted by the average on-site protected area conservation management practitioner, b) whether the policies provide clear guidelines for identifying and classifying those protected area entities that are valued by humans and deemed worthy of conservation or preservation, c) whether the policies provide for human access to protected area natural capital in an equitable manner and within the long-term natural ecological carrying capacity, d) whether the policies provide for enacting appropriate, protected area soil and water conservation measures, for the protection of natural ecological and geomorphic processes, and if required, for their restoration, e) whether the policies provide for assuring that the on-sight management agencies receive adequate technical assistance,

and human and monetary operating resources, f) whether the policies provide for the application of the holistic, integrative, and adaptive ecosystem management approach as it is described in Chapter 3, and g) whether the policies make provision for providing nature education opportunities.

LMSG responses

The LMSG respondents expressed full agreement with the policies on which its 2002 management plan is based, and with the plan's implementation. With regard to existing official provincial and municipal bylaw policies, the respondents' general comments indicate the existence of some shortcomings regarding policies for the classification of specific types of biological heritage, e.g. wetlands, , and for classifying some types of non-biological natural heritage e.g., special geophysical features. Also, while the policies support providing human access to protected area natural capital within the protected areas' long-term natural ecological carrying capacity, no guidelines exist for determining long-term natural ecological carrying capacity. The existing policies lag behind what is actually happening on the ground with regard to shifting the management focus from selected species and single issues to focusing on self-organizing ecological communities. Their general comments also make reference to the difficulty of accessing existing policies because they are not accessible from one or even a small number of sources.

GRCA responses

The GRCA respondents' general comments indicate that at the Apps' Mill Conservation Area on-site management level, GRCA's current policy of managing the conservation area for the purpose of fulfilling the five objectives of its existing 1979 management plan, as is detailed in Chapter 6, in accordance with current up-to-date

management practices, is an acceptable adaptive management approach, given the prevailing circumstances that are due to the existing plan passed its review date.

Their general comments also make reference to 1) the existing official policies that define natural biological and geophysical natural heritage not being explicit in certain important areas, such as in the classification of wetlands, 2) official polices that define cultural heritage being vague, leaving much up to the local management agencies and to cultural heritage lobbyists, 3) official policies exist for the provision of human access to protected area natural capital, within the protected areas' natural ecological carrying capacity. But, they do not provide criteria by which to manage and control on-site human access to the natural capital. Accessing the required resources for managing human access to natural capital is difficult at the present time, and in some cases impossible. 4) the official policies do not specifically place the focus on species or on the self-organizing ecological communities. GRCA's policies are, unless the available resources are specifically dedicated to species or issues, to focus on the natural self-organizing ecological communities, and integrate any associated non-biological and cultural issues directly into the management mix. 5) in the apparent absence of policies that relate to the socioeconomic/cultural component versus institutional component inter-relationships, the responses indicated that within GRCA's jurisdiction, there are good working relationships between the two. On infrequent occasions there are urban/rural divide situations to deal with. Along with the continuous increase in the watershed's human population there is an increase in the number of NYMBY situations, and an increased sense of stakeholder entitlement, and 6) The issue that has the greatest potential for causing friction between the two components is the scarcity of conservation management

operating resources, and the difficulty of accessing those resources that do become available.

MNR responses

Among the four involved agencies, MNR fulfills a unique dual protected area management role. On one hand it fulfills a greater socioeconomic/cultural component role by way of having responsibility for administering whatever policies exist within the provincial jurisdiction. On the other hand it becomes directly involved at the on-site protected area management level. Thus, as is to be expected, the MNR participants' expressed opinions regarding their interpretation of the existing policies, and their insight into the effects of the policies' application at the on-site protected area management level management are bound to be reflective of MNR's dual role.

Thus, the MNR participants' expressed opinions with respect to how the existing policies apply, and are applied by MNR at the on-site protected area management level, are: 1) that the existing provincial policy framework establishes a reasonable balance between human access to protected area natural capital and ecological protection, 2) that landowner rights place public access to private lands at the discretion of the landowners, unless there are land easement agreements in existence, 3) that there is regulatory information available beyond the provincial policy statements, for example there are the Clean Water Act, and the Fisheries Act, 4) that the provincial policies encourage and support a systems (holistic) conservation management approach. They also address specific species issues and specific feature issues, depending on the existence of critical situations, and 5) the provincial policies support the concept of multiple purpose management, which manages for ecological purposes and socioeconomic/cultural purposes according to existing ecological conditions. One MNR respondent responded

"operating within the ongoing shortage of available conservation management resources has become a conservation management impediment issue, and with no indication that the situation will improve within the foreseeable future developing and administrating policies for assuring long-term appropriate protected area conservation management, would be meaningless".

CRR responses

Based on CRR's responses, its on-site management policies are aimed at fulfilling its mission of conserving or preserving, as the case may be, all of the naturally existing species populations within the charitable reserve's natural self-organizing ecological communities of co-operatively cohabitating plant and animal species guilds, for the purposes of maintaining the reserve's natural state, and for providing limited opportunities for nature research and nature education.

With respect to existing official protected area conservation management policies, the CRR responses expressed dissatisfaction on account of the policies not being disseminated in a manner that makes them readily accessible and readily interpretable by organizations like CRR, which provide a valuable niche protected area conservation and preservation service, and operate on small budgets that depend mostly on private donations of human and monetary resources, and that ready access to readily interpretable official policies as they apply to the kinds of protected area conservation works that agencies like CRR engage in would remove some of their financial burden and make them more efficient.

Institutional component

The section 3 questions are aimed at obtaining information about the manner in which the various types of Southern Ontario protected area on-site conservation management

agencies carry out on-site management in accordance with the dictates of the socioeconomic/cultural component's management policies, as they are embedded in the protected areas' existing management plans.

LMSG responses

The LMSG ' responses asserted that: 1) LMSG operates with a co-operative management approach, and focuses on conserving the ecological component of the Lower Maitland Valley in its entire naturally occurring state, and on conserving its natural features, which constitute the better than average natural features of the valley, 2) LMSG puts considerable effort into assisting individual farmers to develop and implement farm management plans that are aimed at conserving natural ecological processes in a manner that is compatible with the type of farming that is being practiced on a particular farm, 3) liaison between the socioeconomic/cultural component and the institutional component is very good at the LMSG and partners level. On the broader scale they are less than satisfactory at the procurement of management resources level. 4) LMSG's adherence to existing official policies is demonstrated through the incorporation of the policies that are embedded in the bylaws of all of the municipalities in which LMSG operates into its 2002 management plan (Szczerbak 2000). 5) With regard to managing in accordance with a set of best management principles, the LMSG responses indicate that this was integral to the development of its 2002 management plan's many actions for addressing the nine valley themes. One respondent offered the following opinion about managing protected areas in accordance with a standard set of best management principles: "A standard set of protected area best management principles could be desirable provided the principles are right. The problem, in particular with regard to tree plantation management, is that the management and thinning practices of

one generation are seldom endorsed by the next generation. With the prolonged lifecycle of trees a change in management tactics at different stages of their lifecycles is most likely unproductive".

LMSG's responses with regard to increased public interest and participation in the conservation of nature in general reflected the decade long experiences of LMSG operating as a community co-management group. In general the responses to that issue indicate that, 1) LMSG's co-management group, composed of voluntary members, considers itself a beneficiary of a public trend toward the general public becoming more interested in and active in the conservation of nature, 2) LMSG and partners', e g MWP, approximately decade long successful co-management experience has demonstrated that collaborative co-management can be and is a viable protected area management option, 3) as a community partnership organization, co-management groups have greater ability than the more traditional types of agencies to influence general conservation policies, to access valuable conservation information and, in some cases, to be more successful in accessing scarce resources, 4) Co-management has the potential for becoming a major protected area conservation management player, 5) it has the capacity for managing more than one protected area within a relatively large local geographical area, and 6) the extent to which it becomes a major player depends on a long-term ongoing committed membership, a local community's sustained support, and the availability of the operating resources that are required for membership recruitment and education, for supporting the group's administration, as well as for obtaining professional advice and guidance for developing and implementing management strategies.

GRCA responses

Based on the GRCA respondents' expressed opinions: 1) currently the on-site Apps' Mill Conservation Area management, the purpose of which is the fulfillment of the five key objectives of the area's 1979 management plan, is applied in accordance with the holistic, integrative, and adaptive ecosystem management approach, which is in line with GRCA's current policy of focusing on the ecological communities and systems in which the communities exist, unless rare or endangered species are involved, or in cases in which management resources become available on the basis of being dedicated to dealing with specific species or issues. The following is a quote by one respondent, "The application of the holistic, integrative, and adaptive ecosystem management approach has gained wide acceptance in recent years. It is readily adapted to the conservation management of protected areas by focusing on the self-organizing ecological communities and the ecological systems in which they exist, which is where the focus needs to be", 2) liaisons between the socioeconomic/cultural component and the institutional component are good at the GRCA operational level. On the broader scale, they are acceptable at the technical information and technical assistance level. At the procurement of management resources level at the Apps' Mill Conservation Area, as is the case in general, accessing scarce conservation management resources is the on-site management agencies' prime source of dissatisfaction because, a) the resources that do become available, usually become available on a project by project basis, tied to performance timelines, b) the projects have to go through a lengthy justification prioritization process, which makes it difficult to plan ahead, c) the amount of funding is likely to change in line with changes in political policies, and d) when private landowners are involved, navigating the resources procurement process is often beyond the private

landowner's ability, and 3) GRCA operates in accordance with best management principles (sometimes referred to as best management practices), but, the great diversity that exists among the protected areas makes applying a standard set of best management principles unworkable.

The expressed opinions also indicate that in the absence of supporting statistics, there are indications of a) a trend among the general public, and private landowners toward greater concern for nature as well as greater involvement in conservation works, b) of greater stakeholder self entitlement, c) greater demand for access to protected areas, in particular around urban areas, which leads to the need for developing and administering access control measures, for which the required resources are difficult and often impossible to obtain, and d) that the idea of co-management does seem to be catching on, to have potential, to have some good qualities. Like all management adaptations it may also have some negative attributes. For example, as one respondent claimed, there is potential for a special interest segment within the group's membership to control the agenda for its own narrow interests to the detriment of the aspirations of the greater portion of the group and of the ecology.

MNR responses

Based on the expressed opinions of the MNR respondents, 1) at the provincial policies jurisdiction level best management principles do exist and are accessible through MNR, 2) the provincial policies and principles are constant across Southern Ontario, 3) the policies of municipalities and conservation authorities are variable, 4) on account of the many variables that exist among the protected areas, the best management principles have to be adjusted for each protected area's conditions, which causes the general application of a standard set of best management principles to be unworkable 5) liaisons between the

greater socioeconomic/cultural component and the institutional component vary from time to time and from location to location depending on how strong the attachments of both components are to their particular geographical area, 5) except when existing conditions, such as the presence of rare or endangered species are involved, or when the available resources have been dedicated to specific species or issues, MNR focuses on ecological communities, 6) on private lands, stakeholder accommodation is at the discretion of the landowner. On most public lands that have sufficient ecological carrying capacity there is stakeholder access accommodation under controlled conditions, and 7) the idea of co-management does have potential. It depends primarily on a community's capacity for sustaining it, and the availability of the required operating resources. As co-management gains more acceptance and becomes better established it is likely that stewardship groups could become quite proficient at organizing themselves and at raising the required resources.

CRR responses

Based on the CRR participants' responses: 1) CRR's on-site management principles are guided by its objective of conserving the reserve's natural self-organizing ecological communities in their existing natural state, and conserving the reserve's natural features, 2) its management strategies are focused on the self-organizing communities, along with guarding against the introduction of species, even native species, that are not compatible with the reserve's naturally occurring native species guilds, and 3) it is also committed to maintaining the reserve as a place of nature research and education ,within the limits of not negatively impacting the reserve's natural state, and the state of its natural ecological component.

Interviews Summary and General Comments

In order to determine whether the different agencies have the capability to manage in accordance with the standards of the evaluation framework, the above interview information that is based on what was interpreted as representing the majority of the expressed opinions among the respondents from each of the four participating agencies, was evaluated in accordance with the Chapter 3 evaluation framework. The outcomes of the evaluations, in accordance with the evaluation criteria and sub-criteria of the Chapter 3 evaluation framework, for each of the four participating agencies are illustrated in tabular form in Appendix 6. The "X" and "0" designations in the Appendix 6 evaluation outcomes tabulations, for each of the three basic protected area management components, indicate which of the protected area conservation management practices evaluation criteria the agencies do or do not address. Likewise, the "x" and "0" designations illustrate which of the evaluation sub-criteria the agencies' management practices do or do not address.

As was indicated by the interview responses, and within the Chapter 5 and 6 case study write-ups, due to each agencies' particular role within the very diverse scheme of Southern Ontario protected area management each agency implements its management practices' adaptations in a manner that suits the purpose of fulfilling its particular protected area conservation management role. Despite the variations in the management practice adaptations among the four agencies, and the variations that exist among the four agencies' operational scales, agency compositions, allotted powers, and degree of autonomy, according to the Appendix 6 evaluation tabulations all four agencies'

management practices satisfactorily address the evaluation framework's evaluation criteria for all three protected area management components.

With regard to the Appendix 6 tabulations, which list a limited number of differences among the sub-criteria that are addressed by each of the four agencies, it is reasonable to assume, based on the participants' general comments, that the differences are attributable to differences in the particular conservation management roles that each agency fulfills. For example, for sub-criterion 1d) constructing or enhancing aquatic-life habitat, the scope at which LMSG, GRCA, and MNR operate does on occasion involve dealing with aquatic habitats. CRR's operational scope does not so much.

The evaluation criteria and sub-criteria of the evaluation framework are based on the standards of the Chapter 3 set of best management principles, which in turn are based on the Chapter 3 literature review information, which was selected for its relevance to the current perceptions about the various aspects of protected areas, and their appropriate management, in accordance with the holistic, adaptive, and integrative ecosystem management approach, which takes into account the concerns of all three basic conservation management components. Thus, according to the evaluation outcomes as they are tabulated in Appendix 6 the management practices objective, of all four agencies, is to apply protected area conservation management in accordance with the holistic management approach.

However, among the Appendix 6 tabulations, and in the respondents' general comments, there are indications of, and references to conditions and situations, which impede progress toward achieving the most satisfactory Southern Ontario protected area conservation outcomes. For example, ecological component level, the tabulations

indicate that in some instances non-native species are used for restocking ecological communities. At the socioeconomic/cultural component level, protected area conservation management, as was referred to above, is influenced by a division of responsibilities. The greater socioeconomic/cultural community is responsible for providing and administering appropriate protected area conservation management policies, for establishing the on-site management agencies (the institutional component), and appropriately supporting them with operational resources and technical guidance. The interview participants were recruited on the basis of their current on-site Southern Ontario protected area conservation management experiences, and the interview process was conducted for the particular purpose of determining the current on-the-ground state of Southern Ontario protected area management practices. Therefore, with regard to official policies, whatever official policies do exist, the tabulations reflect the results of their on-site application by the four agencies, within the limits of their available resources and within the scope of their protected area conservation management role, and not the appropriateness of whatever policies do exist. The tabulation numbers illustrate dissatisfaction, in all four agencies, regarding the availability of operating resources.

At the institutional level the concern is the manner in which the management agencies carry out on-site management actions in accordance with the dictates of the socioeconomic/cultural component's policies, as they are set out in a protected area's existing management plan. According to the tabulations, there are two sub-criteria with which the agencies expressed dissatisfaction: 1) though all of the agencies manage in accordance with best management principles, none of the agencies work in accordance with a uniform standard set of best management principles, and all of the agencies

expressed dissatisfaction with the existing liaisons between the socioeconomic/cultural and the institutional (on-site management agencies) components at the procurement of operating resources level.

The general comments, beyond the formal, predetermined questions and options of the interview, of all four of the participating agencies' respondents about the current state of Southern Ontario management practices provides a clearer understanding than the Appendix 6 tabulations do, of the key existing factors that impede progress toward applying the holistic, integrative, and adaptive ecosystem management approach to the management of Southern Ontario's protected areas. These comments include: 1) a number of protected area managers still resist applying the holistic ecosystem management approach at the protected area level, which results in shifting toward and away from its application in step with changes in managers, 2) frequently scarce management resources become available on the basis of being applied for the benefit of a selected species, or single issues, instead of in a holistic manner, 3) official protected area management policies normally lag behind what actually happens on-site, where applying management for the benefit of the self-organizing ecological communities in their whole has become standard practice unless they are prevented from doing so on account of the above listed reasons, 4) a number of Southern Ontario protected area management plans have passed their review dates, and are therefore based on obsolete management standards, 5) it is not uncommon for agencies to have to develop a management plan, find required operational conservation management resources, and fulfill on-site management duties, which can be beyond the ability of some small agencies and likely of most private landowners, 6) rare or endangered species, and major

biological or geophysical disturbances were mentioned as factors complicating management, which in reality could likely be solved by applying the integrative and adaptive attributes of the ecosystem approach, and 7) in line with Shrubsole (1996), the ongoing, and into the foreseeable future, scarcity of available human and monetary resources for carrying out all types of environmental works has a negative impact on all aspects of protected area conservation management. Every aspect of protected area management requires some type of resources, including the development of management plans, which are meaningless if there are no available resources for implementing them. Based on the respondents' general comments, coming up with a remedy for solving the scarcity of available resources requires the development and maintaining of supportive government policies that remain stable over the long term, the general public's sustained support, and strong and stable economic conditions. Many of these are beyond the authority and combined capacities of that portion of the socioeconomic/cultural component which is directly involved in protected area on-site management.

Another issue, one that has arisen in both Chapter 4 and the interview process, concerns managing the protected areas in accordance with a uniform set of best management principles, such as the Chapter 3 set of small protected area best management principles, and evaluating management practices in accordance with an evaluation framework, whose evaluation criteria and sub-criteria are based on the best management principles. The respondents unanimously agree that managing in accordance with best management principles is essential but, in their opinions, managing in accordance with a uniform set of best management principles would be unworkable on account of the many diversities that exist among the various aspects of the protected

areas. However, it has become acceptable to employ the integrative and adaptive attributes of the holistic ecosystem management approach for managing in an integrative and adaptive manner, which provides a precedent for likewise applying a uniform set of best management practices in an integrative and adaptive manner.

The Evaluation Results

As was referred to above, the information was assembled for the purpose of deducing from it: 1) Whether the current on-site management practices of Southern Ontario protected area conservation management, in line with the goal of this exercise, are progressing toward the application of the holistic, integrative, and adaptive ecosystem management approach, 2) Whether Southern Ontario's various types of protected area on-site management agencies have available to them: a) adequate management support in the form of ready access to technical assistance, b) ready access to appropriate official protected area conservation management policies, in readily interpretable form, which is the responsibility of the greater socioeconomic/cultural component, c) ready access to protected area best management principles, and d) ready access to sufficient human and monetary management resources for maintaining, enhancing, or restoring, as the case may be, the protected areas' ecological component's self-organizing ecological communities' self-organizing integrity, and the essential natural processes of ecological systems in which the ecological component exists, 3) Despite the diversities among the various agencies, whether all of them are capable of and dedicated to managing in accordance with the holistic ecosystem approach in accordance with the standards on which the Chapter 3 evaluation framework is based.

The outcomes of the evaluation are examined in order of these goals and purposes. First, though perhaps less slowly than might be hoped for, due to the above listed

circumstance that impede it, steady progress is being made toward the general application of the holistic, integrative, and adaptive ecosystem management approach at the Southern Ontario protected area management level. The progress in applying the holistic ecosystem management approach at the protected area level is primarily driven at the on-site management level. According to a majority of the respondents' general comments, this is to be expected because trends in protected are conservation management normally become established, based on extended periods of on-site trial and error to determine best outcomes. It is only after prolonged successful on-site application that they are likely to become incorporated into official policies and plans. With regard to evaluation purpose 2a), a majority of the responses indicated that the availability of technical advice and assistance is satisfactory, within the limits of available resources. With regard to evaluation purposes: 2b) and 2c) diversity among the particular roles that the agencies fulfill are reflected in their responses. Although the greater socioeconomic/cultural component is responsible for providing official protected area management policies, and best management principles, MNR's unique role places it in the dual role of being responsible for administering policies and best management principles at the provincial level, as well as in the position of an on-site management agency. Thus, the MNR respondents are knowledgeable about existing policies and best management principles, as well as about their application. The GRCA respondents' responses indicate considerable familiarity with existing official policies and principles, which is likely attributable to its having been established, as were all of Southern Ontario's conservation authorities under the Ontario Conservation Act, as the leading government conservation agency at the river basin level. In contrast, operating as a small community special

interests conservation agency, CRR's responses indicate relative unfamiliarity with official policies and principles, and dissatisfaction on account of difficulty in accessing and interpreting them, which places an undue burden on their operating resources, which depend primarily on private donations. With regard to evaluation purpose 2d) all of the agencies' responses indicate dissatisfaction with the availability of resources, as well as with the difficulties that are encountered in accessing the resources that do become available. While some types of agencies appear to have greater success in accessing the available resources, according to a majority of the respondents' general comments, and in line with Shrubsole (1996), the scarcity of available resources has been ongoing for more than a decade, and is most likely the issue of the greatest concern for the on-site management agencies.

Those of the socioeconomic/cultural component that are directly involved in the on-site management of the protected areas, including MNR, find the situation frustrating because, other than letting their concerns be known, it is beyond their powers to correct the situation. Since, according to the majority of the respondents' general comments, a solution to the situation would only come about through a change in government policies and priorities, a change in the general public's appreciation of the natural world, and its willingness to support changes demand action, all of which tend to depend on good and stable economic conditions. Regarding evaluation purpose 3) The Appendix 6 tabulated evaluation outcomes illustrate that despite the great diversity among the different types of on-site management agencies, all are capable of managing in accordance with the holistic ecosystem management approach and addressing the framework's evaluation criteria, and adaptively integrating and addressing those sub-criteria that are applicable at an on-site

level, which indirectly indicates that all of them are also dedicated to managing in accordance with the holistic ecosystem management approach, and in accordance with the standards on which the Chapter 3 evaluation framework is based. The four participating agencies are representative of a general cross section of Southern Ontario's on-site protected area management agencies. Thus it may be assumed that the foregoing evaluation outcomes are generally representative of the current Southern Ontario protected area on-site conservation management practices which, despite a mixture of overarching positive gains and negative impediments, have progressed and continue to progress toward the application of the holistic, integrative, and adaptive ecosystem management approach, along with the adaptive integration of any associated abiotic and cultural issues directly into the management mix.

Chapter 8: Summary and Conclusions

This chapter includes a summary of the thesis, discussion of limitations and opportunities for future research, and identification of some recommendations to improve management of small protected areas in southern Ontario.

Summary and Results

This research utilized a literature review to develop a set of best management principles, and an associated evaluation framework, for small protected areas conservation management in southern Ontario (Chapter 3). The framework was then applied to a sample of eleven management plans and exercises (Chapter 4), and supplemented for two of those cases, the Lower Maitland and Apps Mill areas, with a series of interviews (Chapters 5 and 6).

