MOVING BEYOND THE DATA: EXAMINING THE EFFECTIVENESS OF THE SENSITIVE ECOSYSTEMS INVENTORY AS A TOOL FOR LOCAL AND REGIONAL CONSERVATION PLANNING

By

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ABSTRACT

Since the late 1980s and early 1990s, regions throughout British Columbia (BC) have experienced rapid and widespread loss of natural areas. Lack of funding has frequently led to poor ecosystem management, short-sighted decision-making and an inability to adequately educate the public about the importance of natural areas protection.

In an effort to promote a shift in land use priorities, Environment Canada's Canadian Wildlife Service (CWS), in partnership with BC Ministry of Environment (MoE), has been working to raise awareness about sensitive ecosystems in areas of the province experiencing concentrated development pressure over the last 15 years. The pilot study for the SEI program, initiated in 1993, was carried out in East Coast Vancouver Island and the Gulf Islands. Inventory results showed widespread fragmentation, degradation and loss of sensitive ecosystems.

A sensitive ecosystems inventory provides the crucial first step in conservation planning: identification of sensitive and significant natural areas. The goal of this thesis is to determine the ways in which Sensitive Ecosystems Inventory data have been used – and where opportunities have been missed – to inform land use decisions made by local and regional governments in the East Vancouver Island/Gulf Islands region. The research identifies institutional barriers to strategic use of ecosystems inventory data, and considers the societal and political forces that hinder effective local and regional conservation planning today. In addition, it recommends ways in which the SEI might be modified and used differently in order to better facilitate local and regional conservation planning.

Three primary methods were used: a review of the literature on local and regional conservation planning, a formal interview process, and a method of problem analysis called Problem Stratigraphy, used here in the analysis of barriers. Analysis of the interview results showed that while most local and regional governments within the study area are using SEI data, different jurisdictions are limited in their use in different ways.

Certainly, the SEI is an imperfect tool, and one of limited use. Innovative municipalities and regional districts, however, have shown that with a small investment of time and resources, it is possible to build upon SEI data to create a local inventory at a finer scale that is very much of use. Coupled with stringent regulation of land use, such a tool has a great deal of potential in reversing the downward spiral of ecological destruction, and depicting the direct association between healthy ecosystems and healthy communities.
# Moving Beyond the Data: the Sensitive Ecosystems Inventory as a Tool for Local and Regional Conservation Planning

## TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABSTRACT</td>
<td>ii</td>
</tr>
<tr>
<td>TABLE OF CONTENTS</td>
<td>iii</td>
</tr>
<tr>
<td>PREFACE</td>
<td>v</td>
</tr>
<tr>
<td>ACKNOWLEDGEMENTS</td>
<td>vi</td>
</tr>
<tr>
<td>1.0 INTRODUCTION</td>
<td>1</td>
</tr>
<tr>
<td>1.1 CONTEXTUALIZING THE PROBLEM</td>
<td>1</td>
</tr>
<tr>
<td>1.2 PROBLEM STATEMENT</td>
<td>4</td>
</tr>
<tr>
<td>1.3 THESIS GOAL AND OBJECTIVES</td>
<td>5</td>
</tr>
<tr>
<td>1.3.1 Thesis Goal Statement</td>
<td>5</td>
</tr>
<tr>
<td>1.3.2 Thesis Objectives</td>
<td>5</td>
</tr>
<tr>
<td>2.0 BACKGROUND TO CASE STUDY</td>
<td>7</td>
</tr>
<tr>
<td>2.1 A GROWING NEED FOR LOCAL CONSERVATION PLANNING</td>
<td>7</td>
</tr>
<tr>
<td>2.2 CONSERVATION PLANNING: PROCESS AND RESPONSIBILITY</td>
<td>9</td>
</tr>
<tr>
<td>2.3 CONSERVATION PLANNING: THE TOOLS</td>
<td>10</td>
</tr>
<tr>
<td>2.4 A BRIEF INTRODUCTION TO ECOSYSTEM INVENTORIES AND SEI</td>
<td>14</td>
</tr>
<tr>
<td>2.4.1 Role and Components of Ecosystems Inventories</td>
<td>14</td>
</tr>
<tr>
<td>2.4.2 The Sensitive Ecosystems Inventory (SEI)</td>
<td>15</td>
</tr>
<tr>
<td>3.0 METHODS</td>
<td>21</td>
</tr>
<tr>
<td>3.1 LITERATURE REVIEW</td>
<td>21</td>
</tr>
<tr>
<td>3.2 FORMAL IN-DEPTH INTERVIEWS WITH LOCAL AND REGIONAL PLANNERS</td>
<td>22</td>
</tr>
<tr>
<td>3.2.1 Sample Selection</td>
<td>22</td>
</tr>
<tr>
<td>3.2.2 Interview Format</td>
<td>28</td>
</tr>
<tr>
<td>3.2.3 Design of Interview Questionnaire</td>
<td>28</td>
</tr>
<tr>
<td>3.3 PROBLEM STRATIGRAPHY</td>
<td>29</td>
</tr>
<tr>
<td>3.4 LIMITATIONS OF METHODS</td>
<td>29</td>
</tr>
<tr>
<td>4.0 RESULTS</td>
<td>31</td>
</tr>
<tr>
<td>4.1 LOCAL AND REGIONAL GOVERNMENT USE OF SEI</td>
<td>31</td>
</tr>
<tr>
<td>4.1.1 Extent to which SEI data used</td>
<td>32</td>
</tr>
<tr>
<td>4.1.2 SEI Products Used (hardcopy/digital maps, atlas products, pamphlets, technical reports, newsletters, website, field data, other)</td>
<td>32</td>
</tr>
<tr>
<td>4.1.3 Awareness and Use of SEI Disturbance Mapping</td>
<td>33</td>
</tr>
<tr>
<td>4.1.4 Method of Use of SEI Products and Services</td>
<td>34</td>
</tr>
<tr>
<td>4.1.5 Usefulness and Improvement of SEI Products</td>
<td>37</td>
</tr>
<tr>
<td>4.1.6 Usefulness of SEI products and services as tools to gaining political commitment to biodiversity conservation</td>
<td>38</td>
</tr>
<tr>
<td>4.1.7 Usefulness of SEI products in support of broad (e.g. regional) scale conservation</td>
<td>39</td>
</tr>
<tr>
<td>4.1.8 Usefulness of SEI products in identifying opportunities for collaboration in conservation</td>
<td>40</td>
</tr>
<tr>
<td>4.1.9 Extent to which SEI data has been complemented by additional mapping at a larger scale</td>
<td>40</td>
</tr>
</tbody>
</table>
PREFACE

This study documents the use of the Sensitive Ecosystems Inventory (SEI) in land use planning on the east Coast of Vancouver Island and the Gulf Islands. The primary objective of the SEI program is to provide local and regional governments with the information required to validate land-use decisions that will preserve the continued ecological integrity of ecosystems identified as rare and sensitive within the study area.

I became interested in ecosystems loss, municipal responsibility for protection and the potential of the SEI to contribute significantly to local knowledge about sensitive ecosystems as a student of Community and Regional Planning. My biases and assumptions within this context are several. I believe municipalities have not just an opportunity to achieve long-term protection of natural areas within their boundaries, but a responsibility – an obligation – to do so on behalf of the citizens they represent. I am confident that permanent protection of such "green infrastructure" is essential to the maintenance of quality of life in any region, and that ecosystems loss will have – is already having – a direct impact on community health. Finally, I believe that municipalities in British Columbia have a range of tools available to them for ecosystems protection that should be capitalized upon, but that their use of such tools is severely hindered by the current economic paradigm. Without addressing these more profound problems, planning solutions can be only superficially successful.

Through this research, I hope to show how the SEI can provide municipalities with a basis of information on which to make ecologically sound planning decisions, and with which to achieve the paradigm shift that will be critical if protection of ecosystems is to take place with any permanence.
ACKNOWLEDGEMENTS

First and foremost, I would like to thank Bill Rees, Jan Kirkby and Tony Dorcey for the support, direction and patience they provided throughout the course of this research. Their guidance and expertise were invaluable.

In addition, I would like to thank all of the planners who took time out of busy schedules to meet with me and discuss the Sensitive Ecosystems Inventory – its strengths, the barriers to its use as a planning tool, and its great potential. The project would not have been possible without the offering of their experience and suggestions, and I only hope I have accurately reflected their views.
CHAPTER 1

1.0 INTRODUCTION

1.1 CONTEXTUALIZING THE PROBLEM

"One of the most helpful things that the provincial and federal governments could do is to provide more biological and scientific data on the critical areas in communities..."


Since the late 1980s and early 1990s, regions throughout British Columbia (BC) have experienced rapid and widespread loss of natural areas. This trend is the cumulative result of several factors. Communities have expanded to accommodate population growth, and the conventional development of housing, commercial areas, industry and supporting infrastructure is a land-intensive undertaking. Compounding this impact is the fact that tourists are increasingly attracted to BC's natural features, stunning landscapes and favourable climates. A secondary, visitor-oriented infrastructure has developed to meet the needs of this seasonal population, further impacting natural ecosystems.

The way in which natural areas have been managed has contributed further to their loss. Waning provincial funding has resulted in local and regional governments being hamstrung by tight budgets, which has led to cuts in most departments. In the field of planning, it has frequently led to poor ecosystem management, short-sighted decision-making and an inability to adequately educate the public about the importance of natural areas protection. Development and destructive use of lands surrounding environmentally sensitive areas has aggravated the problem, turning
protected areas into threatened islands, often without buffers to protect them from adjacent land use.

Conventional planning has seen the organization of communities around service infrastructure, including roads, sewer and water mains, with grids of residential units laid out along roads and little attention in design to landscape characteristics. As a result, protected areas tend to be "islands of green" left over after development has taken place.\(^1\) While some local governments have begun to preserve and rehabilitate ecologically-valuable features on a micro-scale, long-term environmental protection at the planning stage of development is far less integrated into daily practice.\(^2\) This reactive, after-the-fact planning has eroded the integrity of remaining natural areas, degrading wildlife habitat and disrupting the function of natural systems. The ecosystem values which have been lost extend beyond the ecological processes on which we depend, to include recreational opportunities, scenic values, sense of place, and educational value – all of which contribute to quality of life in our communities.

Globally, however, local and regional governments have begun to take on the challenge of ecosystems protection. Local plans often respond directly to higher-level strategies and commitments: the Ramsar Convention on Wetlands (1971), the UN Convention on Biological Diversity, national Species at Risk acts. The United Kingdom established a national campaign for Local Agenda 21 (which provides a framework for implementing sustainable development at the local level) in 1993, and the majority of local authorities responded with the development of local


biodiversity action plans, supported by a nationally established framework. In addition, most American states have wildlife conservation plans in place, and several Australian regions have developed "nature conservation strategies". Canadian cities and regions outside of the study area are beginning to take conservation seriously as well – specific examples of planning initiatives include the Oak Ridges Moraine Conservation Plan, completed in 2002; the City of Calgary's Wetland Conservation Plan; the Toronto and Region Conservation Authority's draft Terrestrial Natural Heritage System Strategy; and the Greater Vancouver Regional District's Biodiversity Conservation Strategy. In addition, the majority of municipal community plans now include some level of guidance on natural area protection, and many regional districts (BC) and virtually all conservation authorities (Ontario) now include dedicated environmental planning units.

In an effort to promote a shift in land use priorities, Environment Canada's Canadian Wildlife Service (CWS), in partnership with BC Ministry of Environment (MoE), has been working to raise awareness about sensitive ecosystems in areas of British Columbia experiencing concentrated development pressure over the last 15 years. In 1993, CWS and MoE (then Ministry of Environment, Lands and Parks) introduced a tool called the Sensitive Ecosystems Inventory (SEI). The inventory consists of spatial and descriptive information about sensitive ecosystems occurring within the study area, including maps at a scale of 1:20,000, supporting field data and comprehensive management recommendations for each ecosystem type. The primary objective of this program is to provide local and regional governments with the information required to validate land-use decisions that will preserve the ecological integrity of ecosystems identified as rare and sensitive within a given study area. To date, SEIs have been completed for East Vancouver Island.
and the Gulf Islands, Sunshine Coast, Central Okanagan and the Bella Vista-Goose Lake Range portion of North Okanagan.  

The East Coast of Vancouver Island and Gulf Islands is one of a number of areas in BC that have experienced a significant loss of natural areas as a result of rapid urban expansion and heavy resource use. The pilot study for the SEI program, initiated in 1993, was therefore carried out there. Inventory results showed widespread fragmentation, degradation and loss of sensitive ecosystems.

1.2 PROBLEM STATEMENT

As senior levels of government work to balance budgets, and as the value of local decision making regarding land use is recognized, responsibilities are increasingly being devolved to local and regional governments. The latter are being asked to play a more important role in environmental protection, often with limited budgets and lacking strong in-house ecological expertise. As they come to recognize the importance of this role, as well as its inherent challenges, the high potential of tools such as the SEI in assisting local governments to make wise and sustainable land use decisions is becoming apparent. Since the inception of the SEI, many local and regional governments have employed the data in innovative ways, which will be outlined in following sections.

However, despite the availability of SEI mapping for the east coast of Vancouver Island and the Gulf Islands, and the innovative ways in which many local governments are making use of the

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4 Ibid. 
data, remnant natural ecosystems continue to be disturbed, fragmented and lost. An update of the original SEI completed in 2004 showed that over 11% of the area occupied by the nine SEI ecosystem types in the early 1990s had been disturbed by 2002. As such, there has been some concern on the part of SEI partners that use of SEI data is falling short of its potential as a land use planning tool. The reasons for this apparent under-use are not clear, and there has not, to date, been an in-depth consideration of what barriers currently prevent the use of the SEI in practical, long-term protection of sensitive ecosystems. This thesis will seek to fill this critical information gap, with a focus on the East Vancouver Island/Gulf Islands region.