The Chapter 3 literature review contained information relating to the three basic components of conservation management, which is recognized as being relevant to the currently held perceptions about the various aspects of the geophysical and biological entities of the protected areas, their cultural associations, and their conservation management. It provided the information on which to base: 1) the identification of the protected areas' self-organizing ecological communities as the basic unit to which the ecosystem management approach can appropriately be applied, 2) the protected area best management principles, and the protected area conservation management evaluation framework, which is based on the best management principles, 3) a set of guidelines by which to gauge the existing self-organizing integrity of the protected areas' ecological communities, and 4) evidence of the feasibility of applying the ecosystem management approach to the conservation management of the protected areas in its holistic, integrative, and adaptive form.

An examination of the information that became available as a result of applying the evaluation framework to the management plans of the Chapter 4 sample of eleven Southern Ontario protected areas, including the two case studies, draws attention to a number of anomalies including: 1) No two Southern Ontario protected areas are alike due to the wide ranging disparities, which exist among their geophysical and biophysical entities, their spatial areas, the number of particular valued protected area features for which each one of them is being conserved, their cultural associations, their rural versus urban locations, and the types of their on-site conservation management agencies. The integrative and adaptive attributes of the holistic ecosystem management approach do appear to make it the currently available best suited management approach for dealing with such an array of diversities. 2) It became apparent that a number of the existing management plans of Southern Ontario's protected areas have passed their review dates, which is bound to affect the manner in which they are being managed. A small amount of circumstantial evidence indicates that conservation management measures continue to be applied to protected areas whose management plans have passed their review dates. This can be interpreted as indicating that agencies like GRCA, which manage several protected areas, have adapted to the scarcity of available resources by applying whatever scarce monetary and human resources become available to dealing with issues as they arise over a greater geographical area, and moving away from proactively managing individual protected areas. The extensive changes that have taken place at Taquanyah, one of the four sites that was personally visited, and the good existing conditions in the other three protected areas that were personally visited, indicate that adapting such tactics is likely an acceptable approach for getting the best returns from scarce resources.

The prevalence of the scarcity of resources and of the uncertainty surrounding official conservation management policies are prominently indicated in the wording of one of the sample property plans, thus " resource stewardship initiatives and preparation of implementation...will be contingent upon the availability of funding and unforeseeable changes in priority and policy" (Parks Ontario's Ojibway Prairie Management Plan, 2002:7). 3) The considerable advances in general understanding and application of protected area conservation management practices between the 1970s and early 2000s, during which the sample plans are dated are reflected in the wording of the plans, and an indication of progress toward more holistic Southern Ontario protected area conservation management. The plans bearing the earlier dates more clearly focus on selected species and single issues. The wording of those that bear the later dates, for example, Parks Ontario's 2002 Ojibway Prairie Management Plan, typifies the approach to its management as "integrated ecosystem management" (Ojibway Prairie Management Plan, 2002:6). The LMSG's plan describes its mission as "To maintain and enhance the natural ecosystem of the Lower Maitland River Valley" (Strategic Watershed Plan for the Lower Maitland River Valley, 2002:4).

The Chapter 5 & 6 case studies were chosen to be generally reflective of the diversity which exists among the various aspects of Southern Ontario's protected areas. The on-site management agency of the first case study, the LMSG, is a community co-management group. It operates co-operatively with the private landowners, and concerned stakeholders of the Lower Maitland Valley, and in partnership with other Maitland Watershed conservation organizations, e.g. the Maitland Watershed Partnerships (MWP), with the MVCA, and with the Huron County Department of

Planning and Development. The prime management concern is "the maintenance and enhancement of the Lower Maitland Valley's natural ecosystem" (Strategic Watershed Plan for the Lower Maitland River Valley 2002:4) A unique characteristic of its management methods involves the identification of nine prominent valley themes, agriculture, development, fish and wildlife habitat, forest cover, monitoring and management, other resources, recreation, views and vistas, and water and landscape (geomorphology/hydrology), as well as the positive and negative effects which each of the themes can bring to bear on the valley's natural ecosystem. For counteracting the potential negative effects, and reinforcing the positive effects of the individual themes, a set of strategic actions were developed, and responsibility for carrying out the various elements of the strategic actions was delegated to appropriately qualified member(s) of the group and/or partners of the group.

LMSG's management plan is based on a long- term strategy. It does not set any fixed time achievement timelines. Thus the final outcomes depend on the long term commitment of a stable and committed membership and ongoing public support. There have been a number of notable achievements such as the development of individual farm management plans, worked out in cooperation with individual farmers. Also, based on the Lower Maitland River field observation exercises, it appears that there is general progress being made toward the achievement of management expectations as they are stated in LMSG's 2002 management plan.

In contrast to the first case study, the Apps' Mill Conservation Area is under the ownership and management of the Grand River Conservation Authority, one of Southern Ontario's main watershed level conservation agencies. GRCA exists and operates in

accordance with the Ontario's Conservation Act (Mitchell & Shrubsole 1992). Its management adaptations vary from site to site according to the on site conditions. The course of the conservation area's management was shaped by the conservation area's (1979) Master Management Plan. Therefore, the plan is worded in accordance with the more traditional species focused/single issues approach. As stated above, the conservation area's present-day prime conservation management's concerns revolve around the preservation of its cultural heritage, the historic Apps' Mill, the continuation of the staffing of its formal nature education center and the delivery of the center's nature education programs, and conserving, for the benefit of present and future generations, the conservation area's natural ecosystem features in order for it to continue functioning as a place of public learning about watershed processes and about nature in general.

In addition to their educational duties at the nature center the interpreters act as the main on-site management agents, in particular, with regard to ongoing monitoring of the conservation area's existing geophysical and biophysical conditions. Based on the field observation exercises that were carried out in connection with the case study, except for the uplands prairie-savannah-treed ecological community for which the required incremental burning has fallen behind, and the thinning of the dense tree plantations being overdue, the conservation area is in good ecological and physical condition. This, even though the Apps' Mill Conservation Area's management plan is dated 1979.

The Chapter 7 interview process involved participants from four agencies. The four agencies represent a typical cross section of the various types of agencies that engage in Southern Ontario protected area conservation management. Therefore, their responses to the interview questions, dealing with the three basic components of protected area

conservation management, not only express the individual respondent's personal experience-based opinions, but they also reflect, in general, the experiences of their particular type of agency, relative to its particular role and position within the general scheme of Southern Ontario protected area conservation management.

In general the responses to the ecological component questions indicate that: 1) There is inter-agency agreement that the holistic, integrative, and adaptive ecosystem approach, is the preferred management approach, and is applied on-site, unless rare or endangered species are involved, or when the available management resources have been dedicated for the benefit of selected species or specific issues. 2) The progress that is being made toward applying the ecosystem approach is being slowed down by the ongoing scarcity of available management resources for all types of environmental works, including the keeping up-to-date of management plans, the dedication of some resources to the species level, and less frequently particular manager's hesitancy toward the adoption of the ecosystem approach. 3) Rare and endangered species are important and essential to their ecosystems and must and do, to some extent, receive particular attention and preservation management. There is intra- and inter-agency acknowledgement of the important seed dispersal role that is fulfilled by wildlife. 4) There is general agreement about the need for providing suitable habitat for indigenous, year-round dwelling wildlife, and for seasonally dwelling migrating wildlife. There is a lack of agreement at both the intra- and inter-agency level about wildlife management policies for dealing with wildlife versus societal lifestyle and domestic animal interference, and for controlling wildlife populations due to the lack of natural predators. 5) There is general agreement that existing conditions in Southern Ontario preclude the expansion of most of the existing

protected areas' spatial size, and that whenever possible advantage should be taken of establishing interconnecting corridors in order to increase the protected areas' ecological connectivity. 6) Since, the majority of the protected areas are located on private lands, ecological community enhancement or establishment, for example, of tree plantations are often at the discretion of the landowner, usually influenced by the landowner's ability to bear the cost. However, there is general agreement that densely stocked monoculture type culturally established ecological communities resist natural successional regeneration processes, require ongoing expenditure of scarce management resources, and are likely less productive in the long-term than randomly spaced, less dense plantations, which require the expenditure of fewer resources and foster natural species regeneration. 7) Though the notion was raised that the protected areas should be managed for purely biological outcomes, there is a more general agreement among the respondents that based strictly on existing ecological conditions, while some protected areas should be managed for ecological benefits, other protected areas can, within their long-term natural ecological carrying capacity, be managed for both ecological benefits and for natural capital production benefits to society.

The responses to the socioeconomic/cultural component associated questions, indicate that in line with their particular protected area management role, i.e. of MNR, GRCA, LMSG, and CRR, there is a general feeling of decrease among the respondents regarding awareness of what official regulatory policies exist, the ability to access whatever provincial and municipal regulatory policies do exist, and understanding of how the policies apply to the particular role that they fulfill in protected area conservation management. The lack of familiarity with the policies was the leading reason given by

the relatively high number of participants that refrained from responding to a number of the questions that deal with policies, which is also reflected in the Appendix 5 tabulations.

Taking into consideration the foregoing, in general the responses indicate that whatever policies do exist, in written form, are scattered throughout various policy statements, revisions to policy statements, and the bylaws of the numerous municipalities. A review of the responses indicates that in general: 1) Existing policies do adequately identify what constitutes protected area natural, biological or ecological heritage, and less adequately what constitutes protected area abiotic and cultural heritage. 2) The policies do allow for human access to protected area natural capital, within their long-term natural ecological carrying capacity, but they do not provide guidelines by which to evaluate sustainable long-term carrying capacity. 3) Some of the policies focus on selected species and single issues. However they do not limit the possibility of focusing on the various types of self-organizing ecological communities, and the adaptive integration of any associated abiotic and cultural issues. 4) The policies single out soil erosion and soil conservation, water and wetlands conservation, and pollutant buffering and abatement as issues of particular importance. 5) There is general agreement among the respondents that on-site management practices are running ahead of policies in the progression toward the application of the holistic ecosystem approach, which is to be expected because protected area management trends normally become established based on longer-term best outcomes of on-site trial and error experiences. 6) Though the responses do not indicate that the policies deal with nature education in any specific manner, the importance of and need for nature education, whenever ecologically and culturally

feasible is clearly recognised in the responses. 7) On the issue of policies for the provision of appropriate long-term protected area conservation management for assuring long-term sustainability, there is general inter-agency agreement that there are no specific policies. Furthermore, the respondents' general comments indicate that since the mid-1990s, the on-site management agencies, regardless of which conservation management role they fulfill, have had to compete for the same scarce management resources, which come from such sources as discretionary government allotments and grants, and charitable donations from private sector organizations and from private citizens. Due to cyclical changes in government policies, general economic conditions, and the public's attitude about the importance of a healthy environment there have been fluctuations in the available resources for supporting protected area conservation management. As a result, it is impractical to plan long-term protected area conservation management strategies. 8) Due to policies that do exist being scattered throughout various provincial policy statements and various municipal bylaws there is no readily available comprehensive and comprehensible list of the existing policies, which places small non-government agencies like CRR at a disadvantage.

The responses to the institutional (on-site) management component questions indicate that: 1) There are existing official policies that identify some good protected area management principles. They mostly cover specific issues such as endangered species, significant wetlands and forests, and fish spawning areas, but there is not a comprehensive set of best management principles available. 2) There is inter-agency agreement that managing in accordance with best management principles is essential. However, as no two protected areas' geophysical and biological features, cultural

associations, and particular protected area valued features are alike, applying a single general set of good protected area management principles in a simple way is impractical. 3) A small number of the responses indicate that liaisons between the socioeconomic/cultural component and the institutional component are dysfunctional. However, in general there is considerable consensus that they are acceptable in the areas of technical advice and technical aid, and not acceptable in the area of securing management resources. 4) In some instances on-site management is still focused on selected species and single issues, mostly due to such prevailing circumstances as the discretionary dedication of available management resources for the conservation of a selected species. When there are no restrictions, except when rare or endangered species are involved, on-site management agencies strongly favor and apply a holistic management approach. 5) The consensus among the respondents is that during recent decades there has been a slow but consistent shift toward the application of the holistic management approach. The reasons for the slow progress are detailed in Chapter 7. There is also consensus that local knowledge is increasingly being integrated into the management process, and that there is an increase in the public's interest in, and participation in, conserving natural areas. 6) There is inter-agency agreement that in general stakeholder demands are increasing along with an increase in the stakeholder's sense of self entitlement, and although in the absence of any formal statistics, there are some indications that private landowners are becoming better stewards of their lands. 7) With respect to co-management, there is inter-agency agreement that co-management group membership, which consists of local individuals that have an attachment to the areas that they are managing, imparts a feeling of belonging and ownership, which results

in greater membership cohesion and willingness to co-operate. Co-management has the potential for becoming a major player in Southern Ontario protected area management. However, how many of Southern Ontario's numerous protected areas will eventually come under co-management is anyone's guess. There are a number of obstacles to overcome, including competing for scarce operating resources, membership recruitment and education, maintaining a long-term stable and dedicated membership consisting of volunteers, and the long-term support of the community. LMSG operates as a co-management group in partnership with such as the Maitland Watershed Partnerships co-management group. Both of these groups have had approximately a decade of successful co-management experiences, which shows that co-management is a viable protected area management option. Also the physical size of the areas that each group manages indicates that they are managing several protected areas, within a relatively large local geographical area at the same time.

Research Limitations and Future Research

This research was based on a limited, though broadly based sample of small protected areas in southern Ontario. Many of the cases did not have current management plans and other policy documents, which lead to some challenges in applying the management evaluation framework due to clear, and to be expected, incompatibilities between current BMPs and thirty year old BMPs. Some limitations were experienced in identifying managers and other stakeholders for interviews. Seeking the views of community members and other citizens involved less formally in small protected areas management would also be interesting. These cases were all government-agency run, it could be interesting to explore the approaches and experiences of NGO and private sector protected areas initiatives as well. A relatively standardized, closed ended set of questions

and criteria were used in this study, and there is room for more in-depth and open-ended study of a range of additional cases.

Conclusions and Recommendations

The results of each of the investigation phases allow deducing certain general conclusions. Chapter 3 illustrated the existence of a wide literature on protected areas' various ecological, socioeconomic/cultural aspects, and their appropriate conservation management. This permits the development of best management principles, a protected area management policies and practices evaluation framework, and the related guidelines to gauge self-organizing ecological community self-organizing integrity. The systematic application of an evaluation framework to a range of small southern Ontario protected areas generated some interesting results, and at the least suggests the need for more such evaluations, both internal and external to protected area management agencies. The application of the evaluation framework also allows some more specific conclusions.

Conclusions derived from the Chapter 4 eleven sample evaluation process include several key lessons. Keeping individual protected areas' management plans up-to-date is not current Southern Ontario protected area management practice. The reasons for this appear to be rooted in the prolonged ongoing scarcity of available resources, which is beyond the authority and capability of those who are directly involved in the protected areas' management to solve. Many southern Ontario protected areas are being conserved for several protected area valued features, while others are being conserved for one or a very limited number of valued protected area features, which makes generalizations difficult. Thus there is a need to update management plans, to apply the evaluation framework in an adaptive manner, and by extension a need to apply the set of best management principles in an adaptive manner to suit the on-site conditions.

Although many sample (and no doubt other) protected area plans were created as long ago as 1979, and are not based on current standards, it is reasonable to assume that achieving the plans' intended management outcomes would benefit the protected areas' ecosystems, and in most cases the greater environment. It is plans with more recent dates that refer to managing with a more holistic ecosystem management approach. These newer plans do indicate a definite shift toward applying a holistic ecosystem management approach, as well as a more agency-centric management approach.

Conclusions derived from the Chapter 5 and 6 case studies are also several and varied. At the base level, the objective of conserving Southern Ontario's protected areas is largely defined in terms of conserving those protected area attributes that constitute natural capital deemed beneficial to both nature and/or humans, in accordance with criteria that are of human design (which is in line with Noss 1987, Saunders et al. 1991, Miller & Hobbs 2002, Scheffer et al. 2002). The diversity of protected area on-site agencies, and the diversity of their on-site management adaptations, means that there is likely no single best type of management agency, and no single best set of on-site conservation management adaptations. A comparison of the LMSG outcomes, a result of a co-management approach based on ecosystem maintenance and/or ecosystem enhancement; with the outcomes of Apps Mill outsomes, which is managed by GRCA, a more traditional protected area management agency in accordance with present day management practices standards, indicates a shift toward the holistic management approach, as well as a shift toward the involvement of less traditional management adaptations.

The conclusions deduced from the Chapter 7 interview process concern all three components of conservation management. The conclusions that concern the ecological component include: If available operating resources are not otherwise constrained on-site management is usually carried out in accordance with a holistic ecosystem approach. Identified rare and endangered plant and animal species are usually afforded special protection and/or management. Although existing circumstances make it very difficult to expand Southern Ontario's protected area ecological influences, whenever it is possible natural corridors are being established. Some protected areas are managed for ecological benefits, others are managed for both ecological benefits and for the availability of natural capital benefits to humans. Wildlife is acknowledged as being an integral part of protected area ecosystems. But there is no inter- or intra-agency general consensus on how wildlife should be and is being managed.

The conclusions concerning the socioeconomic/cultural component are premised on its dual role in Southern Ontario protected area conservation management, as both component and conserver of ecosystems, but also as potential user of ecological service benefits, hopefully within ecosystems' long-term ecological carrying capacity. As well, the greater socioeconomic/cultural component has the responsibility for providing and administering appropriate official protected area conservation management policies, appropriate professional and technical support, and operating resources for the institutional component (the various on-site management agencies). While, providing official protected area conservation management policies is the responsibility of the greater socioeconomic/cultural component, according to the majority of the general comments of the interview participants, MNR's particular role includes the

administration of protected area policies at the provincial policies level. Also, the degree of autonomy under which all of the types of management agencies operate affords them limited power to "*adaptively*" apply the official policies in a manner that is best suited to the existing conditions of a particular protected area.

Because the interview respondents represented government agencies and non-government agencies, and since the government respondents appear to have an advantage in accessing and interpreting the existing policies, the responses largely interview results largely reflect the government/non-government split. Therefore, the following conclusions more closely represent the respondents' general comments than they do the detailed quantitative values in Appendix 5. Existing policies do identify what constitutes natural (biological) heritage quite well, and identify less well natural (non-biological) abiotic heritage, and cultural heritage. Existing policies make allowance for cultural access to natural capital, within the long-term natural ecological carrying capacity. But they do not provide guidelines by which to determine long-term ecological carrying capacity. Many current policies tend to focus on selected species and single issues, lagging behind what is actually being practiced at the on-site management level. There are no policies aimed at ensuring adequate protected area conservation into the future, which can be attributed to the uncertainty of operating resources becoming available. Small non-government agencies like CRR find themselves at a disadvantage with regard to accessing and interpreting whatever policies do exist. There are no policies that link protected areas with nature education, when and where existing ecological and cultural conditions are favorable for doing so, which most of the responses indicate should be basic to conservation efforts in general.

The conclusions deduced from the institutional component (on-site management agencies) are several. Good management principles do exist for some specific issues, e.g. for rare and endangered species, significant wetlands, significant forests, and fish spawning areas. No comprehensive set of best management principles exists. There is inter-agency consensus that the existing diversity of the protected areas makes the application of such a set of best management policies unworkable. Liaison between the institutional component and the socioeconomic/cultural component varies over time and from location to location, from being somewhat dysfunctional to satisfactory in the areas of professional and technical assistance, and unsatisfactory in the area of procuring operating resources. On-site conservation, except when rare or endangered species are involved, or when the available resources are otherwise dedicated, is holistically focused on self-organizing ecological communities. The majority of the responses indicate that co-management has its own types of positive and negative attributes, and fulfilling its potential hinges largely on a community's ongoing, long-term appreciation of its natural environment, on a community's continued commitment, and on the availability of human and financial resources.

From the preceding overview, several issues deserve fuller discussion and possible identification of necessary recommendations.

References to the difficulty of accessing adequate protected area conservation management resources were common throughout the various phases of the research process. The interview process respondents, from all four of the participating agencies, indicated that it has been an ongoing problem since the mid 1990s, which is in alignment with Shrubsole (1996). The government affiliated agencies' basic operating resources are

tied to annual budgetary allotments, of which only a limited portion is dedicated to protected area management in accordance with a list of priorities. Any additional resources must be procured through competition with all other types of agencies and special interest groups. The non-government affiliated agencies' operating resources depend on individual agency fund raising and on various grants that become available, from time to time, from governments and non-government sources, for which they must also compete with all other demands for the same resources.

The inter-agency consensus is that improvement in the availability of resources will most likely only come about through sustained public appreciation for the natural environment, its demands for action to be taken, its willingness to bear the cost of doing so, and on changes in government policies, all of which depend largely on stable, favorable economic conditions. But that said, one clear and necessary recommendation is for improved core funding for small protected areas management.

The interview participants' rejection of the idea of applying a uniform set of best management principles is cause for examining the issue. The best management principles were developed based on relevant academic literature. Therefore, the best management principles, and the evaluation criteria and sub-criteria of the evaluation framework, which are based on the individual best management principles, are well based in accordance with the currently held beliefs about the various aspects of protected areas and their appropriate management

The problem appears to be related to the practical application of the best management principles, and the evaluation framework at the on-site management level. The set of best management principles has the capacity for application to the evaluation

of management practices of multiple-purpose protected areas, of which no two Southern Ontario protected areas are alike, multiple purpose or otherwise. Since, it has become an accepted practice to apply the holistic integrative, and adaptive ecosystem management approach in an integrative and adaptive manner for dealing with a particular individual protected area's existing conditions, the precedent exists for the application of the management principles and the management practices evaluation framework's evaluation criteria and sub-criteria in a similar integrative and adaptive manner. There is a need for further work to identify core and more adaptable elements of best management principles, and to provide some guidance for how they might need modifying in different, representative, contexts.

As has been the case since protected areas have been afforded protective management, protected area management is applied variously and subjectively. Thus approaches to their management change with changes in the general public's beliefs about various aspects of protected areas and their appropriate management. Thus, additionally, protected area best management principles and evaluation frameworks have to change in parallel. This is also one of many reasons why the protected areas' management plans need to be kept up to date if the intent is to proactively manage at the individual protected area level. Thus it is highly to be recommended that protected area management plans be updated at least every ten years, for conceptual and policy reasons as well as practical management reasons. Management plan revision, and on-site management practices, would also benefit from preparing and appropriately disseminating a comprehensive list of current protected area conservation management policies in a readily accessible and in readily interpretable form.

It became apparent during the interview process that a good understanding of the inter-connections which naturally exist between and among the three components of protected areas conservation management, does have a positive influence on how protected area management practitioners view conservation management in general.

In line with the attainment of the goal of this exercise, and though less progressively than may be hoped for, the exercise identified a number of indicators that Southern Ontario protected area conservation management practices are shifting toward the application of the more holistic, integrative, and adaptive ecosystem approach, with a focus on the self-organizing ecological communities and ecosystems. On the institutional side it was clear there are some interesting precedents for collaborative and co-management of individual or networks of, protected areas. There are also suggestions in the interview results that, due to its integrative and adaptive attributes, the ecosystem approach also fosters bottom-up management involving local knowledge and professional inputs, and the accommodation of reasonable stakeholder demands. Further exploring these approaches, through case study research and supportive policy, is highly to be recommended.