1.3 THESIS GOAL AND OBJECTIVES

1.3.1 Thesis Goal Statement

The goal of this thesis is to determine the ways in which Sensitive Ecosystems Inventory data have been used — and where opportunities have been missed — to inform land use decisions made by local and regional governments in the East Vancouver Island/Gulf Islands region. I will identify institutional barriers to strategic use of ecosystems inventory data, and consider the societal and political forces that hinder effective local and regional conservation planning today. In addition, I will recommend ways in which the SEI might be modified and used differently in order to better facilitate local and regional conservation planning.

1.3.2 Thesis Objectives

My three main research objectives are:

1. To describe how local governments are currently making use of SEI data to make local land-use decisions, using the East Vancouver Island/Gulf Islands region as a case study
2. To identify barriers to effective implementation of SEI by local and regional governments in making land-use decisions, using the East Vancouver Island/Gulf Islands region as a case study.

3. To provide recommendations as to how those barriers might be overcome, and to outline an innovative way for the Canadian Wildlife Service and MoE to promote SEI to local governments as a tool for conservation planning.
2.0 BACKGROUND TO CASE STUDY

2.1 A GROWING NEED FOR LOCAL CONSERVATION PLANNING

British Columbia is host to a breadth of diverse and fragile ecosystems. Coastal bluffs, wetlands, riparian areas, woodland, old-growth forest and mixed grasslands create a rich ecological network that stretches across the province. Unfortunately, these rare and sensitive ecosystems have been severely impacted by urbanization, agriculture and intensive recreational use. Temperate coastal regions (Lower Mainland, Vancouver Island), valleys (Okanagan, Fraser, Bulkley, Skeena) and riparian areas have been magnets for urban development, wetlands have been drained for and polluted by agriculture, and forests have been considerably modified by recreational use. Non-native species have invaded impacted areas, and habitats have been fragmented by roads, trails and "satellite" subdivisions.

As noted in the introduction, conventional approaches to local and regional planning have contributed significantly to these impacts. In the words of Curran (1999), "streams and waterways have been treated as stormwater conduits, habitats paved over, and the landscape levelled to facilitate construction of roads and buildings. It is only recently that development practices have been questioned..." This approach to planning was due to a number of reasons: a lack of understanding of the true value of ecosystems; belief in and perceived dependence on economic expansion; and eventually, a gradual economic recession which narrowed the focus of planners to...

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short-term land use planning and the more immediate concerns of infrastructure maintenance and servicing.

The tide, however, is turning. There is now a widespread recognition of the economic benefits of ecosystems protection, including greater certainty, cost savings and faster approvals for developers; quality of life for residents; and greater community support, higher tax revenues, lower servicing costs and free ecosystem services for local governments. In the last two decades, local governments and non-governmental organizations have made significant progress in addressing the need for protection of ecologically sensitive areas. A multitude of planning tools is now available to local and regional governments. Southern BC, which saw a massive influx of population in the 1990s, with growth concentrated in urban and urbanizing areas in the Lower Mainland, Okanagan and south-eastern Vancouver Island, has been the focal point for some of the most important growth management and ecological planning initiatives in the province.

The study area for this thesis has itself been host to a wide range of strong conservation approaches, fostered by a local socio-political climate that is – in many ways – strongly supportive of ecological conservation. This strength of support is likely due to the rich endowment of natural areas the region supports, and a strong grassroots and local government commitment to the conservation of these unique ecosystems. Table 1 outlines the range of tools employed by local and regional governments in the East Coast Vancouver Island/Gulf Islands area, and provides a brief description of each. These tools, as well as the conservation planning process are expanded on in the next section.

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2.2 CONSERVATION PLANNING: PROCESS AND RESPONSIBILITY

The following is a broad outline of the conservation planning process, derived from the Ministry of Environment's *Environmental Best Management Practices for Urban and Rural Land Development*:8

1. *Identify* sensitive ecological areas and features (e.g. through Sensitive Ecosystems Inventories)
2. *Protect* these areas to the extent possible, using a combination of regulatory measures and incentives, and design development accordingly
3. *Manage* and *Monitor* these ecologically sensitive spaces
4. *Restore* degraded areas of ecological value
5. *Document* the results of management decisions, and *share information* among jurisdictions, so that future decisions can be informed by past experience

Source: Ministry of Environment's *Environmental Best Management Practices for Urban and Rural Land Development*

Figure 1: The Conservation Planning Process

These activities should be supported by several levels of planning, from the landscape level, to regional and municipal conservation planning, and down to the site level, with responsibilities allocated according to jurisdiction, capacity and practicality.

1. **Landscape Level Conservation Planning**

Conservation planning at the landscape level should see the development and implementation of landscape level conservation plans that address a geographical area with natural boundaries. As a result, they are often cross-jurisdictional (e.g. integrated watershed management plan).

2. **Community/Regional Level Conservation Planning**

Conservation planning at the regional or municipal level involves the development and implementation of community and regional plans that promote sound environmental management,

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identifying and planning for long-term conservation of landscape level ecological values (including terrestrial, aquatic and riparian environmentally sensitive areas, species at risk and wildlife corridors). Regional and municipal plans have political boundaries, matching either regional district or municipal jurisdiction boundaries, and are administered by those bodies of government. Plans at this level include regional conservation strategies, official community plans, park plans, greenway plans, integrated stormwater management plans, and local area plans. Tools available to local and regional governments include bylaws (tree protection, soil removal/deposit, watercourse protection), zoning, development permits, density transfer, cluster development, urban containment boundaries.

3. Site Level Conservation Planning
Governments have some say in land use and development patterns on private land, through zoning and tools such as the designation of development permit areas. The protection of greenspace and retention of trees can be achieved through clustering, density transfer and comprehensive development zones, and the protection of riparian areas through setbacks.

2.3 CONSERVATION PLANNING: THE TOOLS
This section describes the planning tools that are available to local and regional governments in BC, and references case studies within the study area that illustrate the application of these tools, summarized in Table 1. (It is important to note that this table simply provides examples of jurisdictions utilizing these tools, and is not by any means exhaustive.) At the broadly strategic level, regional conservation strategies are being used increasingly by regional districts to identify protected areas, to integrate wildlife habitat concerns into local planning processes, and to
encourage private land stewardship.\textsuperscript{9} Municipalities contribute to regional conservation strategies through regulatory bylaws, planning and development controls in official community plans, and park and protected areas designation. They also encourage private stewardship, providing incentives to landowners to preserve sensitive ecosystems on their land.

<table>
<thead>
<tr>
<th>Conservation Tool</th>
<th>Level of Government</th>
<th>Description</th>
<th>Study Area Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regional Growth Strategy / Regional Conservation Strategy (RGS / RCS)</td>
<td>Regional District</td>
<td>Local government vision for achieving ecological conservation goals\textsuperscript{10}</td>
<td>RGS: Nanaimo Regional (1997), District Capital Regional District RCS: Islands Trust, Comox Valley RD</td>
</tr>
<tr>
<td>Regional Context Statement (RGS)</td>
<td>Municipality</td>
<td>A municipality's implementation plan for RGS goals</td>
<td>Still under completion for both CRD/NRD</td>
</tr>
<tr>
<td>Official Community Plans (OCP)</td>
<td>Municipality</td>
<td>Provide a general policy direction and establish the basis for regulations and development approvals</td>
<td>Most (DPAs) District of Esquimalt District of Highlands\textsuperscript{11}</td>
</tr>
<tr>
<td>Urban Containment Boundaries (UCB)</td>
<td>Regional District / Municipality</td>
<td>Define limits to urban development (often restricting it to existing serviced areas), with the benefit of preserving areas outside the UCB for their rural, agricultural or ecological value\textsuperscript{12}</td>
<td>Nanaimo Regional District District of Saanich (underway)</td>
</tr>
<tr>
<td>Zoning Bylaws</td>
<td>Municipality</td>
<td>Regulate the use and intensity of use (density), and thereby the development of land</td>
<td>District of North Cowichan</td>
</tr>
<tr>
<td>• Density Bonusing Zones / Cluster Housing Zones</td>
<td>Municipality</td>
<td>Allow developers to exceed an assigned density in exchange for the protection of a sensitive ecological feature</td>
<td>Saltspring Island OCP North Pender Associated Islands</td>
</tr>
<tr>
<td>• Comprehensive Development Zones</td>
<td>Municipality</td>
<td>Enables a municipality to negotiate detailed guidelines and specifications for all aspects of a development in an integrated manner\textsuperscript{13}</td>
<td>District of Langford Village of Cumberland</td>
</tr>
<tr>
<td>Setback Provisions</td>
<td>Municipality</td>
<td>Enables a municipality to create a buffer around an ecologically sensitive feature</td>
<td>Town of Comox Town of Lake Cowichan City of Nanaimo</td>
</tr>
</tbody>
</table>


\textsuperscript{10} Intergovernmental Relations and Planning. \textit{About Regional Growth Strategies}. Retrieved August 27, 2005 from \url{http://www.mcaws.gov.bc.ca/igd/irpd/growth/about_growth.html}.


\textsuperscript{12} West Coast Environmental Law. \textit{Urban Growth and Development}. Retrieved August 27, 2005 from \url{http://www.wcel.org/issues/urban/sbg/Part1/ucb/}.

\textsuperscript{13} \textit{Ibid.}
<table>
<thead>
<tr>
<th>Conservation Tool</th>
<th>Level of Government</th>
<th>Description</th>
<th>Study Area Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmentally Sensitive Areas</td>
<td>Municipality</td>
<td>Spaces formally designated &quot;environmentally sensitive&quot; by local governments, providing the basis for Development Permit Areas (see below)</td>
<td>District of Campbell River Denman Island</td>
</tr>
<tr>
<td>(Environmentally Sensitive) Development Permit Areas</td>
<td>Municipality</td>
<td>Provide local governments with an opportunity to establish site-specific requirements that apply to development or redevelopment, and require that a permit be obtained prior to alteration or disturbance of the land (DP guidelines might include est. of EIA process, designate stream setbacks, require applicant to pay security deposit, set out erosion &amp; sediment control, veg. protection and landscaping requirements)</td>
<td>City of Nanaimo District of Saanich City of Victoria District of Langford Saturna Island</td>
</tr>
<tr>
<td>Environmental Bylaws</td>
<td>Municipality</td>
<td>The Local Government Act provides local governments with the power to create bylaws related to a number of conservation domains, including streams and drainage, trees and landscaping, soils, and animal control</td>
<td>Capital Regional District</td>
</tr>
<tr>
<td>Subdivision Approvals</td>
<td>Municipality</td>
<td>Proposed subdivisions are evaluated by a subdivision approving officer to ensure they conform to local government bylaws. Approving officers have the ability to refuse a subdivision if it is deemed contrary to the public interest or does not meet predetermined requirements (e.g. specific conservation requirements)</td>
<td>District of Highlands</td>
</tr>
<tr>
<td>Staff Education</td>
<td>Regional District / Municipality</td>
<td>Staff and council education about the importance of ecological preservation and the use of conservation tools (e.g. in-house staff workshops)</td>
<td>Capital Regional District District of Saanich</td>
</tr>
<tr>
<td>Sensitive Ecosystems/Environmentally Sensitive Area Inventories</td>
<td>Federal / Province / Regional District / Municipality</td>
<td>Registers of information (generally in map or database form) about areas or features of ecological value</td>
<td>Canadian Wildlife Service in partnership with BC MoE Capital Regional District Islands Trust District of Saanich</td>
</tr>
<tr>
<td>Conservation Easement / Covenant</td>
<td>Municipality / Land Trust / Private Landowner</td>
<td>Legal agreement between a landowner and a land trust or government agency that permanently limits uses of the</td>
<td>Many site-specific examples Mayne Island</td>
</tr>
</tbody>
</table>
### Table 1: Conservation Planning Tools and Use by Study Area Local/Regional Governments

<table>
<thead>
<tr>
<th>Conservation Tool</th>
<th>Level of Government</th>
<th>Description</th>
<th>Study Area Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Best Management Practices</td>
<td>Regional District / Municipality</td>
<td>Land in order to protect its conservation values</td>
<td></td>
</tr>
<tr>
<td>Volunteers (Local Knowledge / Stewardship)</td>
<td>Regional District / Municipality</td>
<td>Permits the sharing of information on effective conservation practices</td>
<td>Most</td>
</tr>
<tr>
<td>Tax Exemptions / Incentives</td>
<td>Regional District / Municipality</td>
<td>Local citizens are often extremely knowledgeable about sensitive ecosystems, and are a valuable resource in conservation</td>
<td>Most</td>
</tr>
<tr>
<td>Subdivision Servicing</td>
<td>Regional District / Municipality</td>
<td>Encourage owners to maintain the natural value of environmentally sensitive lands, and compensate owners for the social/ecological benefits that they provide the community, consistent with the principles of full cost accounting(^1) (e.g. district might enact property tax exemption bylaw for riparian areas on private property dedicated through conservation covenant)</td>
<td>Islands Trust (NAPTEP) Many other jurisdictions encourage protection through EcoGifting (a program administered by Environment Canada)</td>
</tr>
<tr>
<td>Sustainable Environment Scorecard</td>
<td>Regional District / Municipality</td>
<td>Ensure servicing achieved in a way that is sensitive to ecological features/systems (via. landscaping and road design requirements: shallow drainage swales, no curbs, narrow roads, etc.)</td>
<td>Many site-specific examples</td>
</tr>
</tbody>
</table>

Before any of these tools can be implemented, however, a process of identifying priority natural areas must be undertaken. The **sensitive ecosystem inventory** fulfills this need, as described in the following sections.