Not all the research results were indicative of a good situation, or of only progress. As noted, the prime impediments in the progression toward applying the holistic ecosystem management approach is the scarcity of available resources. As a result there are indications that protected area management interventions have drifted from being proactive to becoming reactive. On the other hand, there are also examples of how being confronted with the shortage of resources has brought forth the adaptive resourcefulness of the agencies and individuals that are engaged in the management of the protected

areas. For example, the agency involved in the management of four of the Chapter 4 sample properties, of which the existing management plans have become outdated, adapted to the situation by applying whatever scarce resources became available to the protected areas' management issues over a greater geographical area rather than traditionally to single protected areas in turn. Also, as in the Apps Mill case, agencies and staff have adapted to the lack of up to date management plans by applying management in accordance with up to date management standards for achieving the stated objectives of an existing outdated plan.

On an optimistic note, it was encouraging to see the personal dedication to the cause of conserving protected areas, and conserving nature in general, and the breadth of knowledge and practical experience, of each individual interview participants. It strongly suggests that when acting as a cohesive group they are bound to advance the cause of protected area conservation and of the conservation of nature in general. They have already demonstrated that by advancing on-site management adaptation.

Beyond that, the Lower Maitland Project, provides an example of innovation, flexibility, and cooperation that many other areas could learn from. An outstanding feature of their approach is that it involves the community's citizens at large. During approximately a decade of co-management experiences LMSG and its partners have demonstrated that by fostering and taking advantage of individual knowledge and stewardship responsibility, much can be achieved even in the absence of substantial financial and other resources. This may be well be a key approach for small protected areas conservation management.

Appendices

Appendix 1 – Background on Management Plan & Policy Case Studies

A brief description of each of the eleven case study properties is provided here.

Site Number 1

Sample introduction

Property identification: Damascus Conservation Area

Date of plan: 1980 Timeframe of plan: 20 years
Property general location: West Luther Township Wellington County
Plan was prepared by; the Grand River Conservation Authority (GRCA)
Property classification: A multiple purpose conservation area
Distinctive property features: the property is a water source area, in which there is a 10 ha flood control reservoir
Property spatial area: 235 ha
The conservation management goal/s: the conservation and enhancement of the reservoir. The conservation, enhancement and restoration, as required, of the natural abiotic and biological attributes of the property, and providing and maintaining a general purpose recreation facility for the general local area
The type of on-site management agency: GRCA (the recreation facility is jointly managed by GRCA and the local municipality)

Sample Number 2

Site introduction;

Property identification: Chesney Wilderness Area

Date of plan: 1978 Timeframe of plan: no date given.
Property general location: Blanford/Blenheim Township, Oxford County.
Property classification: Wilderness Area.
Distinctive property features: Under previous ownership, approximately 20% of the property was cultivated. There is a 1¼ ha bog with floating sphagnum moss and boreal type vegetation and bog fringe type forest. A mixed forest, ranging from forested swamp to a small patch of upland maple forest occupies the remainder of the property. Although it is located within the northern reaches of the Carolinian vegetation zone, there is a prominent presence of boreal species in the lower wetland portion of the property. As is typical of natural wilderness there is a high rate of species diversity.
Property spatial area: 81 ha
The conservation management prime goal/s: Preserving its wilderness characteristics while making it available, on a limited basis, for research and to the general public by way of controlled scenic trail hiking.
The type of on-site management agency: GRCA.

Site Number 3

Sample introduction;

Property identification: Banister Lake Complex

Date of plan: 1979 Timeframe of plan: 5yr. Reviews, 20 yr. rewrite
Property general location: North Dumfries Township, Regional Municipality of Waterloo
Property classification: water source area, forest area, wilderness area, and an open area with picnic tables.
Distinctive property features: The property is an assembly of several land parcels. The F. W. R. Dickson wilderness area and the Wrigley Lake area are connected by a walkway. A regional road runs between them and the Banister Lake general area, which is separated from Fairlake by highway 24A. The 15 ha Cranberry Bog, which is included in the complex, is separate, located a few kilometers to the east of Fairlake
Property spatial area: 150 ha
The conservation management prime goal/s: protecting the natural features of the complex, providing opportunities for learning about nature in the wilderness area, maintaining a system of scenic trails in the Wilderness Area, Wrigley Lake, and Banister Lake areas, and a shoreline fishery on Banister Lake.
The type of on-site management agency: GRCA. (MNR involved in Fairlake's waterfoul rearing program)

Site Number 4

Sample introduction;

Property identification: Link Conservation Area

Date of plan: 1978 Time framework of plan: 8 yrs.
Property general location: Burford Township, Brant County
Property classification: Forest Conservation Area
Distinctive property features: a small forested property on poorly drained soil, and located along the edge of a larger block of forest
Property spatial area: 15.18 ha
The conservation management prime goal/s: conducting a 100 yr. rotation with a 10 yr. selective thinning silviculture program for encouraging natural regeneration, benefiting the forest and wildlife. Thinning focuses on removing diseased and misshapen trees, except den trees, and valuable to wildlife apple and hawthorn trees.
The type of on-site management agency: GRCA

Site Number 5

Sample introduction;

Property identification: Cedar Creek Watershed Project, which is a GREEN (Global Rivers Environmental Education Network) initiative

Date of plan: 1996 Time framework of plan: no date given.
Property general location: in Oxford County, including parts of the City of Woodstock and the Townships of Norwich and South-West Oxford, as well as the Towns of Sweaburg and Oxford Center

Property classification: The project is not centered on one particular area of the Cedar Creek Watershed. It is a GREEN initiative based on a wide scale watershed wide ongoing monitoring program, which involves voluntary upper level elementary and secondary school students under the guidance of, and in partnership with an education subcommittee and a technical subcommittee, consisting of volunteers from numerous organizations. As a group they engage in ongoing educational and monitoring programs, identifying and informing the appropriate conservation management agencies about areas within the watershed that require management's attention.
Distinctive property features: Approximately 12% of the watershed has vegetation cover. The landuses are 60% agriculture, 14% residential, 12% within urban center, 8% under environmental protection, 4% industrial/urban development, and 2% miscellaneous. The City of Woodstock's entire water needs come from an aquifer located in the western part of the watershed.
Property spatial area: 93 sq. km.
The conservation management prime goal/s: to improve the health of the watershed, and educate and involve the community
The type of on-site management agency: Upper Thames River Conservation Authority (UTRCA) along with the Cedar Creek GREEN partnership.

Site Number 6

Sample introduction;

Property identification: Taquanyah Conservation Area

Date of plan: 1979 Time framework: 5 yr. Reviews, 20 yr. Rewrites.
Property general location: North Cayuga Township, Regional Municipality of Haldimond-Norfolk.
Property classification: multiple purpose conservation area.
Distinctive property features: Approx 25% of property is woodland, 43% is marsh in combination with a water reservoir behind a dam on Mill Creek. The rest of the property is a mixture of meadow, old-field, parkland, and open space. The cultural landuse features include a multiple purpose nature center that is fully equipped for conducting formal nature education programs, a picnic area, swimming facilities, an information kiosk, and an extensive walking trail system.
Property spatial area: 136 ha.
The conservation management prime goal(s): The prime cultural goals are providing nature education for the region's elementary and secondary school students, opportunities for passive recreation, along with limited wildlife hunting in areas that are remote from the educational and passive recreation areas.
The type of on-site management agency: GRCA.

Site Number 7

Sample introduction;

Property identification: Glennie Property

Date of plan: 1977 Time framework of plan: 10 yrs.

Property general location: Town of Haldimond, Regional Municipality of Haldimond-Norfolk
Property classification: Forestry management area.
Distinctive property features: The property is made up of three separate parcels of land. Each parcel contains a natural hardwood woodlot. The remainder of each property is planted into coniferous tree species, along with a small number of red oak species, which have had their growth retarded by annual deer browsing. The three parcels, along with numerous other forest tracts in the general area, provide good quality wildlife habitat. There is one natural pond and two dug ponds, and an intermittent stream on the property.
Property spatial area: 40.47 ha.
The conservation management prime goal/s: In the short-term, managing the timber resources for the benefit of wildlife. In the long-term, it is thinning the stands of coniferous species in the plantations in order to encourage natural succession toward stands of mixed hardwood.
The type of on-site management agency: GRCA.

Site Number 8

Sample introduction;

Property identification: Jeffray Agro-ecological and Wildlife Farm

Date of plan: 1993-94 Time framework of plan: based on year over year progress.
Property general location: Turnberry Township, Huron County
Property classification: Agro-ecological and Wildlife Farm.
Distinctive property features: The farm is being operated as an Agro-ecological dairy goat operation/wildlife habitat farm.
Property spatial area: 80.85 ha.
The conservation management prime goal/s: steady progression toward low-till farming and development of enhanced wildlife habitat
The type of on-site management agency: Private landowner (technical assistance by Maitland Valley Conservation Authority and Ecological Farmers Association of Ontario.

Site Number 9

Sample introduction;

Property identification: Ojibway Prairie

Date of plan: 2002 Time framework of plan: 20 yrs.
Property general location: City of Windsor and Town of La Salle.
Property classification: Provincial Nature Reserve.
Distinctive property features: tallgrass prairie-oak-savannah.
Property spatial area: 65 ha.
The conservation management prime goal/s: preserving the integrity of the Ojibway prairie/oak savannah, and their contributions to Ontario's life science features and to heritage appreciation.
The type of on-site management agency: Ontario Ministry of Natural Resources, and Ontario Parks.

Site Number 10

Sample introduction;

Lower Maitland River Project (Case Study No. 1)

Date of plan: 2002
Property general location: Lower Maitland River Valley between the towns of Auburn and Goderich in the County of Huron.
Property classification: a stretch of river valley, in a mostly agricultural area, mostly private lands, some small to medium-small urban development.
Distinctive features: Upper portion of Lower Maitlant River flows adjacent to Wyoming Moraine. River bed in lower portion is deeply incised into bedrock.
The conservation management goal: the maintenance of the above average river valley's natural features.
Type of on-site management agency: a local co-management group, the Lower Maitland Stewardship Group (LMSG) in co-operation with the landowners, stakeholders, and interested partners.

Site 11 (Case Study No.2)

Sample introduction;

Apps' Mill Conservation Area

Date of plan: 1979
Property's general location: a short distance west of the City of Brantford, in the County of Brant.
Property classification: a general purpose conservation area.
Property spatial area: 104.5 ha.
The conservation goals: conserving the properties natural features as a place of learning about river basin processes and about nature in general, into the future, the continuous operation of the nature center's educational programs, and the preservation of its cultural heritage, the historic Apps' Mill.
Type of on-site management agency: the Grand River Conservation Authority (GRCA).

Appendix 2 – Detailed Results of the 11 Management & Policy Case Studies

The evaluation process outcomes for each of the sample plans' conservation management practices are recorded below.

Code: (the following designations are assigned based on an interpretation of each area's existing plans)
1 indicates that the sub-criterion is positively addressed.
0 indicates that the sub-criterion is not addressed or is addressed in a negative manner.
N/A indicates that the sub-criterion is not applicable, or that an interpretation of the plan does not justify either a 1 or a 0 designation.

1: Damascus Conservation Area

Section 1: Ecological component

Criteria	Sub-criteria
1A) the plan's long-term scope for managing the ecological communities' long/term self organizing integrity	a) management for their maintenance ---------- 1 b) management for their enhancement ---------- 1 c) management for their restoration ---------- 1
1B) holistic level of the approach to ecological community conservation management:	a) management based on whole communities---------- N/A b) management based on selected species---------- N/A c) provisions for conserving or preserving rare or endangered species---------- N/A
1C) ecological community enhancement or restoration	a) on whole ecological communities---------- 1 b) on a selection of species---------- 0
1D) managing with consideration for wildlife habitat within the ecological communities through:	a) promoting understorey vegetative growth---------- 1 b) conserving edge and internal habitat---------- 1 c) maintaining easily navigated aquatic/terrestrial pathways for wildlife species, which have alternating aquatic/terrestrial lifestyles---------- N/A d) enhancing or restoring habitat for aquatic wildlife-- N/A
1E) estabishing natural interconnections:	a) establishment of natural corridors---------- 1 b) establishment of access to native metapopulations---- 1

Section 2: Socioeconomic/cultural component

Criteria	Sub-criteria
2A) Management policies for cultural access to small	a) viewing and benefiting from aesthetic values---------- 1 b) gaining mental and physical renewal---------- N/A

protected area natural capital for:	c) environmentally friendly recreation---------- 1 d) ground rules for protecting the environment---------- 1 e) hygienic facilities---------- 1 f) visitors' safety measures---------- 1 g) other site-specific natural capital, if yes specify----- N/A h) provisions for nature education, if yes, specify-------- 1 (information kiosk and interpretive signage)
2B management policies for conserving, enhancing or restoring the abiotic attributes, and natural ecological processes:	a) water filtration---------- 1 b) water infiltration---------- 1 c) water conservation---------- 1 d) natural soil formation---------- 1 e) soil conservation---------- 1 f) waterborne pollutant buffering---------- 1 g) wetland protection, enhancement, or restoration------- 1 h) surface water systems protection, enhancement, or restoration---------- 1 i) erosion prevention or remediation---------- 1
2C) management policies for the ecological communities' long-term ecological self-organizing integrity:	a) conservation---------- 1 b) enhancement--- ---------- 1 c) restoration---------- 1 d) establishing natural corridors and networks---------- 1
2D) policies for co-operating with the institutional component:	a) providing plainly worded management objectives----- 1 b) maintaining working relationships with on-site management agency---------- 1 c) providing the institutional component with adequate operating resources---------- 1

Section 3: Institutional component

Criteria	Sub-criteria
3A) providing the on-site small protected area conservation management in accordance with:	a) existing policies and bylaw---------- 1 b) according to best management principles---------- 1 c) in co-operation with the socioeconomic/cultural component---------- 1
3B) applying management in a holistic, integrative, and adaptive manner:	a) management focused on ecological communities as a whole, not on species---------- 1 b) integration of abiotic and cultural issues holistically- 1 c) integration of stakeholder issues---------- 1 d) integration of professional input---------- 1 e) integration of local knowledge input---------- 1
3C) monitoring for:	a) ecological community self-organizing integrity------- 1 b) geophysical conditions---------- 1 c) biophysical conditions---------- 1 d) taking action, based on monitoring results---------- 1
3D) maintaining liaisons	a) obtaining technical assistance---------- 1

with the socioeconomic/cultural component for:	b) obtaining operating resources---------- 1

2 Chesney Wilderness Area

Section 1: ecological component

Criteria	Sub-criteria
1A) the plan's long-term scope for managing the ecological communities' long/term self organizing integrity	a) management for their maintenance ---------- 1 b) management for their enhancement ---------- 1 c) management for their restoration ---------- 1
1B) holistic level of the approach to ecological community conservation management:	a) conservation strategies based on whole communities- 1 b) conservation strategies based on selected species—N/A c) provisions for conserving or preserving rare or endangered species---------- N/A
1C) ecological community enhancement or restoration	a) whole ecological communities---------- N/A b) a selection of species---------- N/A
1D) managing with consideration for wildlife habitat within the ecological communities through:	a) promoting understorey vegetative growth---------- 1 b) conserving edge and internal habitat---------- 1 c) maintaining easily navigated aquatic/terrestrial pathways for wildlife species, which have alternating aquatic/terrestrial lifestyles---------- N/A d) enhancing or restoring habitat for aquatic wildlife-N/A
1E) estabishing natural interconnection	a) establishment of natural corridors---------- N/A b) establishment of access to native metapopulations- N/A

Section 2: Socioeconomic/cultural component

Criteria	Sub-criteria
2A) Management policies for cultural access to small protected area natural capital for:	a) viewing and benefiting from aesthetic values---------- 1 b) gaining mental and physical renewal---------- N/A c) environmentally friendly recreation---------- 0 d) ground rules for protecting the environment---------- 1 e) hygienic facilities---------- N/A f) visitors' safety measures---------- 1
	g) other site-specific natural capital, if yes specify----- N/A h) provisions for nature education, if yes, specify-------- 1 (limited research opportunities, 7 scenic trails with interpretive signage, outlook tower beside bog)
2B management policies for conserving, enhancing or restoring the abiotic attributes, and natural	a) water filtration---------- 1 b) water infiltration---------- 1 c) water conservation---------- 1 d) natural soil formation---------- 1

ecological processes:	e) soil conservation---------- 1 f) waterborne pollutant buffering---------- 1 g) wetland protection, enhancement, or restoration------ 1 h) surface water systems protection, enhancement, or restoration---------- 1 i) erosion prevention or remediation---------- N/A
2C) management policies for the ecological communities' long-term ecological self-organizing integrity:	a) conservation---------- 1 b) enhancement--- ---------- 1 c) restoration---------- N/A d) establishing natural corridors and networks---------- N/A
2D) policies for co-operating with the institutional component:	a) providing plainly worded management objectives----- 1 b) maintaining working relationships with on-site management agency---------- 1 c) providing the institutional component with adequate operating resources---------- 1

Section 3: The institutional component

Criteria	Sub-criteria
3A) providing the on-site small protected area conservation management in accordance with:	a) existing policies and bylaw---------- 1 b) according to best management principles---------- 1 c) in co-operation with the socioeconomic/cultural component---------- 1
3B) applying management in a holistic, integrative, and adaptive manner:	a) management focused on ecological communities as a whole, not on species---------- 1 b) integration of abiotic and cultural issues holistically-- 1 c) integration of stakeholder issues---------- 1 d) integration of professional input---------- 1 e) integration of local knowledge input---------- 1
3C) monitoring for:	a) ecological community self-organizing integrity------- 1 b) geophysical conditions---------- 1 c) biophysical conditions---------- 1 d) taking action, based on monitoring results---------- 1
3D) maintaining liaisons with the socioeconomic/cultural component for:	a) obtaining technical assistance---------- 1 b) obtaining operating resources---------- 1

SampleNo.3: Banister Lake Complex

Section 1: ecological component

Criteria	Sub-criteria

1A) the plan's long-term scope for managing the ecological communities' long/term self organizing integrity	a) management for their maintenance ---------- 1 b) management for their enhancement ---------- N/A c) management for their restoration ---------- N/A
1B) holistic level of the approach to ecological community conservation management:	a) conservation strategies based on whole communities- 1 b) conservation strategies based on selected species—N/A c) provisions for conserving or preserving rare or endangered species---------- N/A
1C) ecological community enhancement or restoration	a) whole ecological communities---------- N/A b) a selection of species---------- N/A
1D) managing with consideration for wildlife habitat within the ecological communities through:	a) promoting understorey vegetative growth---------- 1 b) conserving edge and internal habitat---------- 1 c) maintaining easily navigated aquatic/terrestrial pathways for wildlife species, which have alternating aquatic/terrestrial lifestyles---------- N/A d) enhancing or restoring habitat for aquatic wildlife-N/A
1E) estabishing natural interconnections:	a) establishment of natural corridors---------- 1 b) establishment of access to native metapopulations---- 1

Section 2: Socioeconomic/cultural component

Criteria	Sub-criteria
2A) Management policies for cultural access to small protected area natural capital for:	a) viewing and benefiting from aesthetic values---------- 1 b) gaining mental and physical renewal---------- N/A c) environmentally friendly recreation---------- 1 d) ground rules for protecting the environment---------- 1 e) hygienic facilities---------- 1 f) visitors' safety measures---------- 1 g) other site-specific natural capital, if yes specify----- N/A h) provisions for nature education, if yes, specify-------- 1 (information kiosk in wilderness area and interpretive signage along trails)
2B management policies for conserving, enhancing or restoring the abiotic attributes, and natural ecological processes:	a) water filtration---------- 1 b) water infiltration---------- 1 c) water conservation---------- 1 d) natural soil formation---------- 1 e) soil conservation---------- 1 f) waterborne pollutant buffering---------- 1 g) wetland protection, enhancement, or restoration------- 1 h) surface water systems protection, enhancement, or restoration---------- 1 i) erosion prevention or remediation---------- N/A
2C) management policies for the ecological	a) conservation---------- 1 b) enhancement--- ---------- 1

communities' long-term ecological self-organizing integrity:	c) restoration---------- N/A d) establishing natural corridors and networks---------- 1
2D) policies for co-operating with the institutional component:	a) providing plainly worded management objectives----- 1 b) maintaining working relationships with on-site management agency---------- 1 c) providing the institutional component with adequate operating resources---------- 1

Section 3The institutional component

Criteria	Sub-criteria
3A) providing the on-site small protected area conservation management in accordance with:	a) existing policies and bylaw---------- 1 b) according to best management principles---------- 1 c) in co-operation with the socioeconomic/cultural component---------- 1
3B) applying management in a holistic, integrative, and adaptive manner:	a) management focused on ecological communities as a whole, not on species---------- 1 b) integration of abiotic and cultural issues holistically-- 1 c) integration of stakeholder issues---------- 1 d) integration of professional input---------- 1 e) integration of local knowledge input---------- 1
3C) monitoring for:	a) ecological community self-organizing integrity-------- 1 b) geophysical conditions---------- 1 c) biophysical conditions---------- 1 d) taking action, based on monitoring results---------- 1
3D) maintaining liaisons with the socioeconomic/cultural component for:	a) obtaining technical assistance---------- 1 b) obtaining operating resources---------- 1

4: Link Conservation Area

Section 1: ecological component

Criteria	Sub-criteria
1A) the plan's long-term scope for managing the ecological communities' long/term self organizing integrity	a) management for their maintenance ---------- 1 b) management for their enhancement ---------- 1 c) management for their restoration ---------- N/A
1B) holistic level of the approach to ecological community conservation management:	a) conservation strategies based on whole communitiesN/A b) conservation strategies based on selected species--- N/A c) provisions for conserving or preserving rare or endangered species---------- N/A

1C) ecological community enhancement or restoration	a) whole ecological communities---------- 1 b) a selection of species---------- N/A
1D) managing with consideration for wildlife habitat within the ecological communities through:	a) promoting understorey vegetative growth---------- 1 b) conserving edge and internal habitat---------- 1 c) maintaining easily navigated aquatic/terrestrial pathways for wildlife species, which have alternating aquatic/terrestrial lifestyles---------- N/A d) enhancing or restoring habitat for aquatic wildlife -N/A
1E) establishing natural interconnections:	a) establishment of natural corridors---------- N/A b) establishment of access to native metapopulations- N/A

Section 2: Socioeconomic/cultural component

Criteria	Sub-criteria
2A) Management policies for cultural access to small protected area natural capital for:	a) viewing and benefiting from aesthetic values---------- 1 b) gaining mental and physical renewal---------- N/A c) environmentally friendly recreation---------- 0 d) ground rules for protecting the environment-------- N/Aa e) hygienic facilities---------- N/A f) visitors' safety measures---------- N/A g) other site-specific natural capital, if yes specify------- 1 (limited wintertime wildlife hunting) h) provisions for nature education, if yes, specify-------- 1 (limited research opportunities, 7 scenic trails with interpretive signage, outlook tower beside bog)
2B management policies for conserving, enhancing or restoring the abiotic attributes, and natural ecological processes:	a) water filtration---------- N/A b) water infiltration---------- N/A c) water conservation---------- N/A d) natural soil formation---------- N/A e) soil conservation---------- N/A f) waterborne pollutant buffering---------- N/A g) wetland protection, enhancement, or restoration---- N/A h) surface water systems protection, enhancement, or restoration---------- N/A i) erosion prevention or remediation---------- N/A
2C) management policies for the ecological communities' long-term ecological self-organizing integrity:	a) conservation---------- 1 b) enhancement--- ---------- 1 c) restoration---------- N/A d) establishing natural corridors and networks---------- N/A
2D) policies for co-operating with the institutional component:	a) providing plainly worded management objectives----- 1 b) maintaining working relationships with on-site management agency---------- 1 c) providing the institutional component with adequate operating resources---------- 1

Section 3: The institutional component

Criteria	Sub-criteria
3A) providing the on-site small protected area conservation management in accordance with:	a) existing policies and bylaw---------- 1 b) according to best management principles---------- 1 c) in co-operation with the socioeconomic/cultural component---------- 1
3B) applying management in a holistic, integrative, and adaptive manner:	a) management focused on ecological communities as a whole, not on species---------- 1 b) integration of abiotic and cultural issues holistically N/A c) integration of stakeholder issues---------- N/A d) integration of professional input---------- 1 e) integration of local knowledge input---------- N/A
3C) monitoring for:	a) ecological community self-organizing integrity-------- 1 b) geophysical conditions---------- N/A c) biophysical conditions---------- 1 d) taking action, based on monitoring results---------- 1
3D) maintaining liaisons with the socioeconomic/cultural component for:	a) obtaining technical assistance---------- 1 b) obtaining operating resources---------- 1

5: Cedar Creek Watershed GREEN Initiative.

Section 1) Ecological component

Criteria	Sub-criteria
1A) the plan's long-term scope for managing the ecological communities' long/term self organizing integrity	a) management for their maintenance ---------- 1 b) management for their enhancement ---------- 1 c) management for their restoration ---------- 1
1B) holistic level of the approach to ecological community conservation management:	a) conservation strategies based on whole communities--1 b) conservation strategies based on selected species—-N/A c) provisions for conserving or preserving rare or endangered species---------- N/A
1C) ecological community enhancement or restoration	a) whole ecological communities---------- 1 b) a selection of species---------- 0
1D) managing with consideration for wildlife habitat within the ecological communities through:	a) promoting understorey vegetative growth---------- 1 b) conserving edge and internal habitat---------- 1 c) maintaining easily navigated aquatic/terrestrial pathways for wildlife species, which have alternating aquatic/terrestrial lifestyles---------- N/A d) enhancing or restoring habitat for aquatic wildlife----1
1E) estabishing natural	a) establishment of natural corridors---------- 1

interconnections:	b) establishment of access to native metapopulations-- N/A

Section 2: Socioeconomic/cultural component

Criteria	Sub-criteria
2A) Management policies for cultural access to small protected area natural capital for:	a) viewing and benefiting from aesthetic values---------- 1 b) gaining mental and physical renewal---------- N/A c) environmentally friendly recreation---------- - 1 d) ground rules for protecting the environment--------- N/A e) hygienic facilities---------- N/A f) visitors' safety measures---------- N/A g) other site-specific natural capital, if yes specify----- N/A h) provisions for nature education, if yes, specify--------- 1 (Both classroom and practical field education provided under the GREEN program)
2B management policies for conserving, enhancing or restoring the abiotic attributes, and natural ecological processes:	a) water filtration---------- 1 b) water infiltration---------- 1 c) water conservation---------- 1 d) natural soil formation---------- 1 e) soil conservation---------- 1 f) waterborne pollutant buffering---------- 1 g) wetland protection, enhancement, or restoration------- 1 h) surface water systems protection, enhancement, or restoration---------- 1 i) erosion prevention or remediation---------- 1
2C) management policies for the ecological communities' long-term ecological self-organizing integrity:	a) conservation---------- 1 b) enhancement--- ---------- 1 c) restoration---------- 1 d) establishing natural corridors and networks---------- 1
2D) policies for co-operating with the institutional component:	a) providing plainly worded management objectives------ 1 b) maintaining working relationships with on-site management agency---------- 1 c) providing the institutional component with adequate operating resources---------- 1

Section 3: The institutional component

Criteria	Sub-criteria
3A) providing the on-site small protected area conservation management in accordance with:	a) existing policies and bylaw---------- 1 b) according to best management principles---------- 1 c) in co-operation with the socioeconomic/cultural component---------- 1
3B) applying management in a holistic, integrative,	a) management focused on ecological communities as a whole, not on species---------- 1

and adaptive manner:	b) integration of abiotic and cultural issues holistically-- 1 c) integration of stakeholder issues---------- 1 d) integration of professional input---------- 1 e) integration of local knowledge input---------- 1
3C) monitoring for:	a) ecological community self-organizing integrity-------- 1 b) geophysical conditions---------- 1 c) biophysical conditions---------- 1 d) taking action, based on monitoring results---------- 1
3D) maintaining liaisons with the socioeconomic/cultural component for:	a) obtaining technical assistance---------- 1 b) obtaining operating resources---------- 1

7: Taquanyah Conservation Area

Section 1) Ecological component

Criteria	Sub-criteria
1A) the plan's long-term scope for managing the ecological communities' long/term self organizing integrity	a) management for their maintenance ---------- 1 b) management for their enhancement ---------- 1 c) management for their restoration ---------- 1
1B) holistic level of the approach to ecological community conservation management:	a) conservation strategies based on whole communities---1 b) conservation strategies based on selected species---- N/A c) provisions for conserving or preserving rare or endangered species---------- 0
1C) ecological community enhancement or restoration	a) whole ecological communities---------- 1 b) a selection of species---------- N/A
1D) managing with consideration for wildlife habitat within the ecological communities through:	a) promoting understorey vegetative growth---------- 1 b) conserving edge and internal habitat---------- 1 c) maintaining easily navigated aquatic/terrestrial pathways for wildlife species, which have alternating aquatic/terrestrial lifestyles---------- N/A d) enhancing or restoring habitat for aquatic wildlife--N/A
1E) establishing natural interconnections:	a) establishment of natural corridors---------- N/A b) establishment of access to native metapopulations-- N/A

Section 2: Socioeconomic/cultural component

Criteria	Sub-criteria

2A) Management policies for cultural access to small protected area natural capital for:	a) viewing and benefiting from aesthetic values---------- 1 b) gaining mental and physical renewal---------- N/A c) environmentally friendly recreation---------- 1 d) ground rules for protecting the environment---------- 1 e) hygienic facilities---------- 1 f) visitors' safety measures---------- 1 g) other site-specific natural capital, if yes specify----- N/A h) provisions for nature education, if yes, specify-------- 1 (formal classroom and practical field education provided, an information kiosk, and interpretive signage)
2B management policies for conserving, enhancing or restoring the abiotic attributes, and natural ecological processes:	a) water filtration---------- 1 b) water infiltration---------- 1 c) water conservation---------- 1 d) natural soil formation---------- 1 e) soil conservation---------- 1 f) waterborne pollutant buffering---------- 1 g) wetland protection, enhancement, or restoration------- 1 h) surface water systems protection, enhancement, or restoration---------- 1 i) erosion prevention or remediation---------- 1
2C) management policies for the ecological communities' long-term ecological self-organizing integrity:	a) conservation---------- 1 b) enhancement--- ---------- 1 c) restoration---------- 1 d) establishing natural corridors and networks---------- N/A
2D) policies for co-operating with the institutional component:	a) providing plainly worded management objectives---- 1 b) maintaining working relationships with on-site management agency---------- 1 c) providing the institutional component with adequate operating resources---------- 1

Section 3: Institutional component

Criteria	Sub-criteria
3A) providing the on-site small protected area conservation management in accordance with:	a) existing policies and bylaw---------- 1 b) according to best management principles---------- 1 c) in co-operation with the socioeconomic/cultural component---------- 1
3B) applying management in a holistic, integrative, and adaptive manner:	a) management focused on ecological communities as a whole, not on species---------- 1 b) integration of abiotic and cultural issues holistically-- 1 c) integration of stakeholder issues---------- 1 d) integration of professional input---------- 1 e) integration of local knowledge input---------- N/A
3C) monitoring for:	a) ecological community self-organizing integrity-------- 1 b) geophysical conditions---------- 1

	c) biophysical conditions---------- 1 d) taking action, based on monitoring results---------- 1
3D) maintaining liaisons with the socioeconomic/cultural component for:	a) obtaining technical assistance---------- 1 b) obtaining operating resources---------- 1

7: Glennie Property

Section 1) Ecological component

Criteria	Sub-criteria
1A) the plan's long-term scope for managing the ecological communities' long/term self organizing integrity	a) management for their maintenance ---------- 1 b) management for their enhancement ---------- 1 c) management for their restoration ---------- 1
1B) holistic level of the approach to ecological community conservation management:	a) conservation strategies based on whole communities- 1 b) conservation strategies based on selected species----N/A c) provisions for conserving or preserving rare or endangered species---------- N/A
1C) ecological community enhancement or restoration	a) whole ecological communities---------- 1 b) a selection of species---------- N/A
1D) managing with consideration for wildlife habitat within the ecological communities through:	a) promoting understorey vegetative growth---------- 1 b) conserving edge and internal habitat---------- 1 c) maintaining easily navigated aquatic/terrestrial pathways for wildlife species, which have alternating aquatic/terrestrial lifestyles---------- N/A d) enhancing or restoring habitat for aquatic wildlife---N/A
1E) establishing natural interconnections:	a) establishment of natural corridors---------- 1 b) establishment of access to native metapopulations---N/A

Section 2: Socioeconomic/cultural component

Criteria	Sub-criteria
2A) Management policies for cultural access to small protected area natural capital for:	a) viewing and benefiting from aesthetic values---------- 0 b) gaining mental and physical renewal---------- 0 c) environmentally friendly recreation---------- 0 d) ground rules for protecting the environment---------- 0 e) hygienic facilities---------- N/A f) visitors' safety measures---------- N/A g) other site-specific natural capital, if yes specify----- N/A h) provisions for nature education, if yes, specify------ N/A
2B management policies for conserving, enhancing	a) water filtration---------- ------ 1 b) water infiltration---------- 1

or restoring the abiotic attributes, and natural ecological processes:	c) water conservation---------- 1 d) natural soil formation---------- 1 e) soil conservation---------- 1 f) waterborne pollutant buffering---------- 1 g) wetland protection, enhancement, or restoration----- N/A h) surface water systems protection, enhancement, or restoration---------- 1 i) erosion prevention or remediation---------- 1
2C) management policies for the ecological communities' long-term ecological self-organizing integrity:	a) conservation---------- 1 b) enhancement--- ---------- 1 c) restoration---------- 1 d) establishing natural corridors and networks---------- 1
2D) policies for co-operating with the institutional component:	a) providing plainly worded management objectives----- 1 b) maintaining working relationships with on-site management agency---------- 1 c) providing the institutional component with adequate operating resources---------- 1

Section 3: Institutional component

Criteria	Sub-criteria
3A) providing the on-site small protected area conservation management in accordance with:	a) existing policies and bylaw---------- 1 b) according to best management principles---------- 1 c) in co-operation with the socioeconomic/cultural component---------- 1
3B) applying management in a holistic, integrative, and adaptive manner:	a) management focused on ecological communities as a whole, not on species---------- 1 b) integration of abiotic and cultural issues holistically N/A c) integration of stakeholder issues---------- N/A d) integration of professional input---------- 1 e) integration of local knowledge input---------- N/A
3C) monitoring for:	a) ecological community self-organizing integrity-------- 1 b) geophysical conditions---------- N/A c) biophysical conditions---------- 1 d) taking action, based on monitoring results---------- 1
3D) maintaining liaisons with the socioeconomic/cultural component for:	a) obtaining technical assistance---------- 1 b) obtaining operating resources---------- 1

8: Jeffray Agro-ecological and Wildlife Farm

Section 1) Ecological component

Criteria	Sub-criteria

1A) the plan's long-term scope for managing the ecological communities' long/term self organizing integrity	a) management for their maintenance ---------- 1 b) management for their enhancement ---------- 1 c) management for their restoration ---------- 1
1B) holistic level of the approach to ecological community conservation management:	a) conservation strategies based on whole communities-- 1 b) conservation strategies based on selected species----- N/A c) provisions for conserving or preserving rare or endangered species---------- N/A
1C) ecological community enhancement or restoration	a) whole ecological communities---------- 1 b) a selection of species---------- N/A
1D) managing with consideration for wildlife habitat within the ecological communities through:	a) promoting understorey vegetative growth---------- 1 b) conserving edge and internal habitat---------- 1 c) maintaining easily navigated aquatic/terrestrial pathways for wildlife species, which have alternating aquatic/terrestrial lifestyles---------- 1 d) enhancing or restoring habitat for aquatic wildlife-----1
1E) establishing natural interconnections:	a) establishment of natural corridors---------- 1 b) establishment of access to native metapopulations—N/A

Section 2: Socioeconomic/cultural component

Criteria	Sub-criteria
2A) Management policies for cultural access to small protected area natural capital for:	a) viewing and benefiting from aesthetic values-------- N/A b) gaining mental and physical renewal---------- N/A c) environmentally friendly recreation---------- N/A d) ground rules for protecting the environment---------- 1 e) hygienic facilities---------- 1 f) visitors' safety measures---------- N/A g) other site-specific natural capital, if yes specify----- N/A h) provisions for nature education, if yes, specify------ N/A
2B management policies for conserving, enhancing or restoring the abiotic attributes, and natural ecological processes:	a) water filtration---------- ---------- 1 b) water infiltration---------- 1 c) water conservation---------- 1 d) natural soil formation---------- 1 e) soil conservation---------- 1 f) waterborne pollutant buffering---------- 1 g) wetland protection, enhancement, or restoration------- 1 h) surface water systems protection, enhancement, or restoration---------- 1 i) erosion prevention or remediation---------- 1
2C) management policies for the ecological communities' long-term ecological self-organizing	a) conservation---------- 1 b) enhancement--- ---------- 1 c) restoration---------- 1 d) establishing natural corridors and networks---------- 1

integrity:	
2D) policies for co-operating with the institutional component:	a) providing plainly worded management objectives----- 1 b) maintaining working relationships with on-site management agency---------- 1 c) providing the institutional component with adequate operating resources---------- 1

Section 3: Institutional component

Criteria	Sub-criteria
3A) providing the on-site small protected area conservation management in accordance with:	a) existing policies and bylaw---------- 1 b) according to best management principles---------- 1 c) in co-operation with the socioeconomic/cultural component---------- 1
3B) applying management in a holistic, integrative, and adaptive manner:	a) management focused on ecological communities as a whole, not on species---------- 1 b) integration of abiotic and cultural issues holistically-- 1 c) integration of stakeholder issues---------- N/A d) integration of professional input---------- 1 e) integration of local knowledge input---------- 1
3C) monitoring for:	a) ecological community self-organizing integrity-------- 1 b) geophysical conditions---------- 1 c) biophysical conditions---------- 1 d) taking action, based on monitoring results---------- 1
3D) maintaining liaisons with the socioeconomic/cultural component for:	a) obtaining technical assistance---------- 1 b) obtaining operating resources---------- 1

Sample 9: Ojibway Prairie

Section 1) Ecological component

Criteria	Sub-criteria
1A) the plan's long-term scope for managing the ecological communities' long/term self organizing integrity	a) management for their maintenance ---------- 1 b) management for their enhancement ---------- 1 c) management for their restoration ---------- 1
1B) holistic level of the approach to ecological community conservation management:	a) conservation strategies based on whole communities-- 1 b) conservation strategies based on selected species---- N/A c) provisions for conserving or preserving rare or endangered species---------- 1
1C) ecological community enhancement or restoration	a) whole ecological communities---------- 0 b) a selection of species---------- 1

1D) managing with consideration for wildlife habitat within the ecological communities through:	a) promoting understorey vegetative growth---------- N/A b) conserving edge and internal habitat---------- ---N/A c) maintaining easily navigated aquatic/terrestrial pathways for wildlife species, which have alternating aquatic/terrestrial lifestyles---------- N/A d) enhancing or restoring habitat for aquatic wildlife---N/A
1E) establishing natural interconnections:	a) establishment of natural corridors---------- N/A b) establishment of access to native metapopulations-- N/A

Section 2: Socioeconomic/cultural component

Criteria	Sub-criteria
2A) Management policies for cultural access to small protected area natural capital for:	a) viewing and benefiting from aesthetic values---------- 1 b) gaining mental and physical renewal---------- N/A c) environmentally friendly recreation---------- 1 d) ground rules for protecting the environment---------- 1 e) hygienic facilities---------- N/A f) visitors' safety measures---------- N/A g) other site-specific natural capital, if yes specify------- 1 (leased mineral rights for underground salt removal) h) provisions for nature education, if yes, specify-------- 1 (Information and interpretive brochure available at the adjacent Windsor Ojibway Park, and interpretive signage along walking trails. Also research opportunities by arrangement).
2B management policies for conserving, enhancing or restoring the abiotic attributes, and natural ecological processes:	a) water filtration---------- 1 b) water infiltration---------- 1 c) water conservation---------- 1 d) natural soil formation---------- 1 e) soil conservation---------- 1 f) waterborne pollutant buffering---------- N/A g) wetland protection, enhancement, or restoration----- N/A h) surface water systems protection, enhancement, or restoration---------- N/A i) erosion prevention or remediation---------- N/A
2C) management policies for the ecological communities' long-term ecological self-organizing integrity:	a) conservation---------- 1 b) enhancement--- ---------- 1 c) restoration---------- 1 d) establishing natural corridors and networks---------- N/A
2D) policies for co-operating with the institutional component:	a) providing plainly worded management objectives----- 1 b) maintaining working relationships with on-site management agency---------- 1 c) providing the institutional component with adequate *Operating resources are stated as being contingent upon their availability ----------1

Section 3: Institutional component

Criteria	Sub-criteria
3A) providing the on-site small protected area conservation management in accordance with:	a) existing policies and bylaw---------- 1 b) according to best management principles---------- 1 c) in co-operation with the socioeconomic/cultural component---------- 1
3B) applying management in a holistic, integrative, and adaptive manner:	a) management focused on ecological communities as a whole, not on species---------- 1 b) integration of abiotic and cultural issues holistically-- 1 c) integration of stakeholder issues---------- 1 d) integration of professional input---------- 1 e) integration of local knowledge input---------- 1
3C) monitoring for:	a) ecological community self-organizing integrity-------- 1 b) geophysical conditions---------- 1 c) biophysical conditions---------- 1 d) taking action, based on monitoring results---------- 1
3D) maintaining liaisons with the socioeconomic/cultural component for:	a) obtaining technical assistance---------- N/A b) obtaining operating resources---------- N/A

Sample 10 Lower Maitland River Project (Case Study No.1)

Section 1) Ecological component

Criteria	Sub-criteria
1A) the plan's long-term scope for managing the ecological communities' long/term self organizing integrity	a) management for their maintenance ---------- 1 b) management for their enhancement ---------- 1 c) management for their restoration ---------- 1
1B) holistic level of the approach to ecological community conservation management:	a) conservation strategies based on whole communities---1 b) conservation strategies based on selected species ----- 0 c) provisions for conserving or preserving rare or endangered species----------1
1C) ecological community enhancement or restoration	a) whole ecological communities---------- 1 b) a selection of species---------- 0
1D) managing with consideration for wildlife habitat within the ecological communities through:	a) promoting understorey vegetative growth---------- 1 b) conserving edge and internal habitat---------- 1 c) maintaining easily navigated aquatic/terrestrial pathways for wildlife species, which have alternating aquatic/terrestrial lifestyles---------- 1 d) enhancing or restoring habitat for aquatic wildlife---- 1

1E) establishing natural interconnections with other natural areas	a) establishment of natural corridors---------- 1 b) establishment of access to native metapopulations-----1

Section 2: Socioeconomic/cultural component

Criteria	Sub-criteria
2A) Management policies for cultural access to small protected area natural capital for:	a) viewing and benefiting from aesthetic values---------- 1 b) gaining mental and physical renewal—(implied)-------1 c) environmentally friendly recreation---------- 1 d) ground rules for protecting the environment---------- 1 e) hygienic facilities---------- N/A f) visitors' safety measures---------- N/A g) other site-specific natural capital, if yes specify------- 1 (fishing, hunting and aggregates) h) provisions for nature education, if yes, specify-------- 1 (educational opportunities to learn about and appreciation for the valley's resources, encouragement and direction for valley research).
2B management policies for conserving, enhancing or restoring the abiotic attributes, and natural ecological processes:	a) water filtration---------- 1 b) water infiltration---------- 1 c) water conservation---------- 1 d) natural soil formation---------- 1 e) soil conservation---------- 1 f) waterborne pollutant buffering---------- 1 g) wetland protection, enhancement, or restoration------- 1 h) surface water systems protection, enhancement, or restoration---------- 1 i) erosion prevention or remediation---------- 1
2C) management policies for the ecological communities' long-term ecological self-organizing integrity:	a) conservation---------- 1 b) enhancement--- ---------- 1 c) restoration---------- 1 d) establishing natural corridors and networks---------- 1
2D) policies for co-operating with the institutional component:	a) providing plainly worded management objectives----- 1 b) maintaining working relationships with on-site management agency---------- 1 c) providing the institutional component with adequate operating resources ---------- 1

Section 3: Institutional component

Criteria	Sub-criteria

3A) providing the on-site small protected area conservation management in accordance with:	a) existing policies and bylaw---------- 1 b) according to best management principles---------- 1 c) in co-operation with the socioeconomic/cultural component---------- 1
3B) applying management in a holistic, integrative, and adaptive manner:	a) management focused on ecological communities as a whole, not on species---------- 1 b) integration of abiotic and cultural issues holistically-- 1 c) integration of stakeholder issues---------- 1 d) integration of professional input---------- 1 e) integration of local knowledge input---------- 1
3C) monitoring for:	a) ecological community self-organizing integrity-------- 1 b) geophysical conditions---------- 1 c) biophysical conditions---------- 1 d) taking action, based on monitoring results---------- 1
3D) maintaining liaisons with the socioeconomic/cultural component for:	a) obtaining technical assistance---------- 1 b) obtaining operating resources---------- 1

Sample 11 Apps' Mill Conservation Area (Case Study No. 2)

Section 1) Ecological component

Criteria	Sub-criteria
1A) the plan's long-term scope for managing the ecological communities' long/term self organizing integrity	a) management for their maintenance ---------- 1 b) management for their enhancement ---------- 1 c) management for their restoration ---------- 1
1B) holistic level of the approach to ecological community conservation management:	a) conservation strategies based on whole communities--1 b) conservation strategies based on selected species---- N/A c) provisions for conserving or preserving rare or endangered species---------- 1
1C) ecological community enhancement or restoration	a) whole ecological communities---------- 1 b) a selection of species---------- N/A
1D) managing with consideration for wildlife habitat within the ecological communities through:	a) promoting understorey vegetative growth---------- 1 b) conserving edge and internal habitat---------- 1 c) maintaining easily navigated aquatic/terrestrial pathways for wildlife species, which have alternating aquatic/terrestrial lifestyles---------- 1 d) enhancing or restoring habitat for aquatic wildlife---- 1
1E) estabishing natural interconnections:	a) establishment of natural corridors---------- N/A b) establishment of access to native metapopulations-- N/A

Section 2: Socioeconomic/cultural component

Criteria	Sub-criteria
2A) Management policies for cultural access to small protected area natural capital for:	a) viewing and benefiting from aesthetic values---------- 1 b) gaining mental and physical renewal---------- N/A c) environmentally friendly recreation---------- 1 d) ground rules for protecting the environment---------- 1 e) hygienic facilities---------- 1 f) visitors' safety measures---------- 1 g) other site-specific natural capital, if yes specify--------1 (in season fishing) h) provisions for nature education, if yes, specify-------- 1 (a nature center, center's equipped and staffed to provide a comprehensive learning about nature program).
2B management policies for conserving, enhancing or restoring the abiotic attributes, and natural ecological processes:	a) water filtration---------- 1 b) water infiltration---------- 1 c) water conservation---------- 1 d) natural soil formation---------- 1 e) soil conservation---------- 1 f) waterborne pollutant buffering---------- 1 g) wetland protection, enhancement, or restoration------ 1 h) surface water systems protection, enhancement, or restoration---------- 1 i) erosion prevention or remediation---------- 1
2C) management policies for the ecological communities' long-term ecological self-organizing integrity:	a) conservation---------- 1 b) enhancement--- ---------- 1 c) restoration---------- 1 d) establishing natural corridors and networks---------- N/A
2D) policies for co-operating with the institutional component:	a) providing plainly worded management objectives----- 1 b) maintaining working relationships with on-site management agency---------- 1 c) providing the institutional component with adequate operating resources---------- 1

Section 3: Institutional component

Criteria	Sub-criteria
3A) providing the on-site small protected area conservation management in accordance with:	a) existing policies and bylaw---------- 1 b) according to best management principles---------- 1 c) in co-operation with the socioeconomic/cultural component---------- 1
3B) applying management in a holistic, integrative, and adaptive manner:	a) management focused on ecological communities as a whole, not on species---------- 1 b) integration of abiotic and cultural issues holistically--- 1 c) integration of stakeholder issues---------- 1 d) integration of professional input---------- 1 e) integration of local knowledge input---------- 1

3C) monitoring for:	a) ecological community self-organizing integrity-------- 1 b) geophysical conditions---------- 1 c) biophysical conditions---------- 1 d) taking action, based on monitoring results---------- 1
3D) maintaining liaisons with the socioeconomic/cultural component for:	a) obtaining technical assistance---------- 1 b) obtaining operating resources---------- 1

Appendix 3 – In-Depth Case Studies Interview Participant Consent Form

Wilfrid Laurier University

Information Letter/Consent Statement

Project title: Toward A More Holistic Approach To The Conservation Management Of Southern Ontario's Small Protected Areas.