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\(^{1}\) University of Victoria Environmental Law Centre. *Green Infrastructure Bylaws Tool Kit (Draft)*, 2006.
2.4 A BRIEF INTRODUCTION TO ECOSYSTEM INVENTORIES AND SEI

2.4.1 Role and Components of Ecosystems Inventories

A sensitive ecosystems inventory provides the crucial first step in conservation planning: identification of sensitive and significant natural areas. Knowledge about where these natural areas are and what condition they are in allows local governments to make good decisions regarding their protection and management. Ecosystems inventories take stock of the diversity of life present in a given area – the occurrence of plant and animal species, the ecosystems they are a part of, and the state of those ecosystems. They can take a variety of forms – maps, lists, point source information, monitoring records, datasets – and given frequently limited resources, must be carefully catered to management needs.\(^{15}\)

In 1992, a research project was carried out by the Biodiversity Inventory Task Force (Resources Inventory Committee, MELP) to identify inventory needs for the inclusion of maintenance of biodiversity in planning. A proposal outlining a system of inventories was sent to 74 planners, at different levels of government and representing different geographic areas, and the recipients were asked to rank the proposed inventories and suggest further information that would be beneficial to decision-making.\(^{16}\) The report concluded that local planning needs included the following:

- Maps indicating sensitive ecosystems, remaining natural systems, significant geological features


\(^{16}\) Ibid.
• An overlay of detailed ecosystem maps, showing land use, land status, ownership, condition and how land is protected (park, reserve, land trust, etc.)
• Detailed inventories of habitats at risk, including plant and animal components
• Local-level maps of soil types, moisture, climatic zones, forest cover
• Colour air photos at 1:20,000 or 1:16,000 scale for areas with specific planning needs
• Limitations of the inventory

At the time the report was published, there was already a clear indication that this type of information was becoming necessary. The next year, in 1993, the Ministry of Environment, Lands and Parks (MELP, now the Ministry of Environment), in partnership with Environment Canada's Canadian Wildlife Service, initiated the **Sensitive Ecosystems Inventory (SEI)**. This inventory provided general information on the remaining fragments of sensitive ecosystems, highlighting for local and regional planners critical areas requiring further study prior to land use decision-making. The SEI – in particular the pilot study, focused on the East Coast of Vancouver Island and the Gulf Islands – forms the case study for this thesis, and will be described in depth in the following sections.

**2.4.2 The Sensitive Ecosystems Inventory (SEI)**

**2.4.2.1 Introduction to the SEI**

The East Coast of Vancouver Island and Gulf Islands SEI was initiated in 1993 and completed in 1997. It was carried out by a partnership between what was then the BC Ministry of Environment, Land and Parks and Canadian Wildlife Service (CWS) (Environment Canada), with additional funding provided by the Habitat Conservation Trust Fund and some local governments.
The primary objective of the SEI was to "systematically identify, classify, and map terrestrial ecosystems and other habitats of high biodiversity which remain relatively unmodified on eastern Vancouver Island and adjacent Gulf Islands." The intent was to develop an inventory information base to support sound land management decisions and promote good land stewardship within the study area.

The SEI identifies nine ecosystem types: 7 Sensitive Ecosystems (Coastal Bluff, Wetland, Terrestrial Herbaceous, Sparsely Vegetated, Riparian, Woodland and Older Forest) and two "Other Important" ecosystems (Older Second Growth Forest and Seasonally Flooded Agricultural Fields) (see Appendix B for detailed descriptions of each ecosystem type). The former categories represent the terrestrial ecosystems within the study area that are considered particularly rare, fragile or threatened by development. The latter 2 categories represent ecosystems that have important biodiversity and wildlife habitat values, but have been modified by human use (forestry and agriculture).

The initial SEI showed that only 7.9% of the land base still contained sensitive ecosystems, and that other important ecosystems accounted for another 11.6%. In 2004, a process called "Disturbance Mapping" updated the SEI and found that 8,800 ha (11%) of the area occupied by the nine SEI ecosystem types in the early 1990s had been disturbed by 2002. Encroachment and landscape fragmentation are largely to blame for the degradation of the quality of identified sites.

2.4.2.2 SEI Study Area

The study area is shown in Figure 2. It includes, broadly, the east coast of Vancouver Island – from its south-eastern tip to Campbell River and beyond – and the Gulf Islands.

Figure 2: East Coast Vancouver Island and Gulf Islands Study Area

2.4.2.3 SEI Methodology

The SEI methodology consisted of three phases. Phase I involved the interpretation of 3,000 air photos of the study area, most at scales of 1:10,000 or 1:15,000. The photos were examined stereoscopically, and using the visual appearance of discrete vegetation communities, including qualities such as colour, texture and relative height, experienced ecologists were able to identify and delineate ecosystems. Topographic, soil and forest cover maps provided supporting information in this process.
The second phase involved field checking approximately 30% of the sites identified in Phase I, to verify boundaries and to classify, evaluate and photograph current conditions. Sampling was based on site accessibility, distribution of ecological units across the landscape, the level of verification required for each ecosystem type and budget limits. For example, field checking was higher for ecosystems that were more difficult to identify through photo interpretation, such as wetlands, and for sites that were easily accessible (both physically and with respect to ownership).

**Groundtruthing** involved gathering the following information: date of field visit; field data (slope, aspect, soil type, moisture, nutrient regimes); preliminary information on general landscape condition, adjacent land use, and type and level of site disturbance; vegetation data; supplementary notes on observed wildlife values; ecosystem classification; photographs taken to record site condition; and a site sketch.

The third and final phase involved compilation and editing of data, digitizing of sites outlined on the air photos, and the production of digital/hardcopy maps. First the polygons delineated on the air photos were digitized and the database finalized. The database was then linked to the digitized polygons, facilitating map creation.

### 2.4.2.4 SEI Products

The products of the SEI process include 1:20,000 digital and hardcopy maps, and a Technical Report (SEI Volume 1) outlining the methodology and results, as well as management recommendations for each ecosystem type. A Conservation Manual (SEI Volume 2) was written later (2000), detailing ecosystem values, the impacts affecting them, management options for each
ecosystem type, and conservation tools available to local and regional governments, landowners and other citizens, and senior governments. In addition, a range of supporting documents, including an SEI website, a descriptive pamphlet for each ecosystem type (including recommendations on how to protect it), and a regular newsletter providing updates on advancements of the data are all available to SEI users.

2.4.2.5 Limitations of the SEI Study

The SEI had a number of limitations, which were delineated by its authors. Firstly, it was made clear by the authors of the SEI that it was only intended to serve as a "flagging tool" to alert land-use decision makers to the presence of an important ecological feature, and that further, site-specific research by a qualified professional was strongly recommended if SEI data were to be used for site planning. In addition, accuracy of the SEI polygons is limited by air photo scale and quality. In some cases, for example, outdated air photos may depict a different condition than the current one. For polygons that were not field checked, this may have skewed the results, either resulting in a false classification or false conclusions about ecosystem sensitivity. Accessibility of sites was also a limitation of the study: where ownership or physical barriers prohibited access to sites, they were not field-checked. As more accessible sites were more likely to be degraded (due to assumed higher use by local residents) this could also have affected results.

2.4.2.6 Disturbance Mapping

The Vancouver Island/Gulf Islands SEI has been updated over the last three years, in the form of "Disturbance Mapping". This new study sought to evaluate change in ecosystem health over the past decade, and the results show an alarming trend. Over 8,800 ha (11%) of the area occupied by the nine SEI ecosystem types in the early 1990s had been disturbed by 2002. The disturbed areas
identified were retained on the maps to increase awareness of the escalating loss of natural ecosystems and to encourage conservation of those that remain. The updated maps were released in July 2004. The hope is that this new information will not only raise awareness of ecosystem loss in the study area, but will also encourage a more strategic landscape or ecosystem approach to land use planning to ensure the protection of remaining natural ecosystems.

The following section presents the methods used in this thesis research, and should not be confused with the SEI methodology presented above.
3.0 METHODS

Having established the context of the study and outlined the SEI in some detail, the following sections will identify and discuss the methods used to meet the objectives of this thesis. Three primary methods were used: a review of the literature on local and regional conservation planning, a formal interview process, and a method of problem analysis called Problem Stratigraphy, used here in the analysis of barriers.

3.1 LITERATURE REVIEW

I undertook a review of local conservation planning literature at the outset of the research, in order to understand the planning context within which I was working. I was particularly interested in the evolution of the field of conservation planning, and the developing recognition of a need for information about local ecosystems. In order clearly to understand this context, I reviewed research papers; local and regional government policy documents; official community plans and regional growth strategies; SEI documents (including technical reports, conservation manuals, promotional materials and past evaluations); bylaws; and reports on local environmental initiatives. I incorporated documentation pertaining both specifically to the study area and generally to the subject of conservation planning into the review.

In particular, I was seeking to identify ways in which local and regional governments had made use of SEI information, as well as barriers to effective implementation of the SEI and to effective conservation planning generally. I was also attempting to situate the SEI within a broader context of local and regional conservation planning in BC, including the impetus for its initiation in the early
The results of the literature review informed the interview protocol, analysis, conclusions and recommendations of this thesis.

3.2 FORMAL IN-DEPTH INTERVIEWS WITH LOCAL AND REGIONAL PLANNERS

"Few processes are as fundamental to social science research as the person-to-person exchange of information" (Palys, 2003). The second and principle means of obtaining information, therefore, involved formal, in-person interviews with local and regional planners within the study area.

As some of the subject matter I was exploring was political and potentially delicate, and due to the nuanced nature of conversation, I felt it was particularly important to conduct interviews in person. While this decision had implications with respect to sample size and by extension the robustness of my results (see Section 3.4), I believe the quality of information gleaned was superior to that which might have been collected through questionnaires or other more indirect forms, and the selection of this method, appropriate.

3.2.1 Sample Selection

Due to limited resources, it was not possible to interview planners from each municipality and regional district in the study area. A list of current and potential SEI users at the local and regional level was obtained from Canadian Wildlife Service (CWS) (Environment Canada). Instead, a

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sample was selected in an attempt to be representative of all of five study area "sub-units" identified for the purposes of the SEI: Comox, Nanaimo, Cowichan, Capital and Islands (see Figure 3 for sub-unit boundaries). In addition, I attempted to interview both local and regional government officials within each of the sub-units. I sent a letter of initial contact to each interviewee, including a note describing the research and the interview questionnaire (see Appendix A). I then made follow-up emails and phone calls to those who responded favourably, in order to establish an interview date. Due to limitations discussed below, this was not possible in every case. In total, eight planners were interviewed in person and one provided some information electronically.

I worked closely with a contact at CWS, and my final recommendations will be made to this body for consideration in their implementation of the SEI project.

My final interviewee list was as follows:

**Regional Governments**

Capital Regional District (Director of Regional Planning)
Regional District of Comox-Strathcona (Planning Technician)
Regional District of Cowichan Valley (Deputy Manager of Environment Services)
Islands Trust (Ecosystem Protection Specialist)
Nanaimo Regional District (Senior Planner)

**Local Governments**

Town of Comox (Municipal Planner)
Municipal District of North Cowichan (Municipal Planner)
In addition, I corresponded with a planner in Parksville. She was not able to meet for an interview due to time constraints, but she provided me with some useful information electronically.

Table 2 provides information on the biophysical and administrative attributes of the jurisdictions in which interviews were carried out. I included it to highlight differences in size (physical and population), geography, and nature of the administrative bodies responsible for planning. This context is critical to an informed and objective comparison of jurisdictions' use of the SEI. It is important to note that while the information included is for the political jurisdictions, the entire political jurisdiction was not included in the SEI in every case (i.e., SEI sub-unit boundaries did not always match political ones).
<table>
<thead>
<tr>
<th>Jurisdiction</th>
<th>Biophysical Attributes</th>
<th>Nature of Administrative Body/Planning Department</th>
</tr>
</thead>
</table>
| Capital Regional District (pop. 345,000) | • 2,400 km²  
• 2 physiographic regions: NW portion – Insular Mountains and San Juan Ridge (characterized by steep slopes, rock outcrops); Saanich Peninsula, Gulf Islands (coastal plain: rolling hills, kettle topography, marine basins) | • 13 municipalities, 3 electoral areas  
• “Regional Planning Services” has planning authority  
• Regional Growth Strategy (2003)                                                                                          |
| Regional District of Comox-Strathcona (pop. 96,131) | • 20,292 km²  
• large land area split into two main sections: 1) North-Central Vancouver Island (includes Comox Valley); 2) to the North of the Powell River Regional District on the Mainland  
• region also encompasses many islands in the Straight of Georgia | • 8 municipalities, 9 electoral areas  
• No Regional Growth Strategy to date                                                                                     |
| Cowichan Valley Regional District (pop. 71,998) | • 3,500 km²  
• stretches across Island just north of CRD  
• surrounded by scenic, rugged mountains  
• some of largest freshwater lakes on Island  
• highest mean temperatures in Canada, highly fertile soil | • 4 municipalities, 9 electoral areas  
• “Development Services Dept.” has planning authority  
• No Regional Growth Strategy to date                                                                                     |
| Islands Trust (pop. 23,000) | • 5,200 km²  
• covers islands and water between BC mainland and southern Vancouver Island, including Howe Sound and as far north as Comox  
• warmer and drier than surrounding areas – provides habitat for exceptional variety of species  
• includes 13 major islands, over 450 smaller islands | • comprised of 16 distinct corporate entities (Trust Council, 14 Local Trust Committees, Trust Fund Board)  
• unique mandate to “preserve and protect the Trust Area and its unique amenities and environment for the benefit of the residents of the Trust Area and the |
## Jurisdiction | Biophysical Attributes | Nature of Administrative Body/Planning Department
--- | --- | ---
**Nanaimo Regional District**
(pop. 131,000) | • highly unique natural environment | Province generally
• Trust now an autonomous local government with land use planning and regulatory authority
• Drafted Regional Conservation Plan (2005)

| **Local Governments** | | |
--- | --- | ---
**Town of Comox**
(pop. 12,000) | • 15 km²
• situated on east coast of Vancouver Island in Comox Valley, between Beaufort Range and Comox Glacier (west) and Strait of Georgia (east) | • 3 planning staff (1 municipal planner, 2 planning technicians)

**Municipal District of North Cowichan**
(pop. 26,148) | • 193,98 km²
• in heart of Cowichan Valley
• 5,000 ha community forest | • 3 planning staff (1 municipal planner, 2 planners)

**Municipal District of Saanich**
(pop. 108,661) | • 926,492 km²
• largest of the core municipalities making up Greater Victoria
• topography undulating with glacially scoured rock outcroppings | • Planning Dept. contains a dedicated Environmental Services division responsible for promoting conservation/enhancement of natural environment

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Source: Official Local/Regional Government Websites

Table 2: Biophysical and Administrative Attributes of Interviewee Jurisdictions
3.2.2 Interview Format

Each interview followed the same format: I posed 10 questions, and recorded the answers using a hand-held recorder. I provided time at the end of each interview for the interviewee to make general comments or pose questions regarding use and improvement of SEI products. Each interview record was then transcribed, and the transcription sent electronically to the interviewee for review.

3.2.3 Design of Interview Questionnaire

The questions used in the interviews (see Appendix A) were designed to address Objective 1: to gather information regarding local or regional government use of SEI data and products (reports, brochures, etc.), reasons for non-use of this data, potential improvements to the products, and barriers to effective use. My intent was to generate a clear idea of the uses of the data, as well as to compare barriers among Island jurisdictions and between the two levels of government in question (local and regional).

Questions 1-9 addressed Objective 1, to determine ways in which local governments are making use of the SEI. The first four questions queried whether local and regional planning departments were using SEI products, and if so, which products. Specifically, I sought the following information: whether SEI products are used at all; reasons for non-use (where applicable); which specific products of the suite of products available are used; and a specific question about use of Disturbance Mapping data, a relatively new product.

The next five questions addressed how SEI products were being used, and potential improvements to the products. Specifically: examples of use (in support of staff decision-making about
conservation? To achieve political support for conservation? At a regional rather than site-specific scale? For visualizing opportunities for collaboration among jurisdictions?); usefulness of products and suggested improvements; and whether complementary mapping or inventory had been carried out.

The final question sought to identify barriers to effective implementation of SEI products at the local and regional levels.

### 3.3 PROBLEM STRATIGRAPHY

Problem stratigraphy is an analysis tool used to simplify complex, multi-layer problems. It involves identifying a problem, its root (underlying) causes, and its "symptoms", or effects. As a method, it is particularly useful in identifying **leverage points**, or areas of relatively simple action that can promote significant and profound change.\(^\text{19}\) I used problem stratigraphy in analyzing the barriers to use of SEI identified in the interviews, and to identify leverage points that could be used to encourage wider use of SEI data.

### 3.4 LIMITATIONS OF METHODS

The chosen methods had one major limitation, which was anticipated and unavoidable, given the decisions discussed above. The decision to carry out interviews in person restricted my sample to available staff, resulting in a small and not necessarily representative sample.

By committing to in-person interviews, I was limited to interviewing people who were available during the time period I had designated for interviews. As I was only able to make three trips to

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\(^{19}\) Grimm, Kurt. Course notes, Earth and Ocean Sciences 595: Earth Literacy (University of British Columbia, 2005).
Vancouver Island, and as this time period was during summer months, some potential interviewees were on vacation and remaining staff often burdened with additional work. This was particularly the case in smaller towns, where small planning departments were often unable to meet with me due to time constraints.

This limitation definitely limited my sample. I was only able to interview three local government planners, thus leaving two SEI subunits (Nanaimo and Islands Trust) unrepresented in the local government category. As such, the results do not reflect SEI use in all subunits.
CHAPTER 4

4.0 RESULTS

This section generally outlines the results of the formal interview process. However, where relevant, results from an evaluation of the effectiveness of the SEI program, carried out by AXYS Consulting in 2003, are also provided. Where information from the latter is included, it is explicitly stated; unless otherwise noted, the reader should assume the results pertain to the interviews carried out for this project.

In general, the planners I interviewed were enthusiastic about the opportunity to discuss the SEI. I got a strong sense that many of them understood the potential of the SEI as a planning tool, but were confronted with political, economic and institutional realities that confounded or weakened its implementation. As such, they had numerous suggestions for improvement of the program according to their diverse needs and interests.

Some interviewees, however, were clearly disillusioned with the SEI, and felt that due to a number of identified weaknesses, it simply was not a useful planning tool. This was particularly the atmosphere in interviews with smaller municipalities that did not have a strong conservation emphasis.

4.1 LOCAL AND REGIONAL GOVERNMENT USE OF SEI

The following sections outline results pertaining to Objective 1, identifying the ways in which local and regional governments within the study area make use of SEI data.
4.1.1 Extent to which SEI data used

While all eight interviewees reported that the SEI was being used to some extent by their respective planning departments, the extent to which it was being used depended on such factors as size of municipality, size of planning department (number of planning staff, number of dedicated environmental planning staff), and nature of planning department (explicit environmental protection mandate or not). Smaller municipalities, in particular the town of Comox, reported only limited use of the SEI, as the smaller physical area of the municipality generally resulted in a greater "baseline" awareness of sensitive ecosystems, areas and features, both on the part of planning staff and the community. Regional government bodies (Comox-Strathcona RD, Cowichan Valley RD, Islands Trust, Capital RD) tended, on the whole, to use SEI products more than municipalities. In particular, Islands Trust, a regional body with a specific ecological protection mandate and dedicated ecological planning staff, and the Capital Regional District seem to have used SEI extensively.

4.1.2 SEI Products Used (hardcopy/digital maps, atlas products, pamphlets, technical reports, newsletters, website, field data, other)

Interviewees identified a range of SEI products and services being used. Table 3 shows each product and describes how it was used.

<table>
<thead>
<tr>
<th>Product</th>
<th>Use (Number of Interviewees Identifying Use)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hardcopy Maps</td>
<td>• Used to show SEI polygons to public when responding to inquiries (4)</td>
</tr>
<tr>
<td></td>
<td>• On wall for reference (2)</td>
</tr>
<tr>
<td></td>
<td>• Given to local conservancies, NGOs, as most do not have financial resources to purchase maps (1)</td>
</tr>
<tr>
<td>Digital Maps</td>
<td>• Included as layer in GIS (2)</td>
</tr>
<tr>
<td></td>
<td>• Included as layer in Natural Areas Atlas (latter also has orthophoto, so many local planners find it very useful) (1)</td>
</tr>
<tr>
<td></td>
<td>• Useful for producing hardcopies (1)</td>
</tr>
<tr>
<td>Field Data</td>
<td>• Used during OCP review, when more information on individual features is needed (1)</td>
</tr>
</tbody>
</table>
Table 3: Use of SEI Products by Local and Regional Governments Interviewed

<table>
<thead>
<tr>
<th>Products</th>
<th>Uses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technical Reports</td>
<td>• Used for reference, but local ESA atlas used more readily (3)</td>
</tr>
<tr>
<td></td>
<td>• Used for statistics, so everyone clear on limitations of SEI (can</td>
</tr>
<tr>
<td></td>
<td>determine how many sites have been field checked, etc.) –</td>
</tr>
<tr>
<td></td>
<td>important to understanding of methodology (1)</td>
</tr>
<tr>
<td></td>
<td>• Given to each new Islands Trust trustee (1)</td>
</tr>
<tr>
<td>Brochures</td>
<td>• Brought to meetings for information (1)</td>
</tr>
<tr>
<td></td>
<td>• Suitable for quick reference, but not particularly useful (1)</td>
</tr>
<tr>
<td></td>
<td>• Overview pamphlet useful (&quot;no one wants to take 15 pamphlets with</td>
</tr>
<tr>
<td></td>
<td>them&quot;) (1)</td>
</tr>
<tr>
<td></td>
<td>• Individual ecosystem pamphlets useful – allows focus on one</td>
</tr>
<tr>
<td></td>
<td>area of concern (1)</td>
</tr>
<tr>
<td>SEI Website</td>
<td>• Used for identification of SEI polygons with respect to</td>
</tr>
<tr>
<td></td>
<td>environmentally sensitive areas (2)</td>
</tr>
<tr>
<td>Newsletters</td>
<td>• Useful for quick reference (1)</td>
</tr>
</tbody>
</table>

These uses only reflect what was explicitly identified in the interview process. A wide range of other uses, both for jurisdictions interviewed and for other local and regional governments in the study area, were identified through the literature review and were presented in Table 1.

4.1.3 Awareness and Use of SEI Disturbance Mapping

(See Section 2.4.1.6 for further information on Disturbance Mapping Data.) Many of the interviewees were familiar with Disturbance Mapping Data, but in few cases had it been incorporated into existing GIS systems, or into the day-to-day fabric of local and regional planning. Interviewees noted finding it a useful tool to demonstrate what has been lost, and one individual expressed its usefulness in discussion with politicians.

The general lack of regular use is likely due in part to the fact that the Disturbance Mapping results were released only in 2004. Some interviewees were unfamiliar with the product, in spite of each
planning department within the study area having received the maps for their area of jurisdiction. This may reflect a lack of internal communication on ecological issues, or a high turnover rate amongst municipal staff and a resultant loss of corporate knowledge.

4.1.4 Method of Use of SEI Products and Services

A wide range of uses of SEI products were identified. Use in zoning was one example – when zoning is checked for a local resident, it is now easily linked to SEI polygons, especially where SEI polygons have been incorporated into municipal or regional GIS systems. Other interviewees noted general use in “staff reports and applications”. In several cases, the data has been used in Official Community Plans (OCPs). SEI polygons are frequently included as mandatory development permit areas (DPAs), and often accompanied by an SEI map as part of the OCP. DPAs are areas where certain information – in this case, in-depth site-specific ecological study – is required from an applicant, to support the planner’s consideration of a development permit. Contrary to the responses of some interviewees, incorporating SEI data into such regulatory measures is one way in which some jurisdictions have made an effort to give the SEI, which on its own is only informational and advisory in nature, enforceability.

Use by local and regional parks departments in consideration of what areas might be most worthwhile dedicating as park was also noted by two interviewees as an effective use of SEI data. Presumably this implies that parks staff considered the diverse values of each polygon, and selected those that had the highest overall conservation value for preservation and management in parks systems.
Four of the eight interviewees noted that their departments had used SEI data to develop area-specific **environmentally sensitive area (ESA) atlases**, which in turn are used in review of development permit applications and rezoning considerations. The Islands Trust Fund, for example, used SEI data in the creation of more comprehensive, complementary mapping, entitled Islands Trust Ecosystem Mapping (ITEM). One interviewee commented that their atlas has significantly raised awareness of SEI polygons not only for planners, but also within the Engineering Department, general municipal administration and Council. Additionally, the Regional Districts of Nanaimo and Comox-Strathcona have created Sensitive Habitat Atlases, based partly on SEI data. Of those jurisdictions who hadn't taken on supplementary mapping, one indicated an interest in doing so, but lacked resources. In addition, the literature review identified that North Cowichan District has undertaken the development of a Cowichan Valley Environmental Planning Atlas (2000) and that ecologically sensitive areas have been created on the basis of this map.

The interviewee from the Capital Regional District (CRD) noted use of the data in the CRD's **Regional Blue/Green Spaces Strategy**, a regional conservation strategy. SEI data was useful in identifying sensitive ecosystems outside protected areas, on lands currently held in public or private hands, without any protection. Similarly, another interviewee noted use of SEI data in development of a natural areas network project, which will pull in different departments for a broad-scale consideration of available resources, areas in need of protection and how to match these.

The interviewees from Cowichan Valley RD noted that the SEI is used very little in that region in a regulatory sense – perhaps one development permit area makes reference to SEI polygons – due to the perceived inaccuracy of the data. Without greater confidence in the data, it is difficult for planners to use it to support legal decisions.
One final comment addressed one department’s approach to use of SEI data: the interviewee for Islands Trust noted that SEI is used as a flagging tool to encourage people to take on further, more in-depth research for sensitive areas earmarked by the SEI — as was originally the intent of the Inventory. The interviewee also made clear that SEI is not used at a site-specific planning scale, as there is “too much at stake” for landowners and the Inventory is not accurate enough for decision-making at such a scale. This was also stated by SEI authors, but is not understood by some users, and as a result, often arises as a criticism of the study.

The AXYS evaluation included some information regarding “decision-maker” (including local and regional government) use of SEI information. The following uses were identified:

- Influencing conservation-based land use decisions, by directly influencing decision makers and providing information to groups who subsequently lobbied for protection of SEI sites
- Strategic-level planning
- Development permitting and land protection
- Incorporation into Official Community Plans and used in determining development permit areas, along with other criteria (steep slopes, wetlands, etc.)
- Consideration during land development, capital works projects, enhancement and mitigation activities
- Augmenting in-house inventory information
- Assisting in management of parks and green space
The AXYS study included several specific examples of use of SEI information by local and regional governments within the study area. In the Capital Regional District, SEI information is being used in the development of a "Sea to Sea Green/Blue Belt". The District of Esquimalt has used the SEI as a partial basis for refusal of development permits on SEI sites. The Islands Trust uses SEI sites as the main criteria for deciding which areas are suitable for covenant agreements. Finally, the City of Nanaimo protected all SEI sites within the City through Development permit areas.

4.1.5 Usefulness and Improvement of SEI Products

Most respondents found that SEI products had been useful to some extent, but there were some suggestions as to how they might be improved.

The lack of enforceability was seen by some as a problem with the SEI, which was presented strictly for informational purposes and has no legal clout. The political climate at the local level, one interviewee argued, doesn't support ecological protection in her jurisdiction, given the incentive for people to vote in favour of development. That interviewee asserted that more guidance and regulation from the province is needed, rather than strictly information. In the words of the respondent: "imagine what the ALR would look like if it wasn't a reserve, just a series of identified polygons". Her colleague added, "the province knows full well that there's not going to be a lot of political mandate to do this, and yet they're not putting any provincial protection in place."