Principal Investigator: Wilfred Tschirhart, PhD Candidate, Department of Geography and Environmental Studies, Wilfrid Laurier University.

Advisors: Derek, R. Armitage PhD, Department of Geography and Environmental Studies, and D. Scott Slocombe PhD, Department of Geography and Environment Studies, Wilfrid Laurier University.

Preliminary telephone invitation to individual prospective participants: You are invited to participate in a prepared question/answer interview type research project study. The purpose of your participation, in this study is for providing informed input, based on your protected area conservation management experiences. An analyzed version of the information that is contributed by all of those who consent to participant, and follow through with their participation, will be used in the development of a PhD thesis, the goal of which is conducting an investigation into whether the conservation of Southern Ontario's small protected areas could be better served. In order that participants can freely express their experiences, complete confidentiality and participant anonymity will be adhered to. Participants' replies will be recorded, in handwriting on prepared question-forms. The completed question forms will be in my sole safe keeping, and available for viewing only by my advisors, upon request. All the completed forms and the information thereon will be destroyed upon completion of the defense of the thesis. If you express an interest in participating I shall be glad to meet with you at a time and place that is convenient for you, at which time we can discuss all of the parameters within which the interviews are conducted and what becomes of the assembled information.

Follow-up meetings: The purpose of the follow-up meetings with individual prospective participants, who, over the phone, have expressed, an interest in consenting to participate is for clarifying such as the parameters within which the interviews are conducted, matters of confidentiality and participant anonymity, how the assembled information will be handled and used, all as is outlined under the participant characteristics and research study procedure section below and the confidentiality section below.

Participant characteristics and the research study procedure: Preliminary contact with prospective participants will be through telephone, at which time the telephone script as it is outlined under the preliminary telephone invitation to prospective participants section, above, will be used. Follow-up meetings, with those who express an interest in participating will focus on clarifying the following: 1) In order to obtain information that is relevant for its intended purpose, prospective participants are invited to participate on the basis of: a) having knowledge of the wide ranging disparities, which exist among the abiotic and biotic entities, as well as among the cultural associations of Southern Ontario's small protected areas, b) having practical ongoing, or having had, within recent decades, experience in the management of, or having firsthand knowledge concerning the management of one or the other of the Lower Maitland River or the

Apps' Mill Conservation Area, which have been selected for this interview study as well as for conducting more extensive case studies, and c) regardless of affiliation with or in the employment of any government agency, NGO, or stewardship group, or whether being a private landowner, each potential participant must indicate that he/she is in the position, in which he/she can freely express his/her personal experiences, 2) a one time, one on one, interview, of approximately one and one-half to two hours duration, will be conducted between the principle investigator and each individual consenting participant in the absence of any third parties. The interview format consists of a set of prepared questions, which deal with the three basic components of conservation management, the ecological, the socioeconomic/cultural, and the institutional components. Each participant is also encouraged to contribute comments, based on his/her practical experiences, 3) Each individual participant's replies will be noted, in hand writing, on individual question forms, initialed by the participant, and will be kept, in hand written form, in safe keeping, in the single care of, and accessible only by the principal investigator, and available, upon request only, for viewing by his two advisors, 4) If apart from the interview process a consenting participant wishes to contribute information, which he/she considers to be valuable to small protected area conservation management he/she must provide prior written consent, 5) an analyzed version of the question replies will be incorporated into a thesis, and all completed interview question forms, and the information thereon, will be destroyed upon completion of the thesis defense, 6) Upon completion of the incorporation of the analyzed version of all the information that has been assembled, into the thesis, and completion of the defense, a synopsis will be prepared, outlining the consenting participants' inputs and how that may contribute to the advancement of Southern Ontario protected area conservation. A copy of the synopsis will be delivered to each participant, which it is anticipated will be during the first half of 2008, 7) if the occasion should arise, there is a possibility that the analyzed version of the information, assembled through the interview process may appear in articles or presentations, apart from the thesis, and 8) If the potential participant decides to become a consenting participant, he/she will formalize his/her consent by signing the consent form.

Number of participants: It is anticipated that a minimum of twelve participants, whose small protected area conservation management experiences match the foregoing criteria, and who have association with management of, one or the other, of the two of Southern Ontario protected areas, which have been selected for this study, will consent to participate. No more than approximately one-half of the consenting participants will have direct association with the management of either one of the two selected areas.

Risks: There are no foreseeable risks on the part of the participants.

Benefits: The participants' involvement is on a voluntary basis. Thus in the short-term participants will benefit only from the satisfaction of contributing to the cause. In the long-term, their experience based information, which they contribute, in combination with information gleaned from a literature review of relevant published small protected conservation management literature, information gained from the case studies of two diverse Southern Ontario small protected areas, and information gained from a review of the existing management plans of another nine diverse Southern Ontario small protected areas, will likely provide a body of information upon which strategies for advancing the cause of Southern Ontario small protected area conservation can be based, to the benefit of the environment and to society.

Confidentiality: Any identifiable relationships between each participant and his/her replies to interview questions, as they are noted on his/her completed and initialed question form, and his/her anonymity will be kept strictly confidential. The completed question forms will be kept in a safekeeping facility under the single care of the principle investigator, with viewing access to

his two advisors only. Interviews will be conducted on a one time, one on one basis in the absence of any third parties. Participants may refuse to answer any of the questions, without giving reason for doing so. Participants may drop out of the interview process at any time during the questioning process. Upon dropping out, any information contained on the incomplete question form will be destroyed. If apart from the interview process, an individual participant wishes to contribute information which he/she considers to be beneficial to the exercise, and which may, or may not be identified with the participant, he/she must give prior written consent.

Compensation: Participants participate on a strictly voluntary basis.

Contacts: The University Research Ethics Board of Wilfrid Laurier University has approved this project, if at any time, as a participant, you have questions about the study or the procedures, you can contact Dr. Bill Marr, Chair University Research Ethics Board at 519-884-0710 Ext. 2468.

Advisor: Derek Armitage PhD, Assistant Professor Department of Geography and environmental Studies Wilfred Laurier, at 519-884-0710 Ext. 2653.

Prime Investigator: Wilfred Tschirhart, at 519-884-7345.

Feedback and Publication: Following analysis of all of the information, which will be assembled through the interviews process, and its incorporation into a thesis, a two or three page synopsis thereof will be compiled for distribution to all of the consenting participants. It is anticipated that the synopsis will be completed, ready for distribution during the first half of 2008.

Participant consent: I have read and understand the above information. I have received a copy of this form. I agree to participate in this study.

Participant's signature _____ Date _____

Investigator's signature _____ Date _____

Form revised June 22, 2007.

Appendix 4 – In-Depth Case Studies Interview Protocol

Introduction

There is recognition of complex intra-system relationships among the three basic components of conservation management, the ecological, the socioeconomic / cultural, and the institutional, as well as between the three components and the ecosystem within which they exist, and of which they are an integral part (Saunders et al. 1991, Munn 1993, Holling 1995, Mitchell 1997, Meffe & Carroll 1997, Lee et al 1998, The Nature Conservancy 2000, Primack 2000, Meffe et al. 2002, Scheffer et al. 2002, Miller & Hobbs 2002, Holling & Gunderson 2002, Plummer & Fitzgibbon 2004). Therefore, many of the conservation management issues that may be encountered are associated with more than one of the three basic management components. However, in all likelihood each one of them is more closely associated with one of the components than with the other two. Thus, the interview questions are arranged under three separate sub-headings.

To the individual consenting participant: You are invited, based on your personal protected area management experience, and within the context of your perception of the present day holistic, integrative and adaptive approach to conservation management to submit replies to the interview questions. Please do so in accordance with the contents of the consent form. If you do not fully understand what a question is asking, please ask for an explanation from the investigator, and thank you for participating.

Section 1: Management practices primarily associated with the ecological component.

Each small protected area's ecological component consists of its various types of self-organizing ecological communities. Without the long-term ecological self-organizing integrity of its ecological communities, and the integrity of the ecological systems in which the ecological communities exist, the area's protected status would become meaningless,(Holling 1995, Lee et al. 1998, The Nature Conservancy 2000, Primack 2000, Holling & Gunderson 2002). Thus, within the context of the ecological component's intra-system relationships with the other two management components:

1) In your experience, are small protected area conservation management practices focused on:

A) selections of individual species and single issues?
B) the natural self-organizing ecological communities, e. g. forest, prairie, savannah, swamp, etc, and adaptively integrating any associated abiotic and cultural issues directly into the management mix?

Other (explain)

A B Other

2) In conjunction with question 1, are there measures in place for conserving or preserving rare or endangered plant and animal species?

Yes No Other (explain)

3) When the ecological component's natural self-organizing integrity requires enhancement or restoration:

A) are enhancement or restoration measures applied to individually selected species?
B) are enhancement or restoration measures applied to the ecological communities as a whole?
C) are underlying abiotic or culturally causes addressed?

Other (explain)

A B C Other

4) In conjunction with question 3, when species population restocking is required:

A) does restocking consist of native species only?
B) does restocking consist of mixed native and non-native species?
C) does restocking consist of non-native species only?
D) does restocking vary from place to place, and from time to time?

Other (explain)

A B C D Other

5) In conjunction with question 4, when as is common with terrestrial ecological component restoration, tree plantations are resorted to:

A) is it the most general practice to establish monoculture densely spaced plantations?
B) is it the most general practice to establish randomly spaced, less densely spaced, mixed species plantations?
C) is it the most general practice to plant native species only?
D) is it the most general practice to plant a mixture of native and non-native species?
E) is it general practice to manage plantations as nurse crops for encouraging long-term regeneration of natural self-organizing ecological communities?
F) is it general practice to establish tree plantations for the purpose of producing a marketable product?

A B C D E F Other (Explain)

6) Since Southern Ontario's small protected areas are being conserved as relatively natural patches, representative of a former greater natural ecosystem, and the reservoirs of its indigenous plant and animal species, and thus the seed source for their perpetuation, as well as places for society to enjoy natural aesthetic values and for gaining physical and mental regeneration:

A) is it appropriate for them to be managed for the purpose of producing marketable products?
B) should they be managed for the sole purpose of having their ecological components mimic natural ecological processes, based on the birth, maturity, old age, death and regeneration cycle of their plant and animal living organisms?
C) should they be managed for the purpose of accommodating cultural stakeholders demands, within their long-term sustainable ecological carrying capacity?

A B C Other (explain)

7) Which of the following wildlife management practices are appropriate, considering that some of the wildlife species are year-round dwellers, and other species are migratory seasonal dwellers, e. g. neotropical migratory birds?

A) providing appropriate habitat?
B) maintaining both enforceable wildlife control and protection rules?
C) manage wildlife population size in line with lack of natural predators, and domestic interferences?

A B C Other (Explain)

8) When and where possible, should the small protected areas' influences, be expanded throughout their greater ecosystem?

Yes No If yes by:

A) adding to their physical spatial area,
B) establishing natural corridors or greenways to other natural areas?
C) taking advantage of nearby plant and animal metapopulations?
D) encouraging private landowners to become more actively involved?
E) encouraging stakeholders to become involved in personal stewardship, or with stewardship groups and co-management groups?

A B C D E Other (Explain)

Section 2: Management practices primarily associated with the socioeconomic/cultural component

The socioeconomic/cultural component occupies a pivotal position between the ecological and the institutional components. It has responsibility for developing and administering the small protected area management policies, and for the organization of and for providing adequate operating resources to the on-site small protected area conservation management agencies of the institutional component. As well it has responsibility for the development and administration of policies, which make provisions for, and the regulation of human access to the available small protected areas' natural capital, within their long-term sustainable ecological carrying capacity (Saunders et al. 1991, Meffe & Carroll 1997, Scheffer et al. 2000, Miller & Hobbs 2002, Meffe et al. 2002, Plummer & Fitzgibbon 2004). Thus, within the context of the socioeconomic/ cultural component's intra-system relationships with the other two basic components, and in recognition of Southern Ontario's basic conservation management policies, being embedded in Provincial Policy Statements, and municipal bylaws, which are incorporated into the municipalities' provincially approved Official Plans (Ontario Planning Act, Sect 3, Ontario Conservation Act Sects. 28 & 29, Ontario Provincial Policy Statement 1997, Ontario Natural Heritage Planning Manual 1999):

1 Do existing policies and bylaws provide a set of readily understandable and applicable directives for identifying

A) what constitutes small protected area conservable biological natural heritage?
B) what constitutes small protected area conservable abiotic natural heritage?
C) what constitutes small protected area conservable cultural heritage?

A B C Other (explain)

2) With regard to human access to the small protected areas' natural capital, which is available within the limits of the sustainable long-term ecological carrying capacity, do existing policies provide adequate guidance for managing in order for:

A) providing ready and equitable access to it by humans?
B) assuring visitor safety?
C) setting and enforcing ground rules?

A B C Other (explain)

3) In conjunction with question 2, which small protected area natural capital, if available within the long-term ecological carrying capacity, should the policies make available to the general public?

A) access for enjoying natural aesthetic values?
B) passive recreation opportunities, e.g. trail walking or jogging, birdwatching, swimming, canoeing, skiing, picnicking, etc?
C) more active organized sports type recreation? (except wheeled motorized land vehicles and motorized water craft)
D) horseback riding and snowmobiling?
E) opportunities for engaging in personal discovery and self education about nature?
F) opportunities for participating in formal type nature education where facilities are available?
G) harvesting small protected area bio-product?

0ther? (explain).

A B C D E F G Other (explain)

4) Do the existing provincial policy statements and municipal bylaws provide adequate guidance to small protected area conservation management agencies for practicing best management principles, regarding such basic issues as

A) water filtration?
B) water infiltration?
C) water conservation?
D) soil conservation?
E) natural soil formation (podsolization)?
F) waterborne pollutant buffering?
G) wetland protection, enhancement, or restoration?
H) surfaceewater-system protection, enhancement, or restoration?
I) erosion prevention or remediation?

A B C D E F G H I Other (explain)

5) Do policies, as they presently stand, advocate focusing small protected area conservation management on

A) selected species and individual issues?
B) the various types of ecological communities, and ecological systems in which the ecological communities exist, and on holistically and adaptively integrating any associated abiotic and cultural issues directly into the management mix?

A B Other (explain)

6) Do existing policies adequately assure ongoing quality small protected area conservation management by way of making available and assuring

A) sufficient operating resources for maintaining quality conservation management?
B) flexibility in order to adapt to newly discovered information and innovation?
C) compatible working relationships and continued liaisons between the socioeconomic/cultural and the institutional components?

A B C Other (explain)

7 Small protected areas are places where valuable nature education can take place, at different levels: A) in a very simple form the presence of humans within the areas provides opportunity for nature self-education, at a higher level it can take place through B) the provision of interpretive signage, C) by conducting guided tours, and D) at a formal level, where facilities and teaching staff are present, a combination of classroom and outdoor instructions are provided. At which levels, and where conditions are suitable, should educational opportunities be made available?

A B C D Other (explain)

Section 3: Management practices primarily associated with the institutional component.

The institutional component's primary role consists of, in liaison with the socioeconomic/cultural component, planning and carrying out the practical on-site small protected area management (Munn 1993, Mitchell 1997, Meffe & Carroll 1997, Meffe et al 2002). Thus, within the context of Southern Ontario small protected area conservation management and based on your experience:

1 Do existing policies and bylaws provide a set of uniformly applicable good small protected area management principles? Yes No

2 Since diverse types of agencies engage in small protected area conservation management, e. g. government agencies, NGOs, stewardship groups, and private landowners, would a uniform set of small protected area conservation management principles be

A) an aid for advancing the quality of small protected area conservation management?
B) unfeasible on a broad scale?
C) unnecessary?
D) a basic small protected area management requisite, in order to bring general uniformity to small protected area management?

A B C D Other (explain)

3 In general, do good liaisons exist between the socioeconomic/ cultural component and the institutional component for

A) facilitating the flow of technical advice and assistance?
B) securing operating resources?

A B Other (explain)

4 Is small protected area conservation management presently focused on

A) selected species and single issues as they arise?

B) on the various types of ecological communities in their whole, and adaptively integrating associated abiotic and cultural issues directly into the management mix, making accommodations for and regulating human access to available natural capital, and conducting follow-up monitoring?

A B Other (explain)

5 During the past two decades, has there been a trend in small protected area conservation management toward

A) applying a more holistic integrative and adaptive management approach?

B) integrating local knowledge into conservation management planning?

C) greater public interest in conserving small protected areas?

A B C Other (explain)

6 During the past two decades, has there been a trend toward

A) greater stakeholder demands for access to small protected areas?

B) stewardship groups becoming organized and involved in co-management?

C) private landowners becoming interested in practicing better stewardship on their lands?

A B C Other (explain)

7 In reference to local co-management groups, a co-management group's individual participants, in all likelihood, feel some attachment to, have well informed knowledge about, and have a personal interest in conserving the protected areas, with which the group becomes involved

A) is such a sense of individual protected area ownership reflected in the group's cohesion, in willingness to co-operate, and in the group's achievements?

Yes No Other (Explain)

B) Is there potential for local co-management becoming a major force in Southern Ontario small protected area conservation management?

Yes No Other (explain)

C) If the answer to B) is yes, what % of Southern Ontario's several hundreds of recognized and potential small protected areas are likely to eventually come under co-management? Less than 10% 11-20% 21-30% 31-40% Other

D) Is it likely, that on an ongoing basis, the availability of sufficient resources will be sustained for supporting the administration of, co-management groups, including the recruitment of participants, providing education for them, encouraging their continued participation, and providing the resources and technical assistance required for their field operations? Yes No Other (explain)

Initialed by:

Appendix 5 – Interview Responses by Agency

Section 1: Management practice primarily associated with the ecological component.

Question 1):
Based on your experiences are small protected area conservation management practices focused on:

A) selections of individual species and single issues?

B) the natural self-organizing ecological communities, e g, forest, prairie, savannah, swamp, etc, and adaptively integrating any associated abiotic and cultural issues directly into the management mix?

Other? (Explain)

Agencies	LMSG	GRCA	MNR	CRR	Total
No of responses per agency & total	7	8	3	2	20
No of yes responses for options A	3	1	2	1	7
B	5	6	3	1	15
Other		2			2

Question 2)
In conjunction with question 1, are there measures in place for conserving or preserving rare or endangered plant and animal species?

Yes No Other (Explain)

Agencies	LMSG	GRCA	MNR	CRR	Total
No of responses per agency & total	7	8	3	2	20
No of responses for Yes	7	7	2	1	17
No				1	
Other		1	1		2

Question 3):
When the ecological component's natural self-organizing integrity requires enhancement or restoration:

A) are enhancement or restoration measures applied to individually selected species?

B) are enhancement or restoration measures applied to the ecological communities as a whole?

C) are underlying abiotic or culturally causes addressed?

Other? (Explain)

Agencies	LMSG	GRCA	MNR	CRR	Total
No of responses per agency & total	7	8	3	2	20
No of yes responses for options A	3	4	2	1	10
B	4	7	3	1	15

C	3	5			8
Other					

Question 4):
In conjunction with question 3, when species population restocking is required:

A) does restocking consist of native species only?
B) does restocking consist of mixed native and non-native species?
C) does restocking consist of non-native species only?
D) does restocking vary from place to place, and from time to time?
Other? (Explain)

Agencies	LMSG	GRCA	MNR	CRR	Total
No of responses per agency & total	7	8	3	2	20
No of yes responses for options A	5	6	3	2	16
B	1	2			3
C		1			1
D	3	3			6
Other					

Question 5):
In conjunction with question 4, when as is common with terrestrial ecological component restoration, tree plantations are resorted to:

A. is it the most general practice to establish monoculture densely spaced plantations?
B. is it the most general practice to establish randomly spaced, less densely spaced, mixed species plantations?
C. is it the most general practice to plant native species only?
D. is it the most general practice to plant a mixture of native and non-native species?
E. is it general practice to manage plantations as nurse crops for encouraging long-term regeneration of natural self-organizing ecological communities?
F. is it general practice to establish tree plantations for the purpose of producing a marketable product?

Other? (Explain)

Agencies	LMSG	GRCA	MNR	CRR	Total
No of responses per agency & total	6	8	3	2	19
No of yes responses for options A	2	2			4
B	3	4	1	1	9
C	3	4	1	1	9
D	2		1	1	4
E	5	4	3		12
F	1				1
Other	1	1			2

Question 6)

Since Southern Ontario's small protected areas are being conserved as relatively natural patches, representative of a former greater natural ecosystem, and the reservoirs of its indigenous plant and animal species, and thus the seed source for their perpetuation, as well as places for society to enjoy natural aesthetic values and for gaining physical and mental regeneration:

A) is it appropriate for them to be managed for the purpose of producing marketable products?
B) should they be managed for the sole purpose of having their ecological components mimic natural ecological processes, based on the birth, maturity, old age, death and regeneration cycle of their plant and animal living organisms?
C) should they be managed for the purpose of accommodating cultural stakeholders demands, within their long-term sustainable ecological carrying capacity?

Other? (Explain)

Agencies	LMSG	GRCA	MNR	CRR	Total
No of responses per agency & total	7	8	3	2	20
No of yes responses for options A	1	2	1		4
B	3	6	1	1	11
C	5	4		1	10
Other	1	1	1	1	4

Question 7):
Which of the following wildlife management practices are appropriate, considering that some of the wildlife species are year-round dwellers, and other species are migratory seasonal dwellers, e g, neotropical migratory birds?

A) providing appropriate habitat?
B) maintaining both enforceable wildlife control and protection rules?
C) manage wildlife population size in line with lack of natural predators, and domestic interferences?

Other? (Explain)

Agencies	LMSG	GRCA	MNR	CRR	Total
No of responses per agency & total	6	8	3	2	19
No of yes responses for options A	6	7	1	2	16
B	2	5	1	1	9
C	3	5		1	9
Other			1		1

Question 8):
When and where possible, should the small protected areas' influences, be expanded throughout their greater ecosystem?

Yes No

Agencies	LMSG	GRCA	MNR	CRR	Total
No of responses per agency & total	7	7	3	2	19
No of responses for Yes	7	7	3	2	19

No of responses for	No					

If yes by:

A) adding to their physical spatial area,
B) establishing natural corridors or greenways to other natural areas?
C) taking advantage of nearby plant and animal metapopulations?
D) encouraging private landowners to become more actively involved?
E) encouraging stakeholders to become involved in personal stewardship, or with stewardship groups and co-management groups?

Other? (Explain)

Agencies	LMSG	GRCA	MNR	CRR	Total
No of responses per agency & total	7	7	3	2	19
No of yes responses for options A	6	5	2	2	15
B	6	5	2	2	15
C	5	3	1	2	11
D	5	6	1	2	14
E	6	7	2	2	17
Other		1			1

Section 2: Management practices primarily associated with the socioeconomic/cultural component

Question 1)
Do existing policies and bylaws provide a set of readily understandable and applicable directives for identifying

A) what constitutes small protected area conservable biological heritage?
B) what constitutes small protected area conservable abiotic natural heritage?
C) what constitutes small protected area conservable cultural heritage?

Other? (Explain)

Agencies	LMSG	GRCA	MNR	CRR	Total
No of responses per agency & total	7	5	3	1	16
No of yes responses for options A	7	3	2		12
B	2	2	1		5
C	1	1	1		3
Other	1		1	1	3

Question 2);
With regard to human access to the small protected areas' natural capital, which is available within the limits of the sustainable long-term ecological carrying capacity, do existing policies provide adequate guidance for managing in order for providing ready and equitable access to it by humans?

A) providing ready and equitable human to available natural capital
B) assuring visitor safety?
C) setting and enforcing ground rules?

Other (explain)

Agencies	LMSG	GRCA	MNR	CRR	Total
No of responses per agency & total	6	8	3	1	18
No of yes responses for options A	3	4	1		8
B		5			5
C	2	5			7
Other	3	1	2	1	7

Question 3):
In conjunction with question 2, which small protected area natural capital, if available within the long-term ecological carrying capacity, should the policies make available to the general public?

A) access for enjoying natural aesthetic values?
B) passive recreation opportunities, e.g. trail walking or jogging, birdwatching, swimming, canoeing, skiing, picnicking, etc?
C) more active organized sports type recreation? (except wheeled motorized land vehicles and motorized water craft)
D) horseback riding and snowmobiling?
E) opportunities for engaging in personal discovery and self education about nature?
F) opportunities for participating in formal type nature education where facilities are available?
G) harvesting small protected area bio-product?
Other? (explain).

Agencies	LMSG	GRCA	MNR	CRR	Total
No of responses per agency & total	7	8	3	1	19
No of yes responses for options A	7	7	2	1	17
B	7	6	2	1	16
C		4			4
D	2	2			4
E	4	7	1	1	13
F	5	7	1	1	14
G	2	4	1		7
Other			1		1

Question 4:
Do the existing provincial policy statements and municipal bylaws provide adequate guidance to small protected area conservation management agencies for practicing best management principles, regarding such basic issues as

A) water filtration?
B) water infiltration?
C) water conservation?
D) soil conservation?
E) natural soil formation (podsolization)?
F) waterborne pollutant buffering?

G) wetland protection, enhancement, or restoration?
H) surfacewater-system protection, enhancement, or restoration?
I) erosion prevention or remediation?
Other (Explain)

Agencies	LMSG	GRCA	MNR	CRR	Total
No of responses per agency & total	6	7	3	1	17
No of yes responses for options A		4	1		5
B		5	1		6
C	1	3	1		5
D			1		1
E					
F	1	4			5
G	5	5	1		11
H	2	5	1		8
I	2	5			7
Other	1		2	1	4

Question 5):
Do policies, as they presently stand, advocate focusing small protected area conservation management on

A) selected species and individual issues?
B) the various types of ecological communities, and ecological systems in which the ecological communities exist, and on holistically and adaptively integrating any associated abiotic and cultural issues directly into the management mix?

Other? (explain)

Agencies	LMSG	GRCA	MNR	CRR	Total
No of responses per agency & total	7	7	3	1	18
No of yes responses for options A	4	5	2		11
B	2	4	2	1	9
Other	1	1	1		3

Question 6):
Do existing policies adequately assure ongoing quality small protected area conservation management by way of making available and providing assurance for

A) sufficient operating resources for maintaining quality conservation management?
B) flexibility in order to adapt to newly discovered information and innovation?
C) compatible working relationships and continued liaisons between the socioeconomic/cultural and the institutional components?

Other? (Explain)

Agencies	LMSG	GRCA	MNR	CRR	Total
No of responses per agency & total	6	6	3	1	16

No of yes responses for options A	1				1
B	1	4	1		6
C	3	2	1		6
Other	3	1	1	1	6

Question 7):
Small protected areas are places where valuable nature education can take place, at different levels: A) in a very simple form the presence of humans within the areas provides opportunity for nature self-education, at a higher level it can take place through B) the provision of interpretive signage, C) by conducting guided tours, and D) at a formal level, where facilities and teaching staff are present, a combination of classroom and outdoor instructions are provided. At which levels, and where conditions are suitable, should educational opportunities be made available?

Agencies	LMSG	GRCA	MNR	CRR	Total
No of responses per agency & total	7	8	3	1	19
No of yes responses for options A	5	6	2	1	14
B	5	5	2	1	13
C	4	5	2	1	12
D	5	8	2	1	16
Other	1				1

Section 3: Management practices primarily associated with the institutional component.

Question 1):
Do existing policies and bylaws provide a set of uniformly applicable good small protected area management principles?
Yes No

Agencies	LMSG	GRCA	MNR	CRR	Total
No of responses per agency & total	7	8	3	1	19
No of responses for Yes	3	3	2		8
No of responses for No	4	5	1	1	11

Question 2):
Since diverse types of agencies engage in small protected area conservation management, e g, government agencies, NGOs, stewardship groups, and private landowners, would a uniform set of small protected area conservation management principles be
A) an aid for advancing the quality of small protected area conservation management?
B) unfeasible on a broad scale?
C) unnecessary?
D) a basic small protected area management requisite, in order to bring general uniformity to small protected area management?
Other? (Explain)

Agencies	LMSG	GRCA	MNR	CRR	Total
No of responses per agency & total	7	8	3	2	20
No of yes responses for options A	4	6		2	12
B	1	1	2	1	5
C			1		1
D	2	4			6
Other	2				2

Question 3):

In general, do good liaisons exist between the socioeconomic/ cultural component and the institutional component for

A) facilitating the flow of technical advice and assistance?

B) securing operating resources?

Other? (Explain)

Agencies	LMSG	GRCA	MNR	CRR	Total
No of responses per agency & total	6	6	3	2	17
No of yes responses for options A	4	4	1	1	10
B	3	2		1	6
Other	2	2	2	1	7

Question 4):

Is the on-site small protected area conservation management presently focused on

A) selected species and single issues as they arise?

B) on the various types of ecological communities in their whole, and adaptively integrating associated abiotic and cultural issues directly into the management mix, making accommodations for and regulating human access to available natural capital, and conducting follow-up monitoring?

Other? (Explain)

Agencies	LMSG	GRCA	MNR	CRR	Total
No of responses per agency & total	5	6	3	2	16
No of yes responses for options A	3	2	2	1	8
B	2	5	3	2	12
Other					

Question 5):

During the past two decades, has there been a trend in small protected area conservation management toward

A) applying a more holistic integrative and adaptive management approach?

B) integrating local knowledge into conservation management planning?

C) greater public interest in conserving small protected areas?

Other? (Explain)

Agencies	LMSG	GRCA	MNR	CRR	Total
No of responses per agency & total	7	8	3	2	20

No of yes responses for options A	7	7	2	1	17
B	6	4	2	1	13
C	6	7	3	2	18
Other					

Question 6):
During the past two decades, has there been a trend toward

A) greater stakeholder demands for access to small protected areas?
B) stewardship groups becoming organized and involved in co-management?
C) private landowners becoming interested in practicing better stewardship on their lands?

Other? (Explain)

Agencies	LMSG	GRCA	MNR	CRR	Total
No of responses per agency & total	7	8	3	2	20
No of yes responses for options A	4	7	2	2	15
B	7	8	3	2	20
C	6	7	3	1	17
Other					

Question 7:
In reference to local co-management groups, a co-management group's individual participants, in all likelihood, feel some attachment to, have well informed knowledge about, and have a personal interest in conserving the protected areas, with which the group becomes involved

7A) is such a sense of individual protected area ownership reflected in the group's cohesion, in willingness to co-operate, and in the group's achievements?

Yes No Other (Explain)

Agencies	LMSG	GRCA	MNR	CRR	Total
No of responses per agency & total	6	6	3	1	17
No of responses for Yes	6	6	3	1	17
No					
Other					

7B) is there potential for local co-management becoming a major force in Southern Ontario small protected area conservation management?

Yes No Other (explain)

Agencies	LMSG	GRCA	MNR	CRR	Total
No of responses per agency & total	7	7	3	1	18
No of responses for Yes	6	7	2	1	16
No	1				1
Other			1		1

7C) if the answer to B) is yes, what % of Southern Ontario's several hundreds of recognized and potential small protected areas are likely to eventually come under co-management? Less than 10% 10-20% 21-30% 31-40% Other

Agencies	LMSG	GRCA	MNR	CRR	Total
No of responses per agency & total	5	6	2	1	14
No of yes responses for options <10%		1		1	2
10-20%	1	2	1		4
21-30%	3	3			6
31-40%			1		1
Other	1				1

7D) is it likely, that on an ongoing basis, the availability of sufficient resources will be sustained for supporting the administration of, co-management groups, including the recruitment of participants, providing education for them, encouraging their continued participation, and providing the resources and technical assistance required for their field operations?

Agencies	LMSG	GRCA	MNR	CRR	Total
No of responses per agency & total	6	7	3	1	17
No of responses for Yes	2	1	1	1	5
No	3	4	1		8
Other	1	2	1		4

Appendix 6 – Application of Evaluation Framework to Interview Responses

Based on what was interpreted as representing the majority of the expressed opinions of the respondents of each of the four participating agencies, the purpose here is to evaluate the agencies' management practices in accordance with the Chapter 3 evaluation framework, which is based on the standards of the Chapter 3 set of best management principles. The response evaluation outcomes are illustrated in tabular form below in the following manner, an "X" indicates that an evaluation criterion is addressed, and a "0" indicates that it is not addressed. In like manner a small case "x" indicates that a sub-criterion is addressed, and a"0" indicates that it is not addressed.

Section 1: Ecological component

Criteria and sub-criteria	LMSG	GRCA	MNR	CRR
1A) Management for maintaining, enhancing or restoring the self-organizing integrity of the ecological communities.	X	X	X	X
Per sub-criteria:				
a) maintaining natural ecological self-organizing integrity, or	x	x	x	x
b) enhancing natural ecological self-organizing integrity, if required, or	x	x	x	x
c) restoring natural ecological self-organizing integrity, if required.	x	x	x	x
1B) Applying conservation management to the ecological communities in a holistic manner.	X	X	X	X
Per sub-criteria:				
a) applying management strategies to the ecological communities as a whole,	x	x	x	x
b) providing special conservation or preservation measures for rare or endangered species.	x	x	x	x
1C) Holistically applying enhancement or restoration strategies, when enhancement or restoration is required.	X	X	X	X
Per sub-criteria:				
a) apply enhancement or restoration measures to the ecological communities in whole				

and not to selected species or single issues, and b) restock with native species only, preferably with native stock from the local ecoregion,	x 0	x 0	x 0	x x
1D) Managing with consideration for how particular types of ecological communities can provide wildlife habitat. Per sub-criteria: a) understorey native vegetative growth for providing shelter and brouse, b) internal and edge habitat to accommodate species with different lifestyle habits, c) unobstructed pathways within aquatic/terrestrial ecotones for species whose lifecycles alternate between inundation and desiccation d) constructing or enhancing aquatic-life habitat	X x x x x	X x x x x	X x x x x	X x x x 0
1E) Taking advantage of any possible opportunities for expanding the small protected areas' ecological influences. Per sub-criteria: a) developing natural corridors to other natural areas, b) tapping into nearby native species metapopulations.	X x x	X x x	X x x	0 0 0

Section 2: Socioeconomic/cultural component

Criteria and sub-criteria	LMSG	GRCA	MNR	CRR
2A) Managing in accordance with official policies for providing human access to small protected area natural capital. Per sub-criteria: a) opportunities for viewing, first hand nature's beauty, b) opportunities for gaining physical and mental regeneration, c) opportunities for participating in environmentally friendly recreation, d) providing ground rules, e) assuring visitor safety, f) other site-specific natural capital, g) access to education about nature.	X x x x x 0 x x	X x x x x 0 x x	X x x x x x x x	X x x x x 0 x x
2B) Applying existing official management policies for the purpose of conserving, enhancing, or restoring abiotic attributes and natural ecological processes. Per sub-criteria:	X	X	X	X

a) water filtration,	x	x	x	0
b) water infiltration,	x	x	x	x
c) water conservation,	x	x	x	x
d) natural soil formation,	0	0	0	0
e) soil conservation,	x	x	x	x
f) waterborne pollutant buffering,	x	x	x	x
g) wetland protection, enhancement, or restoration,	x	x	x	x
h) surface-water systems protection, enhancement, or restoration,	x	x	x	0
i) erosion prevention or remediation,	x	x	x	x
2C) Applying existing official management policies aimed at the long-term sustainability of the small protected areas ecological communities' self-organizing integrity	X	X	X	X
Per sub-criteria:				
a) conserving, or	x	x	x	x
b) enhancing, or	x	x	x	x
c) restoring the ecological communities' ecological self-organizing integrity,	x	x	x	x
d) establishing natural corridors and natural networks.	x	x	x	x
2D) Maintaining the socioeconomic/cultural component's co-responsibilities with the institutional component.	X	X	X	X
Per sub-criteria:				
a) existence of management objectives, by way of plainly worded management policies,	x	x	x	x
b) maintaining working relationships between the on-site management agency and the socioeconomic/cultural component	x	x	x	x
c) readily available operating resources	0	0	0	0

Section 3: Institutional component

Criteria and sub-criteria	LMSG	GRCA	MNR	CRR
3A) Carrying out the on-site conservation management, in accordance with the best management principles.	X	X	X	X
Per sub-criteria:				
a) managing according to best management principles.	x	x	x	x
b) managing in accordance with a comprehensive prepared set of best management principles.	0	0	0	0
3B) Applying management in a holistic, integrative, and adaptive manner	X	X	X	X

Per sub-criteria: a) whenever possible, focusing management strategies on the various types of ecological communities, instead of focusing on a selection of species and on single issues, b) holistically integrating all abiotic and cultural issues directly into the management mix, c) involving stakeholders in the management process, d) adapting and integrating professional input, e) adapting and integrating local knowledge into the management process.	x x x x x	x x x x x	x x x x x	x x x x x
3C Monitoring regimes in existence. Per sub-criteria: a) monitoring the existing state of the ecological component. b) monitoring for abnormal geophysical processes, e.g.erosion, compaction, etc, c) monitoring for abnormal biophysical processes, e.g.loss of biodiversity, etc.,	X x x x	X x x x	X x x x	X x x x
3D) Satisfactory liaisons maintained between the institutional and the socioeconomic/cultural component. Per sub-criteria: a) for obtaining technical advice and assistance. b) for obtaining operating resources.	X x 0	X x 0	X x 0	X x 0

Appendix 7 – List of Scientific Names

Since, holistic protected area conservation management is focused on the self-organizing ecological communities instead of individual species and single issues, and since, general case study field exercises' lack the scope that is required for becoming involved in identifying, on a broad scale, individual species populations this general list of species is based on the Case Study No.2 Apps' Mill Conservation Area. There doesn't appear to be a comprehensive species list available for the Lower Maitland River Valley. The Apps' Mill species list below, based on 1970s and 1980s species surveys, and except for butterflies, it does not contain an insect (Insecta) list, nor a ground fauna or a ground microbe list, which would greatly increase the length of the list. The existing list provides some insight into the number of species types that exist in a relatively limited spatial area, which is in line with Meffe & Carroll (1997), and confirms their contention that managing on the basis of a selection of species ignores the importance of the value of the inter-species co-operative contribution to the self- organizing ecological communities. The compiled list is over twenty years old. Natural succession processes, particularly among the tree plantations, among the self-organizing old field ecological communities, and among the self-organizing stream bank ecological communities have greatly transformed their natural habitats. Therefore, the outcome of a present-day species survey would be considerably different.

The two case studies are not located in the same ecoregion. Their climatic conditions are not exactly the same, nor are their geophysical conditions. Therefore, although many of the Apps' Mill area's species will be common to the Lower Maitland River Valley, some of its species will be different.

A small number of the species' binomial names that were not included in the published list were added to the list, as were rare species designations for a small number of the species.

List of Trees and Shrubs

Coniferous species

Eastern White Cedar (*Thuja occedentales)*	Eastern Hemlock (Tsuga canadensis)
Eastern Hemlock (*Tsuga canadensis*)	Scot's Pine (*Pinus Sylvestris*)
Austrian Pine (*Pinus nigra*)	White Spruce (*Picea glauca*)
Red Pine (*Pinus resinosa*)	Norway Spruce (*Picea abies*)
Jack Pine (*Pinus banksiana*)	Black Spruce (*Picea glauca*)
Eastern White Pine (*Pinus Strobus*)	Tamarack (*Larix laricin*

Deciduous Trees

White Ash (Fraxinus americana)	White Elm (Ulmus americans Very rare)
Black Ash (Fraxinus nigra)	Hawthorn (Crataegus sp.)
Prickly Ash (Zanthoxylum americanum)	Hackberry (Celtis occidentalis)
Basswood (Tilia americana)	Black Locust (Robina pseudoacacia)
Buckthorn (Cascara sp)	Honey Locust (Gleditsia triacanthos)
American Beech (Fagus grandifolia)	Bristly Locust (Robina hippida)
Blue Beech (Carpinus caroliniana)	Manitoba Maple (Acer negunda)
White Birch (Betula papyrifera)	Red Maple (Acer reibrum)
Yellow Birch (Betula lutes)	Silver Maple (Acer rubrum)
Black Cherry (Prunus serotina)	Sugar Maple (Acer saccaharm)
Choke Cherry (Prunus virginiana)	Bur Oak (Quercus macrocara Mich x)
Pin Cherry (Prunus pennsilvanica)	Black Oak (Quercus valutina Lam.)
Alternate-leaved Dogwood (Cornus alternifolia)	Red Oak (Quercus Rubra)
Grey-stemmed Dogwood (Cornus racemosa)	White Oak (Quercus alba)
Hob-hornbeam (Ostrya virginiana)	Sycamore (Plantanus tremuloides)
Butternut (Juglans cinerea)	Willow (Salix sp.)
Black Walnut (Juglans nigra)	White Willow (Salix alba)
Bitternut Hickory (Carya cordiformis)	Peachleaf Willow (Salix amygdaloides anderss)
Shagbark Hickory (Carya ovate)	Pussy Willow (Salix discolor)
Red Mulberry (Morus rubra)	Crack Willow (Salix fragilis)
White Mulberry (Morus alba)	Eastern Cottonwood (Populous deltoids)
Serviceberry (Amelanchier sanginea)	Balsam Poplar (Populus balsamifera)
Russian Olive (Elaegnus angustifolia)	Trembling Aspen (Populus tremula tremuloides)

Shrubs and Vines

Common Barberry (*Berberis vulgaris*)	Common Spice Bush (*Lindera benzoin*)
Common Elderberry (*Sambucus canadensis*)	Staghorn Sumac (*Ruhs typhina*)
Red Elder (*Sambucus racemos*a)	Common Dewberry (*Rubus flagellaris*)
Ground Hemlock (*Taxus canadensis*)	Swamp Dewberry (*Rubushispidus*)
Black Alder (*Alnus glutinosa*)	Wild Raspberry (*Rubus idaeus*)
Poison Ivy (*Rhus radicans*)	Willow Shrub (*Salix sp*)
English Ivy (*Hedera helix*)	Hazelnut (*Corylus sp.*)

Ground Ivy (*Glecoma hederacia*)	Witch Hazel (Hamamelis virginiana)
Boston Ivy (*Parenthenocissu tricuspidata*)	Greenstem Fortsythia (*Forthysthia viridissima*)
VirginiaCreeper (*Parenthenocissus quinauefolia*)	Maple-leaved Viburnum (*Viburnum Acerifolium*)
Wild Grape (*Vitis sp.*)	Arrowroot (*Viburnum dentatum*)
American Black Current (*Ribes americanum*)	Wayfaring Tree (*Viburnum lantana*)
Bristly Current (*Ribes lacustre*)	Nannyberry (*Viburnum* lentago)
Prickly Gooseberry (*Ribes cynosbati*)	European Hichbush Cranberry (*Viburnum opulus*)
Smooth Gooseberry (*Ribes hertellum*)	American Highbush Cranberry (*Viburnum trilobum*)
Narrow-leaved Meadowsweet (*Spirea alba*)	Downey Viburnum (*Viburnum rafinesquianum*)
Meadowsweet (*Spirea latifolia*)	Common Privet (*Ligustrum vulgare*)
Crymbed Spirea (*Spirea betulifolia corimbosa*)	Honeysuckle (*Lonicera sp.*)
Red Osier Dogwood (*Cornus stolinifers*)	Japenese Honeysuckle (*Lonicera tatarica*)
Gray Stemmed Dogwood (*Cornus sp.*)	Lilac (*Syinga vulgaris*)
Blueberry (*Vaccinium sp.*)	Ninebark (*Physocarpus*)
Bunchberry (Cornus Canadensis)	

Pteridophyta

Field Horsetail (*Equisetum arvense*)	Lady Fern (*Athyrium filix-femina*)
Rough Horsetail (*Equisetum hyemale*)	Silvery Spleenwort (*Athyrium thelypteroides*)
Marsh Horsetail (*Equisetum palustre*)	Bulblet Fern (*Cystopteris bulbifera*)
Meadow Horsetail (*Equisetum pretense*)	Boot's Fern (*Dryopteris X boottii*)
Dwarf Horsetail (*Equisetum scirpoides*)	Crested Fern (*Dryopteris cristata*)
Tree Clubmoss (*Lycopodium obscurum*)	Evergreen Woodfern (*Dryopteris spinulosa intermedia*)
Quillwort (*Isoetes sp.*)	Oak Fern (*Gymnocarpium drypopteris*)
Marsh Fern (*Thelypteris thelypteroides*)	Ostrich Fern (*Matteuccia struthiopteris*)
Cinnamon Fern (*Osumnda cinnamonea*)	Sensitive Fern (Onoclea sensibilis)
Interrupted Fern (*Osumnda claytoniana*)	Backen (*Pteridium aquilinum*)
Rattlesnake Fern (Botrychium wirginianum	
Maidenhair Fern (*Adiantum pedatum*)	