One interviewee commented that an expansion of what exists is required, with more groundtruthing. Another noted that without prioritization of sites, there is no consideration of tradeoffs that must be made by municipal government and community. As local governments are
forced to make these considerations on a daily basis, the suggestion seemed to be that an
inventory that does not have this information built into it is not very useful.

4.1.6 Usefulness of SEI products and services as tools to gaining political
commitment to biodiversity conservation

Interviewees were divided in their responses to this question. Three of the interviewees felt that the
SEI was a strong tool for encouraging political commitment – one interviewee noted that as many
people are very visual, the map form of the SEI was particularly useful in making a case for
conservation. Another noted that the SEI is a "common denominator" among planners and
politicians, and becoming more credible at the regional level (but that local planning still has a more
specific focus and requires more detailed information than the SEI provides). Still another
interviewee pointed out that it will fall largely to municipal staff to convince politicians that there's
something there to preserve, and that the SEI was a useful tool for familiarizing these individuals,
as well as staff, with sensitive ecosystems.

Other interviewees responded with a qualified "yes". One noted that gaining political commitment
was easier if the community was already on board with ecological protection, as (for example) in
the Capital Regional District, which has a political climate conducive to protection of sensitive
ecosystems. Another noted that the usefulness of the SEI in gaining political commitment was
heavily dependent on an existing basis of environmental knowledge and a positive attitude towards
ecological protection among politicians; while some politicians recognize that it is the best
information available and accept its weaknesses, others reject it outright as an imperfect tool.
Opinions on this topic were strong on the other side, as well. One interviewee was quite adamant that the SEI lacks credibility at the community level, and thus cannot serve as a tool for gaining political commitment. Others noted that provincial commitment to ecological protection must come before regional and local governments will follow suit, and that if the "two arms of government" are not working together towards this goal, it cannot be achieved.

4.1.7 Usefulness of SEI products in support of broad (e.g. regional) scale conservation

The original purpose of the SEI was to serve as a "flagging tool" for more detailed study at a site-specific level. Interviewees were asked whether they saw SEI products as also being useful tools to support conservation at a broad (e.g. regional) scale, rather than/as well as at the municipal level.

Four interviewees stated that the SEI was indeed useful in supporting conservation at a regional scale. Some already have Regional Growth or Conservation Strategies in place, with SEI data incorporated (for example, as designated Environmentally Sensitive Areas) – others saw their lack of use of SEI in such broad-scale conservation planning as a missed opportunity. One interviewee noted that without a Regional Growth Strategy, sensitive areas are more susceptible to shifting political climates. Another individual noted that in a region as jurisdictionally-fragmented as the southeast coast of Vancouver Island, broad-scale planning and collaboration are essential. In short, there was recognition of the potential of SEI data in regional conservation planning, but only limited evidence of it being put to such a use.
4.1.8 Usefulness of SEI products in identifying opportunities for collaboration in conservation

Five interviewees (CVRD, CRD, CSRD, North Cowichan, Nanaimo) saw the SEI as being useful in identifying opportunities for collaboration in conservation. The kind of collaboration to which the SEI most readily contributes, according to responses, is that of partnerships between local land trust/conservation organizations and municipalities/regional districts to protect SEI polygons. The Cowichan Community Land Trust Society, the Nature Conservancy of Canada, and the Habitat Conservation Trust Fund were all noted as examples of organizations with which planning authorities have partnered to achieve ecological protection. (It should be emphasized that these are not the only organizations working with municipalities to this end.) One interviewee noted that the SEI is used to identify areas where there are sensitive ecosystems within parcels of significant private land-holdings, and the municipality then approaches local conservation organizations to broach the subject of protection. In another case, SEI data is used by a regional Parks Department in discussion with the Nature Conservancy of Canada about protection of sensitive areas.

The SEI seems to be contributing less to cross-jurisdictional preservation. Potential for such partnership, however, is recognized. In the words of one interviewee, "If we had had a regional land acquisition strategy and we could partner with other groups, I'm sure it would also be useful in that context."

4.1.9 Extent to which SEI data has been complemented by additional mapping at a larger scale

Only one interviewee identified a case in which SEI information had been refined by complementary mapping: the Islands Trust Fund, where Islands Trust Ecosystem Mapping was
carried out specifically to build on SEI mapping. Recognizing the shortcomings of the SEI (which included a lack of landscape perspective, lack of identification of small wetlands and riparian areas, and in the case of the Islands Trust area, out-of-date air photos), the Islands Trust Fund took updated air photos, mapped sensitive ecosystems with modified systems, so the landscape could be viewed as a whole, and mapped wetland, riparian, lacustrine (lakes/ponds) and littoral (shoreline/marine) areas.

Three other interviewees (CRD, Saanich, CSRD) described Environmentally Sensitive Areas mapping initiatives undertaken in their jurisdictions, often at larger scales and available to the public. However, this mapping, while identifying sensitive areas, was not based exclusively on SEI data.

Some challenges to carrying out complementary mapping were noted by interviewees. Lack of funding, and of designated environmental planning staff with the responsibility of seeking out funding opportunities, was identified as a significant barrier. One interviewee pointed out that this challenge is particularly common to regional districts, which have greater difficulty using funds from general revenue for such projects. Another interviewee noted that mapping tends to be done on a "project-by-project" basis, and resulting parallel mapping systems have never been combined to form one, comprehensive ecological mapping system.

### 4.1.10 Additional Comments

Several additional comments were made about current and potential uses of SEI, or ways in which it might be improved. As well, some interviewees made use of this time to make comments on the state of conservation planning generally. The following points were articulated:
Two interviewees noted that more direction was needed from the province – for example, something like the Riparian Areas Regulation, where no development or disturbance is permitted within an identified area, and mitigative measures are required within a buffer of several metres.

One of these interviewees also identified his concern that development is often presented as inevitable. Even the term "development" permit areas presents development as a given – it is simply a question of how it will take place, and to what extent it will be mitigated in ecologically sensitive areas. As well, it was noted that private lands that include SEI polygons could remain private, but have strict regulations placed on the use of those areas by the province. The ultimate solution, however, would be to return some of these areas in public hands.

Another comment made was that while jurisdictions have had success in preserving some SEI polygons formally (in regional parks, for example), of those not formally protected, the sensitive ecosystems base is rapidly eroding.

One interviewee was concerned that the SEI is being used by citizens in lobbying the local government against development of certain areas – areas which the municipality sees as fit for development. He seemed to perceive this as an inappropriate use.

A final, general comment was made: that because so few municipalities have biologists on staff, any information (including SEI) that allows decisions to be scientifically defensible is very valuable.
The results of the literature review show that much is being done in the way of conservation planning within the study area — at the strategic level, in terms of application of regulatory tools and in the way of local private stewardship. The results of the literature review show a strong commitment to conservation on the part of most local and regional governments, and a general understanding of the issues at play. Why, then, did the Disturbance Mapping released in 2004 depict a continued and steady loss and fragmentation of ecosystems?

The following sections explore this issue, identifying barriers to effective implementation (defined as implementation that is successful in stopping the loss and fragmentation of sensitive ecosystems) of the SEI.

4.2 BARRIERS TO LOCAL AND REGIONAL GOVERNMENT USE OF SEI

The following sections outline the results pertaining to Objective 2, and identify and discuss the barriers to effective use of SEI information. These sections present interviewee responses to the question: "What barriers hinder effective use of SEI for local and regional conservation planning?"

The results of this section have been broken down into 6 categories: Inventory Form and Function, Lack of Enforceability, Limitation of Jurisdiction, Political Climate, Social Paradigm and Lack of Time and Resources. Each is discussed in detail.

4.2.1 Inventory Form and Function

The first set of barriers had to do with the form of the SEI itself, including the incompleteness of and inaccuracies within the data.
Study Boundaries

One interviewee noted that as the boundaries of the SEI study area stop short of the boundaries of the local and regional governments therein, some governments found that SEI data was not sufficient to address the entire geographical area over which they had jurisdiction. As such, noted one interviewee, not all plans could reference SEI data. In the same vein, there was concern that SEI data is provided in a vacuum, with no reference to anything outside the polygons. This has the effect of hindering broad regional conservation planning.

Scale

Another interviewee also took issue with what he perceived as incomplete data; his concern was with the scale and related lack of supporting cadastral information, which he saw as essential to any decision regarding sensitive ecosystems. Given the broad scale of the SEI maps (1:20,000), cadastral information cannot always be accurately included due to problems with the quality of the data; as a result, the data does not lend itself to site-specific planning, which typically requires mapping at a scale of 1:5,000 or less. While the proponents of the SEI made clear at the outset that it was only ever intended to be used as a “flagging tool” for further research, some interviewees felt that more in-depth inventory of critical areas would have been more useful than a broad-scale overview of sensitive ecosystems.

Timeliness of Data

Timeliness of the data was another frequently identified barrier. There was a general concern among interviewees that without regular updating of SEI data, the Inventory would quickly lose its validity and accuracy. Interviewees noted that local environmental organizations view such data
provision as a provincial and/or federal role, as they themselves lack the resources. As air photos for much of the region were updated in 2002, data should be updated to incorporate this new information. The Disturbance Mapping Data updated the SEI in 2004 to include polygons that have been modified in the last 10 years; however, there is no mechanism in place to ensure this happens regularly. Three interviewees articulated that as time passes and the information becomes decreasingly relevant, there needs to be a mechanism in place to ensure ongoing revision of the data. Some interviewees noted the possibility of their departments taking on this role themselves, but limited resources would certainly not make this possible in every case.

An associated concern with the SEI was the lack of an efficient process for capturing complementary ecosystems data gathered at a more local scale and incorporating it into the database. While a process does exist, it is viewed by some as cumbersome and slow, and thus SEI data is not being refined as effectively as it might be.

_Inclusion of 'Other Important' Ecosystems_

An additional barrier identified by one interviewee is that of the decision to include older second growth forests and seasonally flooded agricultural fields, or "other important" ecosystems in the inventory. Two individuals felt that the inclusion of this information – which more than doubles the area of identified ecosystems in this inventory – "shoots [the Inventory] in the foot". One planner stated that in spite of the clear distinction made by SEI authors between Sensitive and Other Important ecosystems, the public perceives _all_ of the identified polygons as "sensitive", and they simply become frustrated with the scale of the problem and ignore any value the Inventory might have.
**Data Accuracy**

A further barrier related to the form of the SEI was that of accuracy. There is a general awareness that only 30% of the polygons have been field-checked (the rest were identified only through photo-interpretation). This knowledge, in combination with select instances where polygons were inaccurately interpreted, has caused some individuals to dismiss the Inventory in its entirety. While such individuals run the risk of “throwing out the baby with the bathwater”, there seems to be a perception among some that lack of accuracy is an inherent attribute of SEI data. In the words of one interviewee, “if there’s one mistake, that’s all people remember.” This barrier was a particular problem in regions or municipalities where there is a large degree of local, “lay” knowledge of sensitive ecosystems and errors in the Inventory are easily spotted.

**Lack of Supporting Information**

Lack of supporting information was also identified as an issue. Concern was expressed that the SEI has replaced much of the ecological support that municipalities and regional districts used to receive from the Ministry of Water, Land and Air Protection (MWLAP – now Ministry of Environment). In the words of one interviewee, “they say, ‘here, this is what the experts say – now deal with it’”. While the BC Conservation Data Centre (MoE) provides ongoing supporting information on species and ecosystems at risk, this interviewee perceived a lack of active support from the provincial level on conservation matters, and that providing SEI data was an easy way out of funding this sort of support.

**4.2.2 Lack of Enforceability**

Another barrier identified by some interviewees was the lack of enforceability of regulations based on the SEI. If a municipality were to establish a DPA with the criterion of preserving SEI polygons,
and that provision were to be violated, there is no penalty for that violation, with the exception of perhaps a token fine. Compared to a designated, regulated area such as the Agricultural Land Reserve, the SEI holds no legal clout beyond that assigned by individual municipalities. In spite of the efforts many local governments have taken to impose regulatory enforceability on the polygons (including the use of SEI data for zoning purposes, regulation through environmental bylaws, and the application of SEI data to development permit areas), some still see its strictly informational purpose as a significant weakness of the program. It was noted by one interviewee that stronger legislation from the province is essential if municipalities are to enforce the protection of SEI polygons.

4.2.3 Limitation of Jurisdiction

Limitation of jurisdiction was identified as an additional barrier to effective implementation of SEI data. One interviewee pointed out that even armed with spatial and descriptive information about sensitive ecosystems within municipal or regional district boundaries, local governments have little control over their protection on private lands. In the words of one interviewee: "...parks acquisition is one thing, but if you're down to the point of trying to set targets, particularly in communities where growth is occurring, on the preservation of the land, and [residents] can recognize that it covers a fairly significant chunk of the undeveloped portions of their municipalities - well, then it gets a little more difficult." As such, limited jurisdiction could be deemed a barrier to effective use of SEI data.

In addition, two interviewees (Comox, Cowichan Valley RD) raised the fact that many of the polygons identified were outside of the jurisdiction of the government in question (as noted in the Introduction, SEI boundaries are not necessarily aligned with RD boundaries). Even where
polygons fell within regional district or municipal boundaries, they were often in forestry areas or
the Agricultural Land Reserve (ALR), and thus not within the jurisdiction of the planning body. In
the Cowichan Valley RD, more than 50% of the land base is in a forestry designation. (Forestry
areas are governed by the forestry company with rights to the land, and management of the ALR
falls within the purview of the province.) Once areas are being considered for development, they
fall within the authority of the Regional District, but by that time, the ecological values have often
been lost (e.g. forests logged, or ecological features degraded or impacted).

4.2.4 Political Climate

Some interviewees identified the “receiving” political climate as a further barrier to effective use of
SEI data. This situation varied considerably from one jurisdiction to the next: the CRD, for example,
is known to have a political climate conducive to ecological protection; some other jurisdictions do
not. While this barrier has less to do with the SEI specifically and more to do with conservation
planning generally, it does directly impact use of the SEI.

In other cases, citizens may be supportive of ecological protection, but a regional district board or
local council may not reflect the values of the broader community. Vancouver Island and Gulf
Island polls have consistently shown that citizens are concerned about the environment, but this
may not always translate into votes for politicians with similar concerns. The challenge, in such
cases, is in reinforcing the direct link between quality of life and ecological protection. However,
whatever the reason, where constituents are unwilling to prioritize ecological protection, local
politicians are likely to follow suit, dependent as they are on voter support.
Where local politicians are not supportive of regulatory action to preserve ecologically valuable areas, it can be difficult for planning staff to pursue progressive conservation initiatives. One interviewee described a situation in which planning staff attempted to update a plan for one area to bring in area-wide land-use designations and DPAs based on SEI data. The Regional District board, however, rejected the proposal. The interviewee noted that while politicians are often supportive of adjustments to site-specific development proposals, "big-picture protection is harder to secure". This can be a challenge for Regional Districts in particular, which are generally in an advisory role and are not mandated by legislation to create regional plans in the same way that municipalities are required to develop OCPs. This situation is extremely unfortunate, given the importance of long-range regional ecological planning, and the comparatively ineffective nature of site-specific ecological planning once most significant development decisions have been made.

Senior government support is also needed for many creative conservation initiatives. Official Community Plans must be adopted by the provincial government, and where changes are made, Regional Districts have little ability to argue. One interviewee voiced concern about provincial leadership in general, noting that the majority of provincial direction holds an underlying assumption that land will be "used", rather than preserved, and that the question was around how, and not whether, land will be developed.

Another political barrier to effective implementation of SEI stems from inter-jurisdictional tensions. Municipalities, one interviewee noted, see certain things as being outside their jurisdiction (and within that of the Regional District (RD)), but there is often much resistance to any initiatives put forward by the RD. He alluded to nervousness on the part of municipalities that the RD might be trying to expand or overstep its jurisdiction. Within this context, he continued, anything the RD can
do to "overcome its [perceived] predisposition to self-aggrandizement" will be beneficial to its relations with municipalities. The RD must be seen as the ultimate partner: "facilitative and supportive, but not directive." However, this also means that new RD initiatives can take some time to gain momentum.

The final political barrier was less a barrier to use of SEI data, and more a concern posed by it. One interviewee noted that the SEI is occasionally used as "an excuse" for provincial government to be hands-off in cases of protection. Rather than becoming involved, or providing the required support, the government simply passes off the inventory to local governments with a recommendation to "use best practices", and washes its hands of any action. (The other side of this argument is that bottom-up local planning is often more effective than top-down senior government planning, as the former is more flexible and context-specific and is done by those with a vested interest in the health of the community.)

4.2.5 Social Paradigm

Underlying local and regional political climates is a general societal paradigm. In the case of most Western countries, it is a paradigm of growth, development and consumption which drives both individual and government decisions. It has resulted in the commodification of land, and a bias that tends to favour the landowner or developer's interests.

While Vancouver Island and Gulf Island communities seem more concerned about this paradigm than others throughout the province, they are not immune to it – particularly smaller communities seeking economic expansion. One interviewee alluded to a "growth-oriented environment" among
small communities attempting to improve themselves through economic and population expansion. In reference to one such community, he noted:

"I think as the community develops and matures, it's probably going to start to value what remains a little bit more – but it's going to go through a period of degradation before it gets to the point where people really start to say... some of that would be nice to keep, and we've lost a lot in the effort to improve our community over the last 15 years... but I'm not sure if they're really there yet. There's still a very growth-oriented consensus, but there are little indications that the mood is changing."

Another interviewee was concerned about the lack of balance between market-driven and non-market-driven values. While land has a very clear market value, environmental values such as ecological processes, recreational opportunities, quality of life, scenic values, sense of place, and educational value are more difficult to monetize, and as such are often overlooked.

Increasingly in Western society, market-driven values tend to far outweigh non-market values. As one interviewee put it: "You need something to even the odds between non-market [e.g. ecological] values and market-driven values, because right now you've got this see-saw with a hippopotamus on one end and a mouse on the other... surprise surprise, it's leaning down that way. You've got to get something to balance it out a bit."
Certainly our economic system is driven by this growth-oriented paradigm. Randall\textsuperscript{20} asserts that our economic system and the skewed set of values that it is founded upon is "utilitarian, anthropocentric and instrumentalist in the way it treats biodiversity (original emphasis). It is utilitarian in that things count to the extent that people want them; anthropocentric, in that humans are assigning the values; and instrumental, in that biota is regarded as an instrument for human satisfaction."

It is this 'mood' of "growth equals progress" that contributes to the final barrier in this category: the perception that the flagging of a property for its ecological value will result in the decline of its financial value. The underlying premise of this perception is that the preservation of a space for its ecological value precludes the realization of that site's "full potential" – maximum development. This premise is reflected in the concept of "highest and best use" of land, as determined by the marketplace. This use is generally perceived, where it is economically feasible, to be development.

\textbf{4.2.6 Lack of Time and Resources}

A final category of barriers to effective use of SEI data is that of lacking time and resources. Many municipalities within the study area are small, both physically and in terms of population, and as such have limited staff and resources. In such cases, long-term ecological planning tends, by necessity, to take a back seat to more pressing, day-to-day neighbourhood planning. As noted by one interviewee, where planners are arguing over the placement of a fence or driveway, large-scale environmental planning simply isn't a priority. In addition, development is often perceived as

a necessary form of revenue for municipalities (particularly small ones), who have limited ability to raise funds and often depend heavily on property taxes to supplement provincial funding.

Technical constraints in dealing with and accessing SEI data is a further barrier to its use. While most regional districts have sufficient resources to create ESA atlases and GIS systems, many municipalities do not. For this reason, some RDs are committed to expanding regional ecological data layers and updating air photos, in order to make this data available to municipalities. However, even at the regional level, it is difficult to establish core funding in order to be able to regularly update ecological information. Once again, ecological planning must be made a political priority, and the challenges associated with this have been discussed above.
5.0 ANALYSIS AND CONCLUSIONS

5.1 FACTORS AFFECTING RESULTS

5.1.1 Local vs. Regional Government

Several factors must be taken into consideration when analyzing the results of this study. Clearly, whether the interviewee was from a local or regional government would have considerable bearing on his/her responses to the questions. The two administrative bodies differ in many ways – with respect to resources, political climate, administrative authority, staff numbers and mandate. All of these factors will have affected interviewee responses. Regional Districts are by their very nature (better-resourced, with broader jurisdictions more closely aligned to ecosystem boundaries) more likely to have undertaken ecological planning.

This did, in fact, prove to be the case: with more staff members dedicated to specific aspects of planning, including ecological planning, and fewer pressing priorities than municipalities, application of SEI data in a number of ways was a more realistic undertaking for the Regional Districts interviewed. Four of the five RDs interviewed make fairly extensive use of the data; the fifth has had difficulty convincing its regional board of the importance of ecological planning (political barrier). In general, however, the fact that Regional Districts are not directly accountable to constituents in the same way that municipalities are, seemed to have freed up RD staff to focus on the longer-term priorities that might be perceived as “inefficient” or tying up too many resources at the local level.
Many municipalities, however, have employed the regulatory tools available to them in an effort to provide long-term protection of SEI polygons. Table 1 showed a number of applications of such tools to an end of conservation.

5.1.2 Size of Municipality/Region
The size, both in population and in area, of the municipality or region, is also an important variable to consider. Smaller municipalities, for example – particularly those without dedicated environmental planning staff – are less likely to be able to carry out and fund ecological planning initiatives, and as such are less likely to have made use of SEI data. Based on my limited findings from municipal interviews, this did, in fact, appear to be the case: Comox, the smallest municipality I interviewed (both with respect to physical size and population) was making little use of SEI data due to other, more “immediate” priorities, while the municipality of Saanich, the largest within the CRD, has a dedicated environmental planning division and its own Environmentally Sensitive Area atlas, based in part on SEI data.

5.1.3 Political Climate
The political climate of the jurisdiction, both at the community and political levels, will also have impacted willingness to support environmental initiatives. Some jurisdictions are inherently progressive (CRD, Islands Trust), while others tend to be more conservative. Still others have regional boards or local councils that are unrepresentative of the public in one way or another. Some municipalities, for example, seemed to have a strong environmental awareness at the grassroots level, represented by active land trust organizations, but a highly conservative regional board. In any of these cases, the political climate of the jurisdiction is a variable that should be considered.
5.1.4 Specific Conservation Mandate

In one case, the regional body interviewed had a specific environmental protection mandate. The responses of the interviewee from that body (the Islands Trust) must be considered with that mandate in mind, as it is likely to affect resource availability and program focus.

5.1.5 Interviewee Position

A final consideration is that of who within the jurisdictional body was interviewed. An environmental, a technical and a regional planner are all likely to work on different types of projects, and be familiar with different aspects of planning. While the questions were posed in such a way as to highlight general trends within a planning department, individuals within the department may not be familiar with activity throughout it.
Figure 4: Problem Stratigraphy

**Symptom 4°:** societal breakdown due to loss of essential ecological functions and "secondary" benefits of ecosystems (educational, recreational, etc.)

**Symptom 3°:** loss of ecosystems, including the values associated with them – ecological functions, educational, aesthetic, recreational, etc.

**Symptom 2°:** disturbance and modification of sensitive ecosystems on East Coast Vancouver Island/Gulf Islands, including rare/endangered species that depend on these ecosystems

**Symptom:** lower level of local and regional government awareness of critical areas, and subsequent lack of planning to protect them

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**Problem: Lack of Use/Under-use of SEI**

**Underlying Cause:** inventory form and function – inaccurate/incomplete/untrustworthy data

**Underlying Cause 2°:** lack of commitment of resources at municipal, regional, provincial, federal level to improve Inventory form/function

**Underlying Cause 3°:** lack of political commitment to ecological protection results in lack of commitment of resources

**Underlying Cause 4°:** lack of awareness, education about significance, importance of ecological function

**Underlying Cause 5°:** social paradigm encourages consumption, development
5.2 PROBLEM STRATIGRAPHY

5.2.1 Analysis of Barriers

The Problem Stratigraphy (Figure 4) above provides a different means of analyzing the barriers identified in this research. The "problem" identified is the lack of use, or "under-use" of SEI data, one of the issues I sought to address in the interviews. The problem has several layers of causes, the most deeply-seated being the underlying social paradigm. As well, we can infer several potential symptomatic results of this chain of causality.

The symptoms of this problem are depicted in the top section of the Stratigraphy, starting with direct effects immediately above the problem, and increasing in severity, or generality, above. Direct effects of low use of SEI data might include a lessened awareness of critical sensitive ecosystems within the study area, which is likely to precede a lack of adequate protection of these areas. In turn, ecosystems are likely to be lost, and with them their many associated values (educational, recreation, scientific, quality of life, etc.). It could even be speculated that the logical extension of this situation is the breakdown of society, for lack not only of the "resources" on which we depend, but also for lack of the mental and emotional health, scientific discoveries and educational opportunities supported by healthy ecosystems.

The Stratigraphy also shows the different levels of profoundness of the barriers, or "causes" identified by interviewees (below the problem box). While many of the causes initially identified appear quite "superficial", such as the inaccuracy and incompleteness of SEI data, they were found, with some discussion, to be causes of other, more profound issues, such as our consumption-oriented social paradigm.
The intention of this analysis is in no way to undermine or gloss over less "profound" barriers, nor is it to suggest that these barriers require less attention than more deeply-seated ones. Inaccuracies within SEI data, a perceived inability of local and regional planners to trust the data, and the presentation of data on a scale that is not useful to the day-to-day needs of planners are all very real problems, and ones that need to be addressed. This analysis is merely intended to demonstrate that by simultaneously addressing more deeply-rooted barriers, such as the lack of public awareness about ecological issues, or the lack of funding of conservation initiatives, the effects are likely to be felt "up the chain". Underlying problems of lower degree (less profound) are likely to be solved – or at least lessened – by the solving of problems of higher degree (more profound).

The assumed chain of events is this (subject, of course, to any number of derailments): A greater understanding of the critical point we as a society have reached with respect to the ecological health of the communities we inhabit is likely to lead to the selection of political leaders sympathetic to this issue, or at the very least to holding our politicians accountable to a higher standard of ecological protection. The application of political pressure by an informed, educated community is likely to lead to greater funding of ecological inventory (including such initiatives as SEI), planning and protection, at the provincial, regional and municipal levels. Greater funding should, in turn, lead to a greater capacity to create and maintain effective planning tools, which, logically, should lead to significantly improved ecological protection due to trust in and relevance of the data.

5.2.2 Identifying the Leverage Points

One of the benefits of Problem Stratigraphy analysis is that it facilitates identification of leverage points, which are points of simple action that bring about widespread or profound change. In this
case, public education about ecosystem values, or involvement of the public in the design and implementation of conservation initiatives, are actions that do not need to be costly or time-consuming, but that have the potential to result in profound change. Increasing public commitment to the issues is likely to result in different political decisions, greater financial and technical support for conservation initiatives, and resultant improvement of ecosystems information. This, in turn, will facilitate conservation planning at the local level, and the symptoms identified above are likely to be alleviated.

This process, however, is a slow one; social paradigms are not transformed overnight. In the interim, application of pressure at other points in the system is essential. Municipalities have a range of regulatory mechanisms available to them, many of which could be well-served by an improved set of SEI data. Zoning, density bonusing, environmental bylaws, and ecologically sensitive development permit areas (DPAs) should (where they are not already) be employed to protect what fragments of sensitive ecosystems remain. These and other tools are further discussed in the Recommendations section. While such action may be perceived as treating the symptom, rather than the deeper causes of the problem, the situation is critical, and demands both immediate regulatory and more gradual, fundamental paradigmatic change.