Herbaceous Plants

Angiospermae (Monocotyledons & Dicotyledons)

Common Cattail (*Typha latifolia*)	Jack-in-the-pulpit (*Arisaema triphyllum*)
Bur Reed (*Sparganium eurocarpum*)	Skunk Cabbage (*Symplocarpus foetidus*)
Quack Grass (*Agropyron repens*)	Minor Duckweed (*Lemma minor*)
Redtop (*Agrostis gigantea*)	Duckweed (*Spirodela polyrhysa*)
Upland Bentgrass (*Agrostis perennans*)	Asiatic Dayflower (*Commelina communis*)
Creeping Bentgrass (*Agrostis stolonifera*)	Wild Garlic (*Allium canadense*)
Smooth Brome Grass (*Bromus inermis*)	Wild Leek (*Allium tricoccum*)
Pumbell's Brome Grass (*Bromus inermis f pupellianus*)	Asparagus (*Asparagus oficcicinalis*)
	Yellow Clintonia (*Clintonia borealis*)
Tall Brome Grass (*Bromus laticlumis*)	Lily-of-the-valley (*Canvallaria majalis*)
Downy Chess (*Bromus tectorum*)	White Trout-lily (*Erythronium albidum*)
Drooping Woodreed (*Cinna latifolia*)	Yellow Trout-lily (*Erythronium umbilicatum*)
Crested Dogtail (*Cynosurus cristatus*)	Day Lily (*Hemerocallis fulva*)
Orchard Grass (*Dactylis glomerata*)	Plantain Lily (*Hosta lancifolia*)
Barnyard Grass (*Echinochloa crusgalli*)	Michigan Lily (*Lilium canadense f. michiganense*)
Canada Wild Rye (*Elymus Canadensis*)	Canada Mayflower (*Maianthemum canadense*)

Bottlebrush Grass (*Elymus hysterix*)	Hairy Solomon's Seal (*Polygonatum pubescens*)
Virginia Wild-rye (*Elymus virginigus*)	False Solomon's Seal (*Smilacina racemosa*)
Stink Grass (*Eragrostis cilianensis*)	Star-flowered Solomon's Seal (*Smilacina stellata*)
Tufted Love Grass (*Eragrostis pectinacea*)	Bristly Greenbrier (*Smilax hispida*)
Tall Fescue (*Festuca arundinaccea*)	Red Trillium (*Trillium erectum*)
Hard Fescue (*Festuca ovina f. duriuscula*)	Large-flowered Trillium (*Trillium grandiflorum*)
Meadow Fescue (*Festuca pratensis*)	Yellow Stargrass (*Hypoxis hirsute*)
Tall Manna Grass (*Glyceria maxima grandis*)	Large Blue Flag (*Iris versicolor*)
Fowl Meadow Grass (*Glyceria striata strict*)	Common Blue-eyed Grass (*Sisyrinchium monatum*)
Foxtail Barley (*Hordeum jubatum*)	Smaller Yellow Slipper (*Cypripedium calceolis parviflorum*)
Rice Cut Grass (*Leersia oryzoiedes*)	Helleborine (*Epipactis helleborine*)
Scratch Grass (*Muhlenbergia asperifolia*)	Showy Orchid (*Galearis spectaabilis*)
Witch Grass (*Panicum capillare*)	Stinging Nettle (*Urtricia dioica*)
Reed Canary Grass (*Phalaris arundinacea*)	Wild Ginger (*Asarum canadense*)
Timothy (*Phleum pratense*)	Japanese Knotweed (*Polygonum cuspitadum*)
Woodland Bkue Grass (*Poa alsodes*)	Common Smartweed (*Polygonum hydropiper*)
Annual Blue Grass (*Poa annua*)	Nodding Smartweed (*Polygonum lapthifolium*)
Canada Blue Grass (*Poa compressa*)	Lady's Thumb (*Polygonum perisicaria*)
Kentucky Blue Grass (*Poa pratensis pratensis*)	Fielf Sorrel (*Rumex acetosella*)
Little Bluestem (*Schizachyrium scorparium*)	Curled Dock (*Rumex crispus*)
Yellow Foxtail (*Setaria glauca*)	Bitter Dock (*Rumex obtusifolius*)
Green Foxtail (*Setaria viridis*)	Green Amaranth (*Amaranthus retroflexus*)
Indian Grass (*Sorghastrum nutans*)	Spring Beauty (*Claytonia virginica*)
White Baneberry (*Actaea pachypoda*)	Thyme-leaved Sandwort (*Arenaria serpyllifolia*)
Red Baneberry (*Actaea rubra*)	Mouse-eared Chickweed (*Cerastium vulgatum*)
Canada Anemone (*Anemone Canadensis*)	Deptfort Pink (*Dianthus armaria*)
Wood Anemone (*Anemone Quinquefolia*)	Bouncing Bet (*Saponaria officinalis*)
Tall Anemone (*Anemone riparia*)	White Campion (*Silene pratensis*)
Marsh Marigold (*Caltha paalustris*)	Sand Spurry (*Spergularia rubra*)
Purple Clementis (*Clematis occcidentalalis*)	Japenese Barberry (*Berberis thumbergii*)
Virgins Bower (*Clematis virginiana*)	Common Barberry (*Berbeis vulgaris*)
Goldthread (*Coptis trifolia*)	Mayapple (*Podophyllum pelatum*)
Sharp-lobed Hepatica (*Hepatica nobilis acuta*)	Common Moonseed (*Menispermum canadense*)
Round-lobed Hepatica (*Hepatica nobilis obtuse*)	Celandine (*Chelidonium majus*)
Tall Buttercup (*Ranunculus acris*)	Bloodroot (*Sanguinaria Canadensis*)
Early Buttercup (*Ranunculus fascicularis*)	Round-leaved Sundew (*Drosera rotundifolia*)
Hooked Crowfoot (*Ranunculus recurvatus*)	Miterwort (*Mitella diphylla*)
Cursed Crowfoot (*Ranunculus scelaratus*)	Grass-of- parnassus (*Parnassia glauca*)
Swamp Buttercup (*Ranunculus septentrionalis*)	Early Saxifrage (*Saxifraga virginiensis*)
Early Meadow Rue (*Thalictrum dioicum*)	Wild Strawberry (*Fragaria virginiana*)
Tall Meadow Rue (*Thalictrum dioicum*)	Yellow Avens (*Geum aleppicum*)
Rue Anemone (*Thalictrum thalictroides*)	White Avens (*Geum canadense*)
Garlic Mustard (*Alliaria petiolata*)	Silvery Cinquefoil (*Potentilla argentea*)
Early Winter Cress (*Barbarea verna*)	Dwarf Cinquefoil (*Potentilla canaensis*)
Common Winter Cress (*Barbarea vulgaris*)	Rough Cinquefoil (*Potentilla norvegica*)
Spring Cress (*Cardimine bulbosa*)	Rough-fruited Cinquefoil (*Potentilla recta*)
Cut-leaved Toothwort (*Cardimine conatenata*)	Common Cinquefoil (*Potentilla simplex*)
Toothwort (*Cardimine diphylla*)	Smooth Rose (*Rosa blanda*)
Wormseed Mustard (*Erysimum cheiranthoides*)	Pasture Rose (*Rosa carolina*)
Dames Rocket (*Hesperis matronalis*)	Sweetbrier (*Rosa eglantera*)
Field Peppergrass (Lepidium capestre)	Multiflora Rose (*Rosa multiflora*)
Watercress (*Nasturtium officinale*)	Swamp Rose (*Rosa hispidus*)
Creeping Yellow Cress (*Rorippia sylvestris*)	Rose (*Rosa rugosa*)
Charlock (*Sinapis arvensis*)	Virginia Rose (*Rosa virginiana*)
Tumble Mustard (*Sisymbrium altissimum*)	Wild Geranium (*Geranium maculatum*)

Hedge Mustard (*Sisymbrium officiinale*)	Herb Robert (*Geranium robertianum*)
Hog Peanut (*amphicarpea bracteata*)	Creeping Wood-sorrel (*Oxalis cornaculata*)
Groundnut (*Apios Americana*)	Yellow Wood-sorrel (*Oxalis stricta)*)
Crown Vetch (*Coronilla varia*)	Flowering Spurge (*Euphorbia corollata*)
Cow Vetch) (*Vicia cracca*)	Cyprus Spurge (*Euphorbia cyparissias*)
Showy Tick Trefoil (*Desmodium canadeense*)	Spotted Tough-me-not (*Impatiens capensis*)
Everlasting Pea (*Lathyrus latifolia*)	Common St. Johnswort (*Hypericum perforatum*)
Round-headed Bush Clover (*Lespedeza capitata*)	Spotted St. Johnswort (*Hypericum punctuatum*)
Birdsfoot Trefoil (*Lotus corniculatus*)	Rose of Sharon (*Ribiscus syriacus*)
Black Medic (*Medico lupulina*)	Muk Mallow (*Malva moschata*)
White Sweet Clover (*Melilotus alba*)	Fringed Loosestrife (*Lysimachia ciliate*)
Yelow Sweet Clover (*Melilotus officinalis*)	Winged Loosestrife (*Lythrum alatum*)
Alsike Clover (*Trifolium hybridum*)	Purple Loosestrife (*Lythrum salicaria*)
Red Clover (*Trifolium pratense*)	Dwarf Enchanter's Nightshade (*Circaea alpina*)
White Clover (*Trifolium repens*)	Enchanter's Nightshade (*Circaea lutetiane canadensis*)
Dog Violet (*Viola conspersa*)	
Mash Blue Violet (*Viola cacullata*)	Northern Willow Herb (*Epilobium ciliatum*)
Northern White Violet (*Viola pallens*)	Purple-leaved Willow Herb (*Epilobium coloratum*)
Smooth Yellow Violet (*Viola Pensylvanica)*	Hairy Willow Herb (*Epilobium hirsutum*)
Long-spurred Violet (*Viola rostrata*)	Common Evening Primrose (*Oenothera bienis*)
Wooly Blue Violet (*Viola sororia*)	Swamp Milkweed (*Apocynum* incarnate)
Honewort (*cryptotaenia canadensis*)	Common Milkweed(*Apocynum* syriaca)
Queen Anne's Lace (*Daucus carota*)	Butterfly Weed (*Apocynum* tuberosa)
Wild Parsnip (*Pastinaca sativa*)	Wild Blue Phlox (*Phlox divaricata*)
Clustered Snakeroot (Sanicula gregaria)	Garden Phlox (*Phlox paniculata*)
Golden Alexanders (*Zizia aurea*)	Blue Vervain (*Verbena hastate*)
Moneywort (*Lysimachia nummularia*)	Hoary Vervain (*Verbena stricta*)
Starflower (*Trientalis borealis*)	White Vervain (*Verbena urticifolia*)
Fringed Closed Gentian (*Gentiana andrewsii*)	Motherwort (*Leonurus cardiaca*)
Indian Hemp (*Apocynum cannabinum*)	Water Horehound (*Lycopus americanus*)
Intermediate Dogbane (*Apocynum medium*)	Wild Mint (*Mentha arvensis*)
Myrtle (*Vinca minor*)	Peppermint (*Mentha piperita*)
Hound's Tongue (*Cynoglossum officianale*)	Spearmint (*Mentha* spicata)
Viper's Bugloss (Echium vulgar)	Wild Bergamot (*Monarda fistulosa*)
Virginia Stickseed (Hachelia virginiana)	Purple Bergamot (*Monarda xmedia*)
Hoary Puccoon (*Lithospermum canescens*)	Catnip (*Nepeta cataria*)
Smaller Forget-me-not (*Myosotis laxa*)	False Dragonhead (*Physostegia virginiana*)
Selfheal (Prunella vulgaris)	Beechdrops (*Epiphagus virginiana*)
Wild Basil (*Satureja vulgaris*)	Lopseed (*Phryma leptostachya*)
Mad-dog Shullcap (*Scutellaria laterifolia*)	English Plantain (*Plantago lanceolata*)
Bittersweet Nightshade (*Solanum dulcamara*)	Common Plantain (*Plantago major*)
Purple geradia (*Agalinis purpurea*)	Rough Bedstraw (*Galium asprellum*)
Turtlehead (*Chelone glabra*)	Northern Bedstraw (*Galium boreale*)
Dalmation Toadfax (*Linaria genistifolia delmatica*)	Wild Madder (*Galium mollugo*)
Butter and Eggs (*Linaria vulgaris*)	Clayton's Bedstraw (*Galium* tinctorium)
Wood Betony (*Pedicularis Canadensis*)	Long-leaved Houstonia (*Houstonia longifolia*)
Hairy Beardtongue (*Penstemon hirsutis*)	Partridgeberry (*Mitchela repens*)
Moth Mulein (*Verbascum blattaria*)	Teasel (*Dipsacus sylvestris*)
Common Mulein (*Verbascum thapus*)	Wild Cucumber (Echinoystis lobata)
American Brooklime (*Veronica Americana*)	Azure Aster (*Aster azureeus*)
Water Speedwell (*Veronica anagallis*)	Heart-leaved Aster (*Aster cordifolius*)
Common Speedwell (*Veronica officinalis*)	Heath Aster (*Aster ericoides*)
Thyme-leaved Speedwell (*Veronica* serpyllifolia)	Calico Aster (*Aster lateriflorus*
Creeping Bellflower (*Campanula rapunculoides*)	New England Aster (*Aster novae-angiliae*)
Harebell (*Campanula rotundifolia*)	Spray Aster (*Aster pilosus*)
Indian Tobacco (*Lobelia inflata*)	Swamp Aster (*Aster puniceus*)

Great Lobelia (*Lobelia siphilitica*) Spiked Lobelia (*Lobelia spicata*) Yarrow (*Achillia milefolium*) White Snakeroot (*Ageratina altisima*) Common Ragweed (*Ambosia artemisiifolia*) Field Pussytoes (*Atenneria neglecta*) Smaller Pussytoes (*Atenneria neglecta attenuata*) Plantain-leaved Pussytoes (*Atenneria plantaginfolia)*) Great Burdock (*Arctium lappa*) Common Burdock (*Arctium minus*) Purple Coneflower (*Ecinacea purpurea*) Daisy Fleabane (*Erigeron annus*) Common Fleabane (*Erigeron phyladelphious*) Robin's Plantain (*Erigeron pulchellus*) Lesser Daisy Fleabane (*Erigeron strigosus*) Pineapple Weed (*Matricaria matricarioides*) Scotch Thistle (*Onopordum acanthium*) Black-eyed Susan (*Rudbeckia hirta*) Tall Coneflower (*Rudbeckia laciniata*) Tin-leaved Coneflower (*Rudbeckia triolba*) Golden Ragwort (*Senecio aureus*) Tall Goldenrod (*Solidago altissima*) Blue-stemmed Goldenrod (*Solidago*) Canada Goldenrod (*Solidago canadensis*) Zig-zag Goldenrod (*Solidago flexicaulis*) Late Goldenrod (*Solidago gigantea*) Early Goldenrod (*Solidago juncea*) Large-leaved Goldenrod (*Solidago macrophylla*) Gray Goldenrod (*Solidago nemoralis*) Rough-leaved Goldenrod (*Solidago* patula) Rough-stemmed Goldenrod (*Solidago rugosa*)	Marsh Aster (*Aster puniceus firmus*) Arrow-leaved Aster (*Aster* sagittifolius) Scherbers Aster (*Aster* schreberi) Panicled Aster *Aster simplex*) Nodding Bur Marigold (*Bidens cernua*) Nodding Thistle (*Carduus nutans*) Chicory (*Cichorium intybus*) Canada Thistle (*Cirsium arvense*) Swamp Thistle (*Cirsium muticum*) Bull Thistle (*Cirsium vulgare*) Horseweed (*Conyza Canadensis*) Spotted Joe-Pye Weed (*Eupatoriadelphus maculates*) Boneset (*Eupatorium perfoliatum*) Lance-leaved Goldenrod (*Euthamia graminifolia*) Thin-leaved Sunflower (*Helianthus descapetalus*) Pale-leaved Sunflower (*Helianthus strumosus*) Orange Hawkweed (*Hieracium aurantiacum*) Mouse Ear (*Hieracium pilosella*) Field Hawkweed (*Hieracium pratense*) Oxeye Daisy (*Laucanthemum vulgare*) Field Sow Thistle (*Sonchus arvensis*) Spiny-leaved Sow Thistle (*Sonchus asper*) Tansy (*Tanacetum vulgare*) Common Dandelion (*Taraxacum officinale*) Yellow Goatsbeard (*Tragopogon pratensis*) Coltsfoot (*Tussilago farfara*) Common Coltbur (*Xanthium strumariium glabratum*)

Tree, Shrub & Vine, Pteridophyta, and Herbaciou Plant lists taken from French, Hamming and Bui (1983, 1984)

Wildlife

Mammals

Beaver (Castor Canadensis) Eastern Cottontail (Sylvilagus floridanus) Eastern Chipmunk (Tamias striatus) Grey Squirrel (Sciurus carolinensis) Red Squirrel (Tamiasciurus hudisonicus) Groundhog (Marmota monax) Meadow Vole (Nicrotus pennsylvanicus) Stiped Skunk (Mephitis mephitis) Mink (Mustela vision) Weasel (Mustela sp.) Muskrat (Ondatra zibethicus) Raccoon (Procyon lotor) Eastern Cottontail (Silvilagus floridianus) Porcupine (Erethizon dorsatum	Short-tailed Weasel (Mustela sp.), Northern Short-tailed Shrew (Blarina breevicauda) Virginia Oppossum (Didelphis virginiana) Otter (tracks seen at creek in Apps' Mill area in winter 2004 White-tailed Deer (Odocoileus virginianous). Deer Mouse (Peromyscus maniculatus) Red Fox (Vuples vulpes) Norway Rat (Rattus norvegius) Southern Flying Squirrel (Glaucomys volans) Special concern in Canada. Hotspot:Lower Grand River Basin

This list of wildlife mammals was taken from a list at the Apps' Mill Conservation Area per Paul Eagles Team (1978-79). Mr. D. Brown, Apps' Mill Interpreter (2005) confirmed that all of the species in the list, except Weasel, Norway Rat, and Porcupine have been sighted in recent years, and that Otter tracks were identified in the winter of 2004.

Herpetiles (Amphibia & Reptilia)

Blanding's Turtle (*Emydoidea blanding*) Snapping Turtle (*Chelydra serpentia serpentia*) Midland Painted Turtle (*Chrysenya picta marginata*) Bullfrog (*Rana catesbeiana*) Green Frog (*Rana Clamitans melanota*) Northern Leopard Frog (*Rana pipiens*) Western Chorus Frog (*Pseudacris triseriata)* American Toad (*Bufo americanus*) Canadian Toad (*Bufo hemiophris hemiophris*)	Northern Brown Snake (*Storeria dekayi*), Eastern Garter Snake (*Thamnophis sirtalis*) Northern Water Snake (*Natrix sipedon sipedon*) Eastern Milk Snake (*Lampropeltis doliata triangulum*) Eastern Hognose Snake (*Hederodon platyrhinos platyrihnos*) Queen Snake *(Regina septemvittatie), Threatened in Canada.* Grand River *Watershed hotspot: Brant County*) Redback Salamander (*Plethodon cinereous*)

From French, Hammin, Bui (1983, 1984), Brown (2005)

Buterflies

Viceroy (Basilarchia arcipuss) Red-spotted Purple (Basilarchia astyanax) Pearly Eye (Enodia porlandia) Little Wood Satyr (Euptychia cymela) Large Wood Nymph (Cercyonis pegala) Great Basin Wood Nymph (Cercyonis sthenele) Prairie Ringlet (Coenonyympha inornata) Eyed Brown (Satyrodes eurydice) White Cabbage Butterfly (Artogeia rapae) Common Sulphur (Colias philodce) Sleepy Orange (Eurema nicippe)	Northern Checkerspot (Charidryas palla) Pearly Crescentspot (Phyciodes tharos) Gray Comma (Polygonia progne) Great Spangled Fritillary (Speyeria Cybele) American Painted Lady (Vanessa virginiensis) Red Admiral, Painted Lady (Vanessa atalanta) American Monarch (Danaus plexippus) Eastern Black Swallowtail (Papilo polyxenes asterius) Tiger Swallowtail (Pterourus glaucus)

From French, Hamming, Bui (1983, 1984), Paul Eagles Team (1978, 1979)

Aracinidae

Grass Spider (Angelenopis Sp.) Garden Spider (*Areneus diadematus*) Six-spotted Fishing Spider (*Dolomedes triton*) Nursery Web-Spider (Pisaurina mira) Elongate Long-jawed Orb Weaver (*Tetragnatha elongate*)	Black and white Argiope (*Argiope auranta*) Hammock Spider (*Pityohyphantes costatus*) Dimorphic Jumping Spider (*Maevia inclemens*) Goldenrod Spider (*Misumena vatia*)

French, Hamming, Bui (1993, 1994)

Fish

American Brook Lamprey (*Lampetra lamottei*) Rainbow Trout (*Salmo gardnen*) Brown Trout (*Salmo trutta*)	Northern Hog Sucker (*Hypentellium nigricans*) Rock Bass (*Ambioplites rupestris*) Pumpkinseed (*Lepomis gibbosus*)

Central Mudminow (*Umbra limi*)	Iowa Darter (*Etheostoma exile*)
Northern Pike (*Esox lucius*)	Smallmouth Bass (*Micopterus dolomieui*)
Carp (*Cyprinus carpio*)	Jhonny Darter (*Etheostoma nigrum*)
Northern Redbelly Race (*Chrosomus eos*)	Rainbow Darter (*Etheostoma caeruleum*)
River Chub (*Nocomis comutus*)	Fantail Darter (*Etheostoma flabellare*)
Mimic Shiner (*Notropis volucellus*)	Blackside Darter (Percina maculata)
Fathead Minnow (*Pimephalus promelas*)	Redhorse Sucker (*Moxostoma sp.*)
Blacknose Dace (*Rhinichthys atratulus*)	Common White Sucker (*Catostomus commersoni*)
Longnose Dace (*Rhinichthys cataractee*)	
Creek Chub (*Semotilus atromaculetus*)	

From Paul Eagles Team 1978, 1979)