While Figure 4 is a gross over-simplification of the issues, and makes abstract the many solutions that have already been put into action on the ground by informed and concerned citizens, the exercise is a valuable one; it reinforces the deep-seated nature of many apparently simple problems.
5.3 CONCLUSIONS

Several conclusions may be drawn from this research. As identified in Chapter 3, conservation planning has evolved considerably over the last three decades, and a role and responsibility for local governments within this context has been identified. In addition, local and regional ecosystems information is in increasing demand, and is essential to sound ecological planning. Its importance will be increasingly recognized as more and more local and regional governments become involved in conservation planning. As a result, it is important that programs like the Sensitive Ecosystems Inventory be financially and politically supported, updated on an ongoing basis, and technically refined.

Analysis of the interview results showed that while most local and regional governments within the study area are using SEI data, different jurisdictions are limited in their use in different ways. The interviews also permitted the identification of a range of uses of SEI data.

The barriers identified in the interviews revealed several realities. They show that while many municipalities are making concerted efforts to protect what they know are sensitive ecosystems, some communities have yet to make a strong commitment to environmental protection. In some cases, this is due to a lack of resources and ability; in other cases it is due simply to a lack of prioritization of environmental issues. In the latter case, the lack of awareness coupled with a low level of political support has resulted in little action with respect to conservation of critical sensitive areas. Institutional and public perception barriers still exist in some communities, and subdivision-style development is, in general, still the norm within the context of development. In short, the conventions of planning have been difficult to shake.
The problem stratigraphy demonstrated that it is not enough to throw money at "superficial" barriers to implementation (such as technical glitches within the Inventories). In order to effectively eliminate these barriers, resources should be directed at more deeply-rooted problems, such as community environmental involvement in decision-making. Once there is a stronger investment in ecological values, there is likely to be a "domino effect", with increased political attention to ecological conservation, increased commitment of resources to related programs, and subsequent improvement of Sensitive Ecosystems Inventory information.

The situation, however, calls for immediate action as well as long-term education and a significant paradigm shift. As such, it is up to planners and local government officials to "read the writing on the wall" and take responsible action. We have enough information to know the situation is desperate; tools such as the SEI Disturbance Mapping depict an enormous and ongoing loss and degradation of the sensitive ecosystems that we are directly dependent on. In the words of one interviewee, "how much money do you spend mapping this stuff, and when do you just get out and get it done? We know the problem's there, so let's just move on..." The SEI offers an important type of information and an opportunity for local and regional governments to follow this lead and expand on the data. It is not "the solution" – but it is one in a suite of tools that can assist responsible planners in making better land-use decisions.

Certainly, the SEI is an imperfect tool, and one of limited use. Innovative municipalities (e.g. Regional Municipality of Saanich) and regional districts, however, have shown that with a small investment of time and resources, it is possible to build upon SEI data to create a local inventory at a finer scale that is very much of use. Coupled with stringent regulation of land use, such a tool has
a great deal of potential in reversing the downward spiral of ecological destruction, and depicting the direct association between healthy ecosystems and healthy communities.
6.0 RECOMMENDATIONS AND SUGGESTIONS FOR FURTHER RESEARCH

6.1 A NEW DIRECTION FOR CONSERVATION PLANNING

“It is not resources we lack, nor even the knowledge, but the vision to use them constructively.”

-Calvin Sandborn, 1996

As reflected in both the quote and the sections above, local and regional planners do not lack the tools, or even the expertise, required to make ecologically-sound land use decisions. Local and regional governments are empowered to protect wild spaces in a diversity of ways — through land acquisitions, through planning and development controls, through regulatory bylaws and policy direction. And ecosystems information exists — documented in State-of-the-Environment reports and ecosystems inventories and confirmed through NGO and community monitoring, government reporting and academic research. Granted, the tools are imperfect and the information incomplete, but neither should justify inaction.

A renewed commitment to ecological planning on the part of all local and regional governments is crucial. It is critically important — particularly at this stage, when so much of our unique and sensitive ecosystem network has been degraded and lost — that remaining sensitive ecosystems be identified and preserved before further development is considered. Development must subsequently be designed to minimize further impact to these sensitive areas. Most importantly, identification of sensitive ecosystems must be the basis, and not an “innovative” tangent of planning. Ecological planning is no longer forward-thinking; it is crucial to the survival of all species.

A broad range of tools must be implemented to this end. Regional conservation strategies should be created for each region, in conjunction with regional growth strategies. Strong environmental objectives should be set out in OCPs, and should be reflected in effective bylaws. Creative zoning should be encouraged, with comprehensive development zones used to maximize flexibility in site development. Regulatory mechanisms such as clustering and density transfer should be employed to maximize protection of ecologically sensitive areas and features within a site. Environmentally Sensitive Area and Development Permit Area designations should be used to identify larger sensitive areas, and strict requirements established for development within these areas. In the words of Sandborn, we must improve the tools governments have for 1) acquiring natural areas when development takes place, 2) regulating natural areas when development takes place, and 3) encouraging creative development that makes room for nature. The SEI Conservation Manual is an excellent resource outlining such tools, and should be widely promoted not just within the study area, but across the province.

North Cowichan District is one example (among many within the study area) of a community that has taken on such innovative conservation planning. The District's Official Community Plan has a policy dedicated to the protection of its "natural ecosystems". SEI mapping has been incorporated into the Cowichan Valley Environmental Planning Atlas (2000), and Ecologically Sensitive Areas have been created on the basis of this mapping. The OCP dictates that these ESAs will be protected through one of several mechanisms, including: the return of watercourses and adjacent riparian zones to the Province for management; dedication to the municipality for environmental management; dedication to a private land trust for ongoing stewardship; or the creation of incentive zoning that ensures the protection of the site. Sites hosting SEI polygons are evaluated on the

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basis of the municipality’s Development Permit Guidelines. Disturbance of vegetation, movement of soil or other disturbance of land and water are not permitted without a development permit, issued in accordance with the Guidelines, which in turn conform to Section 919.1(1)a of the Local Governance Act. Finally, North Cowichan has set aside a number of highly sensitive sites in Environmental Management Areas, and the District cooperates with their owners and managers on an ongoing basis to ensure their protection.23

However, such innovative planning, though laudable, is not enough. While it commits local governments to short-term management of sensitive ecological areas, it does not in itself promote a shift in paradigm, which is essential to long-term ecological protection. As depicted in the Problem Stratigraphy, leverage points such as staff education and public involvement in key conservation decisions must support regulatory mechanisms. As well, a multi-jurisdictional and multi-sectoral approach must be taken to conservation planning, with strong communication across municipal and regional departments (particularly in areas where jurisdiction is illogically allocated), and between municipalities and regions. Information sharing is a crucial element of this communication. This includes Best Management Practices, bylaw templates, guidelines for environmental policies in OCPs, and case studies of effective initiatives, including information about benefits, barriers, costs, and public response.24 The Environmental Law Centre at the University of Victoria, in partnership with Ducks Unlimited Canada, the Wetlands Stewardship Partnership and the Grasslands Conservation Council of BC, recently drafted a “Bylaw Toolkit” for green infrastructure and sensitive ecosystem, responding to a critical need for model bylaw templates.

In addition, and most importantly, the social paradigm of growth and development that permeates almost all political and the majority of personal decisions must be uprooted and replaced with a paradigm driven by ecological and community values. Collective responsibility must be taken in order to conserve the resources which offer us collective benefits.

6.2 A NEW DIRECTION FOR THE SEI

The SEI has potential to contribute to this transition to conservation planning, and should be promoted as such. The following section provides a number of recommendations for the Canadian Wildlife Service and MoE, regarding both improvements to the SEI, and how current products might be better presented to be more useful to local and regional governments. In some cases, recommendations are also directed at other government agencies, but CWS and MoE might, as the owners of the SEI project, take steps to encourage these actions, to the extent that it is appropriate and useful.

Recommendations were formulated around each of the barriers identified in the Results section: Inventory form and function; lack of enforceability; limitation of jurisdiction; political climate; social paradigm and lack of resources.

6.2.1 Inventory Form and Function

One of the most fundamental issues interviewees had with the SEI was inaccuracy and incompleteness of the data. There is concern that it does not go into enough depth for detailed site planning, that the data are not well-maintained or easily updated, and that additional groundtruthing
is necessary if decision-makers and community members are to feel confident enough with the data to base regulatory decisions on it.

Recommendations:

A process should be set in place to ensure additional groundtruthing and long-term maintenance and updating of the data. In cases where departments are willing and able to take this on themselves, SEI staff should encourage more in-depth study of identified natural areas, on a scale more conducive to site planning (1:5,000). In addition, the database should be expanded to cover entire regional jurisdictions. Such a database could serve as the basis for sound regional conservation planning, and would encourage regional districts to work collaboratively to conserve SEI sites that bridge jurisdictional boundaries. Complementary mapping for municipal or regional jurisdictions should also be encouraged, where resources permit.

In addition, a concerted effort should be made to improve existing SEI products. The website should be made more user-friendly, including easily accessible, jurisdiction-specific statistics; the SEI Conservation Manual in a searchable HTML format; and interactive maps showing SEI sites and related data attributes. The website could also showcase SEI "success stories", highlighting case studies that demonstrate how SEI data can be effectively put to use for conservation planning. The examples provided in the Conservation Manual would be an excellent starting point, and could be outlined in a separate section of the website. The new Model Bylaws report outlined earlier, as well as the new provincial standards for Predictive and Terrestrial Ecosystem Mapping\(^{25}\) could also be included with other potentially useful resources.

6.2.2 Lack of Enforceability/Limitation of Jurisdiction

The SEI does not hold any regulatory power. That is, unlike the Agricultural Land Reserve, and the new Riparian Area Regulation – both provincial initiatives – the SEI is intended strictly for information purposes. And while it is, to a degree, useful in identifying areas in need of protection, it lacks the strength of the ALR or RAR in that municipalities are forced to forge their own way if they intend to regulate land use on the basis of the SEI – often in the face of political contentiousness.

Limitation of jurisdiction was another barrier identified, and I have addressed it here with Lack of Enforceability because I see the two as being closely linked, and addressed by some of the same recommendations. Several interviewees identified limitation of jurisdiction as being a reason SEI-informed land-use decision making could not be employed on private lands.

Recommendations:

One of the strong messages communicated by interviewees was the need for stronger provincial legislation on sensitive ecosystems, and I believe this is something that should be stressed by SEI proponents – the province has a greater responsibility than simply providing information on these critical and threatened areas. As it has done with respect to riparian and agricultural areas, the province should create strong legislation to protect critically endangered sensitive ecosystems. This will facilitate local government enforcement of regulatory tools currently being used, to varying degrees of effectiveness, to protect these areas. This would not leave local governments in the awkward position of having to convince their politicians to prioritize ecological protection; they would have a mandate from the province to do so.
With respect to the identified limitation of jurisdiction on private property, tax exemption can be an effective tool for encouraging private stewardship. In addition, the following tools can be used by local governments to ensure protection on private lands.

**Zoning**

Used innovatively, zoning bylaws may be effective mechanisms for ecological protection. Local governments may achieve the following through zoning:

- Establish setback provisions to buffer environmentally significant features or areas
- Create density bonusing zones or cluster housing zones for residential areas adjacent to ESAs to allow developers to exceed an assigned density in exchange for the preservation of sensitive ecological features or areas
- Create comprehensive development zones to ensure careful site planning on complex sites containing sensitive ecosystems
- Create conservation covenants to ensure that sensitive areas are protected from future development

**Environmental Bylaws**

The Local Government Act provides local governments with the power to create bylaws related to a number of conservation domains, including streams and drainage, trees and landscaping, soils, and animal control. An environmental bylaw might, for example, prevent pollution and contamination of ecological systems of aquatic areas, trees, soils or sloping terrain. Again, the recently completed Model Bylaws document could serve as a highly useful resource.

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Development Permit Areas (DPAs)

DPAs are areas with specific informational requirements which must be met prior to the issuance of a development permit. In designated Environmentally Sensitive Areas, this might include information as to how sensitive ecosystem components and services will be protected during and following development. As noted in previous sections, many local governments have already designated SEI polygons as DPAs.

6.2.3 Lack of Time and Resources

Underlying the issue of perceived inaccurate and incomplete data is a lack of commitment of resources from the provincial and federal governments to improve Inventory form and function. There is not currently long-term funding in place to ensure the data is updated and maintained regularly, and as such the integrity of the data is threatened.

Recommendations:

Existing resources should be leveraged by SEI proponents to secure long-term funding for the SEI program. SEI "successes" should be communicated to the federal and provincial governments, and a case made for the importance of ongoing funding. In addition, local governments should be encouraged to apply for funding from non-government funding organizations, and to apply for grants through their respective umbrella administrative bodies, such as the Federation of Canadian Municipalities. The Green Municipal Fund is an example of such a grant.

Partnerships among municipalities, and between municipalities and regional districts, are also essential, and can increase the cost-effectiveness of conservation. Regional acquisition strategies,
with a goal of acquiring key SEI sites, could establish joint acquisition funds into which taxpayers contribute a nominal amount on an annual basis. Similar resources could be levied for the maintenance and improvement of SEI data.

In addition, southern British Columbia has a very strong land trust community. In areas where such organizations exist (most of the study area), SEI data should be shared with them so that they can approach private landowners with sensitive ecosystems on their land in the hopes of securing conservation easements as an alternative means of protection. Again, some land trusts and conservancies have already taken this important step, and their work should be recognized.

Technical assistance is an invaluable resource. The Canadian Wildlife Service should ensure that they continue to provide such assistance to local residents interested in stewardship and restoration of sensitive sites in their regions.

Finally, ongoing supportive information services should be requested from the province, in order to maintain the “personal touch” and to ensure local governments and staff do not feel abandoned with new and intimidating data. A linkage with the Conservation Data Centre should be maintained, and regular contact should be made with local governments implementing SEI-based projects.