Birds

Great Blue Heron (*Ardea herodias*)	Spotted Sandpiper (*Actitis macularia*)
Green Heron (*Butorides striatus*)	American Woodcock (*Philohela minor*)
Mallard Duck (*Anas platyrhynchos*)	Rock Dove (*Columba livia*)
American Black Duck (*Anas rubripes*)	Mourning Dove (*Zenaida macroura*)
Common Merganser (*Mergus merganser*)	Long-eared Owl (*Asio otus*)
Blue Winged Teal *(Anas discors*)	Great Horn Owl (*Bubo virginianus*)
Canada goose (*Branta Canadensis*)	Common Screech Owl (*Otus asio*)
Northern Goshawk(*Accipiter gentilis*)	Ruby-throated Hummingbird (*Archilochus colubris*)
Sharp-shinned Hawk (*Accipiter striatus*)	
Cooper's Hawk (*Accipiter coperii)*	Belted Kingfisher (*Megaceryle alcyon*)
Red-tailed Hawk (*Buteo jamaicensis*)	Common Flicker (*Colaptes auratus*)
*Red-shouldered Hawk (*Buteo lineatus*)	Downy Woodpecker (*Picoides pubescens*)
(*Now of special concern in Canada, sightings in	Hairy Woodpecker (*Picoides villosus*)
Brant County, and Region of Waterloo)	Eastern Wood-Pewee (*Contopus virens*)
Broad winged Hawk (*Buteo platypfeus*)	Eastern Phoebe (*Sayonaris phoebe*)
Rough-legged Hawk (*Buteo lagopus*)	Eastern Kingbird (*Tyrannus tyrannus*)
American Kestrel (*Felco Sparverius*)	Barn Swallow (*Hirundo rustica*)
Ring-necked Pheasant (*Phasianus colchius*)	Tree Swallow (*Iridoprocne bicolor*)
Northern Harrier (*Curcus cyaneus*)	Bank Swallow (*Riparia riparia*)
Common Nighthawk (Chordeiles minor)	Blue Jay (*Cyanocitta cristata*)
Osprey (*Pandon haliaetus*)	American Crow (*Corvus brachyrhynchos*)
Ruffed Grouse (*Bonasa umbellus*)	Brown Creeper (*Certhia Americana*)
Turkey Vulture (*Cathartes aura*)	House Wren (*Troglodytes aedon*)
Herring Gull (*Larus argentatus*)	Winter Wren (*Troglodytes troglodytes*)
Black-capped Chickadee (*Parus atricapillus*)	Veery (*Catharus fuscescens*)
White-breasted Nuthatch (*Sitta corolinenis*)	Swainsons Thrush (*Catharus ustulatus*)
Red-breasted Nuthatch (*Sitta Canadensis*)	American Robin (*Turdus migratorius*)
Gray Catbird (*Dumetella carolinenis*)	Red-eyed Vireo (*Vireo olivaceus*)
Brown Thrasher (*Toxostoma rufrum*)	Warbling Vireo (*Vireo gilvus*)
Ruby-crowned Kinglet (*Regulus calendula*)	Yellow-rumped Warbler (*Dendroica coronata*)
Golden-crowned Kinglet (*Regulus satrapa)*	Yellow-throated Warbler (*Dendroica dominica*)
Cedar Waxwing (Bombycilla cedrorum)	Blackburnian Warbler (*Dendroica fusca*))
European Starling (*Sturnus vulgaris*)	Palm Warbler (*Dendroica palmara*)
House Sparrow (*Passer domesticus*)	Chestnut-sided Warbler (*Dendroica pensyvanica*)
Red-winged Blackbird (*Agelaius phoeniceus*)	Yellow Warbler (*Dendroica petechia*)
Northern Oriole (*Icterus galbula*)	Black-throated Green Warbler (*Dendroica virens*)
Bobolink (*Dolichonyx orizivorus*)	Cerulean Warbler (*Dendroica cerulea)*
Brownheaded Cowbird (*Molothrus ater*)	Black and White Warbler (*Mniotilta varia*)
Common Grakle (*Quiscalis quiscula*)	Common Yellowthroat (*Geothlypis trichas*)
Eastern Meadowlark (*Sturnella magna*)	Ovenbird (*Seiurus aurocapillus*)
Scarlet Tanager (*Piranga olivacea*)	American Redstart (*Setophaga raticilla*)

Northern Cardinal (*Cardinalis cardinalis*)	Canada Warbler (*Wilsonia canadensis*)
American Goldfinch (*Carduelis tristis*)	Mourning Dove (*Zenaida macoua*)
Purple Finch (*Carpodacus purpureus*)	Rock Dove (*Columba livia*)
Rose-breasted Grosbeak (*Pheucticus ludovicianus*)	Black-billed Cuckoo (*Coccyzus erythropthaimus*)
Evening Grosbeak (*Hesperiphonia vespertina*)	Eastern Kingbird (*Tyrannus tyrannus*)
Indigo Bunting (*Passerina cyanea*)	Great-crested Flycatcher (*Myiarchus crinitus*)
Dark-eyed Junco (Junco hyamalis)	Olive-Sided Flycatcher (*Nuttallornis borealis*)
Rufous-sided Towhee (*Pipilo erythrophthaimus*)	Tufted Titmouse (*Parus bicolor*)
Rufous-sided Towhee (*Pipilo erythrophthaimus*)	Tufted Titmouse (*Parus bicolor*)
Chirping Sparrow (*Spizella passerina*)	Common Redpoll (*Carduelis flammea*)
Field Sparrow (*Spizella pusila*)	Pine Siskin (*Carduelis pinus*)
White-throated Sparrow (*Zonotrichia albicollis*)	Wood Thrush (*Hylycichia mustelina*)
White-crowned Sparrow (*Zonotrichia leucophrys)*)	
Song Sparrow (*Melospiza melodia*)	

From French, Hamming, Bui (1983, 1984), Paul Eagles Team 1978, 1979).

References

Allen, T.F.H. & T.W. Hoekstra, 1992, *Toward a Unified Ecology*. Columbia University Press, New York.

Baschak,L. A.,& R.D. Brown, 1995, An ecological framework for the planning, design, and management of urban river greenways, in *Landscapes and Urban Planning,* 33: 211-225

Beak International Inc., 1999, (in cooperation with Aquafor Beech Limited, M.L. Dorfman, & Santec Engineering), Eramosa River-Blue Springs Watershed Recommended and Implementation Plan, GRCA, Cambridge, Ont.

Begon, M.,J.L. Harper, & C.R. Townsend, 1986, *Ecology; Individuals, Population, and Communities,* Sinauer Associates, Sunderland Mass.

Berkes, F., & C. Folke, 2002, Back to the Future: Ecosystem Dynamics and Local Knowledge, in *Panarchy*, pp.121-146, eds. Gunderson, L.H. and C. S. Holling, Island Press,Washington.

Bolen, E.G., & W.L. Robinson, 1995, Wildlife and Farmland, in *Wildlife Ecology and Management,* pp. 256-288, 447-470, Prentice Hall, New Jersey.

Bradshaw, A.D., 1997, What do we mean by restoration? in *Restoration Ecology and Sustainable Development?* pp. 8-14, eds. Urbanska, K.M., N.R. Webb, and P.J. Edwards, Cambridge University Press.

Brown, D. 2005, Apps' Mill Interpreter, Personal discussion about Apps' Mill Conservation Area Species

Bryant, C., 1992, Community Development and Changing Rural Employment in Canada, *Economy and Society,(U K)* 2: 265-278.

Cairns, J. Jr., 1998, Eco-Societal Restoration: Rehabilitating Human Society's Life Support System, in *Damaged Ecosystems and Restoration*, pp. 1-23, B.C. Rana World Scientific, New Jersey.

Campbell, I.D., & C. Campbell. 1994, The Impact of Late Woodland Land-use on the Forest Landscape of Southern Ontario, *The Great Lakes Geographer* 1 (1): 21-29.

Christenson, N.L., A.M. Bartuska, J.H. Brown, S. Carpenter, C.D. Antonio, R. Francis, J.K. Franklin, J.A. MacMahon, R.F. Noss, D.J. Parson, M.G. Turner, and R.G. Woodmansee, 1996, Report of the American Committee on Scientific Basis for Ecosystem Management, *Ecological Applications*, Vol. 6, No. 3: 665-691.

Curthoys Brown, L., 1995, Exploratory Study of Successful Management, Approaches For Small Protected Areas, PHD Thesis, University of Alberta.

Curthoys, L. P., 1998, Ramsey Canyon Preserve: A case Study in Successful Small Area Mamagement, in *Natural Areas Journal* 18:28-37.

Curthoys, L. P., 2002, Mary's Point Western Hemispheric Shorebird Reserve: A Case Study in Community Leadership and Successful Protected Area Management,

in *Environments* 30 (2):43-61.

Detenbeck, N. E., S.M. Galatowich, J.Atkinson, & H. Ball, 1999, Evaluating Perturbations and Developing Restoration Strategies for Inland Wetlands, in The Great Lakes Basin, *Wetlands*, 19 (4)) 789-820.

Fabos, J. G., 1995, Introduction and Overview; the greening movement, uses and (the) Potentials of greenways, in *Landscapes and Urban Planning*, 33: 1-13.

Ferreyra, C., & P. Beard, 2007, Participatory Evaluation of Collaborative and Integrated Water Management: Insights from the Field, pp271-296, in *Journal of Environmental Planning and Management,* Vol. 50, No. 2.

Franklin, J. F., 1993, Preserving Biodiversity: Species, Ecosystems, or Landscapes, in *Ecological Applications*, Vol. 3, No. 2: 202-205.

French, E, J. Hamming, H. Bui, (1983 1984) Flora and Fauna for App' Mill Conservation Area, GRCA, Cambridge Ontario.

Gilbert, O. L., & P. Anderson, 1998, *Habitat Creation and Repair*: Woodland, Scrub, and Hedgerow; pp 92-129, Oxford University Press, New York.

Girt, J., 1990, Common Ground, Recommendations for Policy Reform to Integrate Wildlife Habitat, Wildlife Habitat Canada, Ottawa.

GRCA 1979, Apps' Mill Conservation Area Master Plan, GRCA, Cambridge, Ont.

GRCA, 1982, Your Valley, Winter Edition 1982, GRCA Cambridge Ont.

GRCA, 1995, Grand River Conservation Authority Annual Report, Cambridge, Ont.

Grumbine, R.E., 1994, What Is Ecosystem Management? *Conservation Biology*, 8 (1): 27-38.

Grumbine, R. E. 1997, Reflections on "What is Ecosystem Management"? *Conservation Biology,* Vol. II, No. 1:41-47.

Gutrich,J., D. Donovan, M. Finucane, W. Focht, F. Hitzhusen, S. Manopimoke, D, Mc Cauley, B. Norton, P. Sabatier, J. Salzman, V.Sasmidjaja, 2005, Science in the public process of ecosystem management: lessons from Hawai, Southeast Asia, Africa, and the U S Mainland, in *Journal of Environment Management* x x (2005): 1-13.

Handel, S. N., 1997, The role of plant-animal mutualisms in the design and restoration of natural communities, pp 111-132, in *Restoration Ecology and Sustainable Development,*, eds. Urbanska, K.M., N.R. Webb, P.J. Edwards. Cambridge University Press.

Harris, J, A., P. Birch, & J. P. Palmer, 1996, *Land Restoration and Reclamation: Principles and Practice*, Longman, Essex. England.

Hobbs, R. J., 1998, Managing Ecological Systems and Environmental Management, pp. 459-483, in *Ecological Scale: Theory and applications*, eds. Peterson, D. I.& V. T. Parker, Columbia University Press.

Hollick, M., 1993, Self-Organizing Systems and Environmental Management, *Environmental Management,* Vol. 17. No. 5: 621-628.

Holling, C. S, 1994, Simplifying the Complex: The paradigms of ecological function and structure. *Futures*, 26(6):598-609Holling, C. S., 1995, What Barriers What Bridges, in *Barriers and Bridges to theRenewal of Ecosystems and Institutions,* pp. 3-34, eds Gunderson,L.H., C. S. Holling, and S. S. Light, Columbia University Press, New York.

Holling, C. S. & L. H. Gunderson, 2002, In Quest of a Theory of Adaptive Change, in *Panarchy,* pp. 25-62, eds. Gunderson, L. H. & C. S. Holling, Island Press, Washington.

Hoover, A.P., &M.A. Shannon, 1995. Building greenway policies within a participatory framework, in *Landscape and Urban Planning* 33: 433-454.

Imhoff, J., 2007. Personal Conversation, Aquatic Life Biologist, and advisor to LMSG, University of Guelph,

Jalava, J. V., J. L. Riley, A. E. Zammit, P. J. Sorrill, T. Holden, and J. Henson, 2001. Big Picture Applications of Bioregional Planning in Ontario, in. *Ecological Integrity and Protected Areas,* pp. 25-35, Proceedings of the Parks Research Forum of Ontario (PRFO), Annual Meeting, Black's Creek Pioneer Village, North York,Ontario.

Kay, J. J., H. A. Regier, M. Boyle, and G. Francis, 1999, An Ecosystem Approach for Sustainability: addressing the challenge of complexity, *Futures*, 31: 721-742.

Lajeunesse, D., G. Doman, P.Drapeau, A. Cogliastro, A. Bouchard, 1995, Development and Application of an Ecosystem Management Approach for Protected Natural Areas, pp. 481-491, in *Environmental Management* Vol. 19. No. 4.

Lee, H. T., W. D. Bakowsky, J. Riley, J. Bowles, M. Puddister, P. Ulig, and S. McMurray, 1998, *Ecological Land Classification: for Southern Ontario, First Approximation and its Application*, Ontario Ministry of Natural Resources, Southcentral Science Section, Science Development and Transfer Branch, SCSS Field Guide FG-02.

Levin, S. A., 1999, *Fragile Dominion*, pp.37-38, 57-80, 81-105,161-162, Perseus Books, Reading,Mass.

Lower Maitland Stewardship Group, 2000, reprinted 2006, The Lower Maitland River Poject, edited by S. Szczerbak, University of Guelph.

Lower Maitland Stewardship Group, 2002, Strategic Watershed Plan for the Lower Maitland River Valley.

Mader, S., 1985, *Biology: Evolution, Diversity, and the Environment*, Wm. C. Brown, Dubuque, Iowa.

Margerum, R. D., & D. Whitall, 2004, The Xchallenges and Implications of Collaborative Management on a River Basin Scale, in *Journal ofEnvironmental Panning and Management*, Vol. 47, No. 3: 407-427.

Martinez,, Neo D., 1996, What is functional about biodiversity? Pp. 115-117,in, *Biodiversity a Biology of Numbers and Difference,* ed. K.J. Gaston,Blackwell Science Ltd., Osney Mead, Oxford.

McKnight, T. L., 1992, *Regional Geography of the United States and Canada*, Prentice Hall, New Jersey.

Meffe, G. K, & C. R. Carroll, 1997, Conservation Management Principles, pp. 347-383,in *Pinciples of Conservation Biology 2nd ed.* Sinauer Pubiishers, Sunderland, Mass.

Meffe, G. K., L.A. Nielsen, R. L. Knight, D. A, Schenborn, 2002, Getting a Grip on EcosystemManagement, pp. 57-78, in *Ecosystem Management*, eds Meffe, G.K., L. A. Nielsen, R.L. Knight, D. A Schenhorn, Island Press, Washington.

Merriam, G., 1999, Survival of Fragmented Woodland Systems, in *Southern OntarioWoodlands: The Conservation Challenge*, 32-36, A. Kettle ed., Federation of Ontario Naturalists, Toronto, Ont.

Merriam, G. 2001, Ecological Integrity in Parks, in *Ecological Integrity and Protected Areas,* pp.. 7-18, Proceedings of the Parks Research Forum of Ontario (PRFO Annual Meeting, Black Creek Pioneer Village, North York, Ont.

Miller, G.T. Jr. 1994, *Living in the Environment*, pp 49-75,79-80, Wadsworth Publishing Company, Belmont, California.

Miller,J. R., & R. J. Hobbs, 2002, Conservation Where People Live and Work, in *Conservation Biology*, Volume 16 No. 2: 330-337.

Mitchell, B. 1997, *Resource and Environmental Managemen*t, Addison Wesley Longman Limited, Harlow England.

Mitchell, B., & D. Shrubsole, 1992, *Ontario Conservation Authorities: Myth and Reality*, The Department of Geography, University of Waterloo, PublicationNo. 35.

Moffat, A. J. & P. Buckley, 1995, Soils and Forest Restoration Ecology, in *The Ecology of Woodland Creation,* 75-90, R. Ferris-Keen, ed., Wiley, London.

Munn, R.E., 1993, Monitoring For Ecosystem Integrity, in *Ecological Integrity and the Management of Ecosystems*, 105-115, S. Woodley, J. Kay, andG. Francis, eds., St Lucie Press, Sponsored by the Heritage Resources Center, center's, University of Waterloo and Canadian Parks Service Ottawa.

Niemela, J., 1999, Ecology and Urban Planning, in *Biodiversity and Conservation*, 8: 119-131.

Noss, R.F., 1987, Protecting Natural Areas in Fragmented Landscapes, in *Natural Areas Journal:* Volume 7 (1): 2-13.

Noss, R. F., & B. Csuti, 1997, Habitat Fragmentation, pp. 269-304, in *Principles of Conservation Biology 2nd* ed., eds. Meffe G. K.C. R. Carrol, and ContributorsSinauer Associaes, Inc, Sunderland, Mass.

Ontario Planning Act, Sect 3.

Ontario Conservation Act, Sections 28 & 29.

Ontario Provincial Policy Statement 1996.

Ontario Provincial Policy Statement, 1997.

Ontario Natural Heritage planning Manual, 1999.

Parker, V. T., & S.T.A. Pickett, 1997, Restoration as an Ecosystem Process, *in*

Restoration Ecology and Sustainable Development, 17-32, K.M. Urbanska, N. R. Webb, & P.J. Edwards, eds. Cambridge University Press.

Paul Eagles Team, 1978-1979, ESA # 3, (Whiteman's Creek, Apps' Mill Species Survey)

Plummer, R., 2000. Lower Maitland Valley User Survey Analysis, University of Guelph.

Plummer, R., & J. Fitzgibbon, 2004, Co-management of Natural Resources: A Proposed Framework, in *Environmental Management* Vol. 33, No. 6: 876-885.

Plummer, R., 2006, Sharing the Management of a River Corridor: A Case Study of the Co-management Process, in *Society and Natural Processes*, 19: 709-721.

Plummer, R, & J. Fitzgibbon,, 2006, People Matter: The importance of social capital in the co-management of natural resources, in *Natural Resources Forum 30 (2006)* 51-62

Press, F, & Siever, 1986, *Earth,* Freeman and Company, New York.

Primack, R.B., 2000, *A Primer of Conservation Biology 2nd ed.* Sinauer Associates Inc. Sunderland, MA.

Quayle, M., 1995, Urban greenways and public ways: realizing public ideas in a Fragmented world, , in *Landscape and Urban Planning*, 33. 461-475.

Ramsay, D. & G. Whitelaw, 1997, Biosphere Reserves and Ecological Monitoring as Part of Working Landscapes: The Niagara Escarpment Biosphere Reserve Experience, in *Linking Protected Areas With Working Landscapes, Conserving Biodiversity*, 295-307, N. Munro, & J. H. M. Willison, eds., *Science and Management of Protected Areas 1998*, Wolfville, Nova Scotia.

Richardson, A. H., 1974, *Conservation by the People: The History of the Conservation* Movement to 1970, University of Toronto Press, Toronto

GRCA, 1977, Glennie Property Management Plans

GRCA, 1978, Chesney Wilderness Management Plans

GRCA, 1978, Link Consevation Area Management Plans

GRCA, 1979, Taquanayah Conservation Area Management Plans

GRCA, 1979, Banister Lake complex Management Plans

GRCA, 1980, Damascus Conservation Area Management Plans

MVCA, Landowner, & Ecological Farmers Association, 1993-1994, Agro-ecological Farm Plan

Ontario Ministry of Natural Resources &Ontario Parks, 2002, Ojibway Prairie

Upper Thames Conservation Authority & Cedar Creek Partnership, 1996, Cedar Creek Watershed, a GREEN initiative

Sauer, L., 1994, Making a Habit of Restoration, *in Biodiversity and Landscapes*, 209-227, K, Kim, & R. D. Weaver eds., University of Cambridge.

Saunders, D. A., R.J. Hobbs, C. R. Marqules, 1991, Biological consequences of ecosystem fragmentation: A review, *Conservation Biology*, pp 18-34 5(1).

Schneider, E.D., J.J. Kay1994, Complexity and Thermodynamics, Toward a New Ecology, *Futures*, 26 (6): 626-647.

Schwartzel, E. & G. Miller, 2001, Human Dimensions and Ecosystem Based Planning Using the Environmental Bill Of Rights (EBR) To Change Perspectives on Ecosystem Planning, pp.47-52, in *Proceedings of the Parks Research Forum of Ontario (PRFO),* 2001 Annual Meeting.

Szczerbak, S., 2000, (reprinted 2006) University of Guelph, The Lower Maitland River Project Information report, MVCA.

Shafer, C. L, 1990, *Nature Preserves: Island Theory and Conservation Practice,* Smithonian Institution Press, Washington.

Shafer, C. L., 2004, A Geography of Hope: pursuing the voluntary preservation of America's Natural Heritage, pp.127-171 in *Landscapes and Urban Planning*, 66.

Shrubsole, D., 1996, Ontario Conservation Authorities: principles, practice, and Challenges, 50 years later, *Applied Geography,* Vol. 16, No. 4:319-335.

Soils of Waterloo County, Report No. 44 of Ontario Soil Survey.

Soils of Wellington County, Report No. 35 of Ontario Soil Survey.

Soils of Wentworth County, Report No.32 of Ontario Soil Survey.

Strahler, A.N.& A. H. Strahler, 1987, *Modern Physical Geography 3rd. Edition,* John Wiley and Sons, New York.

Scheffer, M., F. Westley, W.A. Brock, M. Holmgren, 2002, Dynamic Integration of Societies and Ecosystems-Linking Theories from Ecology, Economy, and Sociology, pp. 195-239, in *Panarchy*, eds, Gunderson, L.H., C.S. Holling,Island Press, Washington.

Strobl, S, 1999, OMNR, The Science of Forest Management: Towards an Ecological Approach, in *Southern Ontario Woodlands: The Conservation Challenge*, 9-22, A. Kettle ed.. Federation of Ontario Naturalists, Toronto, Ont.

Spencer, J. W., 1995, To What Extent Can We Recreate Woodland? in *The Ecology Of Woodland Creation*, 1-16, R. Ferris-Kean, Wiley, London

Szczerbak, S., 2000, reprinted 2006, (University of Guelph), Lower Maitland River Project Information Report, for MVCA.

The Nature Conservancy, 2000, The Five-S Framework for Site Conservation: A Practitioner's Handbook for Site Conservation Planning and Measuring Conservation Success.

Vance, J. E., 1970, *The Merchant's World: The Geography of Wholesaling*, Prentice-Hall Inc., Englewood Cliffs, N.J.

Watkins, M. H., 1963, A staple Theory of Economic Growth, *The Canadian Journal of Economics and Political Science,* XXIX. (2):141-158.

Western, D., 1989, Conservation Biology pp. 31-36, in *Conservation for the Twenty-First Century*, eds. Western, D. & M. C. Pearl, Oxford University Press.

Wilson, J. 2007, a meeting at the Huron County Department of Planning and Development with Ms Wilson re discussing the structural makeup, functions, and management approach of LMSG.

Whittaker, R.J. 1998, *Island Biogeography*, Oxford Univeristy Press, Inc., N.Y.

Yin, R.K. 2003. *Case Study Research: Design and Methods*, 3rd ed. Sage Publications, Thousand Oaks, CA.

Yu, M. & B. Veale, 1994, Grand River Basin Water Management Study, Technical Report # 20, GRCA, Cambridge, Ont.