6.2.4 Political Climate

Underlying the issue of lacking resources for maintenance and improvement of SEI products is a lack of political commitment to ecological protection. Conservation can be perceived as being costly, time-consuming and an inexact science – as such, politicians are often loath to take it on.
Recommendations:

Raising awareness among politicians and within communities about the value of healthy ecosystems and the services they provide – including water and air purification, waste absorption, educational and recreation opportunities – is a critical step towards overcoming political inaction as regards conservation. Local planners should be encouraged to share SEI information to this end. Demonstrating the well-proven cost-effectiveness of protecting natural areas will assist politicians in promoting conservation. In addition, SEI staff should encourage information sharing among municipalities and recognize communities that have successfully engaged in conservation. Planning departments should champion the use of the SEI to identify local “green infrastructure”, and use this information to guide the layout and patterning of development.

Further, SEI staff should ensure SEI information reaches residents. As voters, and thus the drivers of political change, community members armed with information about sensitive and significant ecosystems have the ability to hold politicians accountable for the decisions they make. Equally, informed citizens can pressure local governments to utilize SEI information in the application of regulatory tools – Official Community Plans, bylaws, development permit areas, local area plans, zoning, etc. this information could be disseminated through the website, grassroots organizations, land trusts, list-servs, and showcased at community centres and schools.

6.2.5 Lack of Awareness/Social Paradigm

Underlying the lack of political commitment to conservation is, among other things, a lack of public awareness and understanding of the importance of ecological function, and a social paradigm that perpetuates consumption, and economic development.
Recommendations:

The SEI can play a significant role in raising awareness about sensitive ecosystems both on the part of decision-makers and the community, both by identifying key sensitive areas and by highlighting the alarming trend of ecosystem loss and degradation. AXYS Consulting Ltd recommended in its 2003 evaluation of the SEI that an SEI “guidebook” be developed by Inventory authors; I reiterate that recommendation here. A guidebook could break down the statistics by municipality – rate of loss, number of sites loss, number conserved – and include information regarding how sites were conserved and what methods of conservation were most successful. The wide publicity of such information would have a twofold effect: first, to draw attention to those municipalities doing little to conserve natural areas within their jurisdictions, and second, to commend those that are committed to conservation and to make others aware of the options available to them. The development of an SEI “report card” could reinforce this message, though this is best taken on by a non-governmental organization, so that local and regional governments do not perceive senior level of government to be pointing fingers or overstepping their jurisdiction.

In addition, SEI staff could undertake the creation of a video highlighting key SEI sites in various municipalities with footage of the sites, and include interviews with decision-makers regarding the ways in which they have used SEI information to preserve sites, how they overcame challenges and acquired resources, and what the results have been.

Finally, SEI staff should raise awareness of ecological value by encouraging communities to “personalize” the data, pairing SEI products with processes such as community-based mapping and the identification of locally significant ecological and cultural spaces. Such an exercise will not
only raise awareness within the community, but encourage alliances of citizens committed to conservation. Citizens owning ecologically sensitive land should be invited to partake in such events, and informed of programs such as Environment Canada's Ecological Gifts program and the Islands Trust's Natural Area Protection Tax Exemption Program, both of which use tax incentives to encourage the protection of privately owned natural areas in perpetuity.

Finally, we come to the most deeply-seated issue – the Western social paradigm that sees growth as an automatic "good", with little regard to what the growth is for, who it benefits, and at what cost it takes place. This paradigm, which encourages thoughtless consumption, development and exploitation, underlies all of the other issues we have discussed thus far, and will certainly prove the greatest challenge to conservation.

Sound ecosystems information is an essential tool to combating this worldview. By promoting the responsible and effective use of such information, decision makers and community members will be contributing to the expansion of a new paradigm – one that, in the words of Donella Meadows promotes the "4 Es": equity, ecological integrity, empowerment of all people and an economy that produces sustainable development.27

If such a reality is to be realized, significant changes to our current economic system will be critical. Rees28 argues that "fine-tuning the global economy" – that is, attempting to represent the diversity of ecological value using economic valuation tools that have thus far proven inadequate for such a

purpose – will be insufficient to bring about the fundamental change that is required, and that a more radical paradigm shift is necessary. He asserts that “a shift to steady-state thinking and ethics-based approaches are necessary, and possibly even sufficient, for sustainability.”

Changing our social paradigm is perhaps the most effective leverage point in the Problem Stratigraphy presented earlier. By demonstrating that an alternative paradigm promotes not only healthy ecosystems but by extension healthy communities and individuals, those involved in the SEI program have a unique and valuable opportunity. They will assist the transition to a new way of perceiving our place in the natural world, which will translate to land use decision-making in our communities, our regions, and our bioregions that respects and conserves remaining natural ecosystems.

Changing a social paradigm, however noble a goal, is perhaps not altogether realistic as a municipal undertaking. However, it can be achieved in part through public education, an indirect means of shifting values and encouraging a more expansive examination of the state and future of sensitive ecosystems. By widely publicizing what data exists on the condition of local ecosystems (including SEI results), as well as informing citizens about incentive programs, volunteer opportunities and other ways in which they can become directly engaged in ecosystems protection, municipalities can promote – indirectly – a shift towards ecological awareness and a political and economic system that is supportive of conservation.

6.3 REFLECTIONS AND OPPORTUNITIES FOR FURTHER RESEARCH

While I feel that this research was generally successful, and hope that it will prove useful both to the Canadian Wildlife Service and to local governments within the study area, I am not convinced
that my approach was as effective as it might have been. My decision to carry out in-person interviews in the summer months, and perhaps more importantly, to limit my communication to these interviews, rather than incorporating a survey or some other form of written questioning, was probably the greatest hindrance to a more fruitful exploration of this topic. A larger sample would have provided a more representative snapshot of use of and issues with the SEI, and increased my confidence in the conclusions I drew. It would have enabled me to posit more just generalizations about municipal versus regional, and small versus large municipal use of and barriers to use of the SEI.

In addition, I would have expanded my literature review to include local and regional ecosystems protection initiatives not just within British Columbia, but across the country and the world, simply as a means of better contextualizing the issues at hand. Such a broad view would have enabled me to comment on the broader commonality of the problems uncovered within my study area, and possibly provided better advice on the applicability of solutions from other, similar jurisdictions.

Research on the following topics would complement and enhance the research presented here:

- Effecting ecological value changes through public education utilizing SEI data
- Case studies ("success stories") depicting local and regional government use of SEI data for inclusion in an SEI video
- Survey of local and regional conservation initiatives outside of BC, for purpose of comparison of BC programs/initiatives with others and drawing of parallels (and delineation of potential for success of such programs within BC).
REFERENCE LIST


9. Harris, Nitya C. Programs for land-based habitat conservation in BC. A Report to the CRD Roundtable Sub-Committee on land-based habitat.


GLOSSARY

Agricultural Land Reserve (ALR): a provincial zone in which agriculture is recognized as the priority use and non-agricultural uses are controlled. The ALR takes precedence over other legislation and bylaws which may apply to the land and is administered by the Agricultural Land Commission.

Conservation Planning: a branch of planning that has developed over the last several decades, which emphasizes the planning of development around identified sensitive ecosystems and the protection of ecological values before, during and following the development process.

Development Permit Areas: areas with specific informational requirements which must be met prior to the issuance of a development permit. In designated Environmentally Sensitive Areas, this might include information as to how sensitive ecosystem components and services will be protected during and following development.

Ecological Gift: a donation of land or an interest in land - such as a conservation easement, covenant or servitude - that has been certified as "ecologically sensitive" according to specific national and provincial criteria.

Ecological Integrity: the condition of an ecosystem determined to be natural and likely to persist, including native species, rates of change and supporting processes

Ecosystems Inventory: a study determining the location and condition of sensitive ecosystems

Ecosystem Planning/Management: an ecological approach to natural resource management and urban development to assure productive, healthy ecosystems

Environmentally Sensitive Areas Atlases: a set of maps outlining the location of environmentally sensitive areas, typically at a local or regional scale

Extirpated: a wildlife species that no longer exists in the wild within an identified area (e.g. Canada), but still persists in the wild outside of that area

Groundtruthing: the process of verifying on the ground information that has been gathered through other means – for example, through analysis of aerial photographs

Invasive Species: any species, including its seeds, eggs, spores, or other biological material capable of propagating that species, that is not native to that ecosystem, and whose introduction does or is likely to threaten the integrity of the form and function of the ecosystem

Islands Trust's Natural Area Protection Tax Exemption Program (NAPTEP): a property tax incentive program administered by the Islands Trust Fund and designed to encourage landowners to protect the natural and cultural features of their land.

Leverage Points: areas of relatively simple action that can promote significant and profound change
**Paradigm:** the predominant worldview

**Problem Stratigraphy:** an analysis tool used to simplify complex, multi-layer problems. It involves identifying a problem, its root (underlying) causes, and its "symptoms", or effects. As a method, it is particularly useful in identifying **Leverage Points** (see definition above)

**Regional District:** in British Columbia, a unit of administrative jurisdiction that falls between the city and the province, and allows municipal partnerships in service delivery and the management of issues that transcend municipal and electoral area boundaries, including ecological planning and conservation

**Regional Conservation Strategy:** a document analogous to the **Regional Growth Strategy** (see below), outlining the long range conservation planning direction of a regional district and its constituent members

**Regional Growth Strategy:** a vision outlining long range planning direction for regional district and municipal official community plans (OCPs) and providing a basis for decisions regarding implementation of provincial programs in the area

**Sensitive Ecosystems Inventory:** systematically identifies and maps rare and fragile ecosystems in a given area. The program was initiated in 1990 by a partnership between the Canadian Wildlife Service and the Ministry of the Environment, but has since been taken on by other government agencies.

**Stereoscopic:** the overlapping of air photos to allow a 3-D perspective and recognition of topographic features
APPENDIX A: Interview Questions for Local/Regional Decision-Makers
Interview Questions for Local/Regional Decision-Makers

Preamble

In 1993, a Sensitive Ecosystems Inventory (SEI) of East Coast Vancouver Island and the Gulf Islands was initiated by a partnership between the provincial government and Canadian Wildlife Services (Environment Canada). The project identified, classified and mapped the region's remaining fragments of ecologically sensitive terrestrial ecosystems in response to an urgent need for sound inventory information on these ecosystems. The primary goal of the project was to support informed stewardship and improved land use decision-making.

The intent of this interview is twofold:
1. to identify a) how and to what extent the data is being used, and
   b) those decision-makers not using SEI data, and why not;
2. to identify the ways in which SEI data might be used to support biodiversity protection on a broader (e.g. regional) scale, and to uncover existing barriers to such use.

Questionnaire

1. Do you use Sensitive Ecosystems Inventory (SEI) Data?

2. If not, what are your reasons for not using SEI data? How might SEI data be improved to make it more useful to you? Specifically, what products and/or services might make it more useful?

3. Are you aware of the new “Disturbance Mapping Data”? If so, do you use it?

4. Which other SEI products/services do you use (hardcopy/digital maps, atlas products, pamphlets, technical reports, newsletters, website, field data, other)?

5. Have these SEI products/services been useful? If not, how might they be improved or supplemented?

6. How do you use SEI products/services (planning, creation Development permit areas, incorporation into OCP, land protection/conservation, park/greenspace management, other)?
   a. Has the SEI been used to support conservation in land-use decision making in your jurisdiction? If so, in what way? If not, why not?
   b. Do you see SEI products as being useful tools to gaining political commitment to conserve biodiversity? If so, how? If not, why not?

7. The original purpose of the SEI was to serve as a “flagging tool” for more detailed study at a site-specific level. Do you see SEI products as also being useful tools to support conservation at a broad (e.g. regional) scale, rather than/as well as on a strictly site-specific basis? If so, in what way? If not, why not?
c. Are SEI products currently being used for such a purpose (e.g. to create regional biodiversity strategies) in your jurisdiction? If not, would you be supportive of such an application?

d. Do you see SEI products as valuable tools for visualizing opportunities for collaboration in conservation?

8. Has there been any attempt in your jurisdiction to build on SEI data by carrying out complementary mapping at a larger scale (e.g. Environmentally Sensitive Area mapping)? If so, what type and scale of mapping was carried out?

9. Are there any further comments you would like to make regarding the ways in which you use SEI, future potential uses, or ways in which it might be improved to support regional land use decision-making?

10. Of what value do you see regional biodiversity conservation strategies or ecoregional strategies?

11. What do you see as the primary barriers to use of SEI at the local/regional level?

*End of Interview*
APPENDIX B: Sensitive Ecosystem Descriptions
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<thead>
<tr>
<th><strong>Sensitive Ecosystems</strong></th>
<th><strong>Ecosystem Description</strong></th>
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<tbody>
<tr>
<td>Coastal Bluff</td>
<td>Vegetated rocky islets, rocky shoreline/grassland, rocky shoreline/moss or coastal cliff</td>
</tr>
<tr>
<td>Sparsely Vegetated</td>
<td>Sand dunes, gravel spits and inland cliffs with sparse vegetation</td>
</tr>
<tr>
<td>Terrestrial Herbaceous</td>
<td>Mosaics of rare coastal grassland and/or moss- covered rock outcrops; typically occur as openings in forested areas or adjacent to Garry oak woodlands</td>
</tr>
<tr>
<td>Wetland</td>
<td>Wet soil and moisture-dependent plants; includes bogs, fens, marsh, swamps, shallow water and wet meadow</td>
</tr>
<tr>
<td>Riparian</td>
<td>All stages of floodplain vegetation including riparian ecosystems associated with lake shorelines and gullies</td>
</tr>
<tr>
<td>Woodland</td>
<td>Open stands of Garry oak or trembling aspen; mixed stands of Douglas fir-Garry oak and Douglas fir-arbutus</td>
</tr>
<tr>
<td>Older Forest</td>
<td>Older than 100 years; coniferous, or mixed with broadleaf species</td>
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