

Recovery Strategy
for Garry Oak and Associated Ecosystems
and their Associated Species at Risk
in Canada

2001 - 2006

Prepared by the
Garry Oak Ecosystems Recovery Team

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The Garry Oak Ecosystems Recovery Team

Marilyn A. Fuchs (Chair)

Foxtree Ecological Consulting, Friends of Government House Gardens Society

Robb Bennett

Private entomologist

Louise Blight

Capital Regional District Parks

Cheryl Bryce

Songhees First Nation

Brenda Costanzo

BC Ministry of Sustainable Resource Management – Conservation Data Centre

Michael Dunn

Environment Canada - Canadian Wildlife Service

Tim Ennis

Nature Conservancy of Canada

Matt Fairbarns

BC Ministry of Sustainable Resource Management – Conservation Data Centre

Richard Feldman

University of British Columbia

David F. Fraser

BC Ministry of Water, Land and Air Protection – Biodiversity Branch

Harold J. Gibbard

Friends of Mt. Douglas Park Society, Garry Oak Meadow Preservation Society, Garry Oak Restoration Project

Tom Gillespie

Garry Oak Meadow Preservation Society, Victoria Natural History Society

Richard Hebda

Royal British Columbia Museum, University of Victoria

Andrew MacDougall

University of British Columbia

Carrina Maslovat

Native Plant Study Group of the Victoria Horticultural Society, Woodland Native Plant Nursery

Michael D. Meagher

Garry Oak Meadow Preservation Society, Thetis Park Nature Sanctuary Association

Adriane Pollard

District of Saanich, Garry oak Ecosystems Restoration Kit Committee, Garry Oak Restoration Project

Brian Reader

Parks Canada Agency

Arthur Robinson

Department of National Defence

James W. Rutter

JR Recreation, Management and Land Use Consulting

George P. Sirk

Regional District of Comox-Strathcona Board

Kate Stewart

The Land Conservancy of British Columbia

Disclaimer

This recovery strategy has been prepared by the Garry Oak Ecosystems Recovery Team to define recovery actions that are deemed necessary to protect and recover Garry oak and associated ecosystems and their associated species at risk. It does not necessarily represent the views of the individuals involved in the strategy's formulation or the official positions of the organizations with which the individual team members are associated. The goals, objectives, and recovery actions identified in the strategy are based on the best existing knowledge and subject to modifications resulting from changed objectives and new findings. We recognize that implementation of the plan will be subject to appropriations, priorities, and budgetary constraints imposed by participating jurisdictions and organizations.

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Executive Summary

Garry oak (*Quercus garryana*) ecosystems, and the complex of closely related coastal bluff, maritime meadow, vernal pool, grassland, rock outcrop, and transitional forest ecosystems of southwest British Columbia, are important for their great beauty and their biological diversity. Over recent decades, habitat conversion of the ecosystems to agricultural and urban uses has occurred at an alarming and accelerating rate. Less than 5

% of the original habitat remains in a near-natural condition. Habitat loss, fragmentation, and invasion by exotic species, altered fire regimes, and other factors pose serious and ongoing threats to these ecosystems throughout their range in Canada. Unless these factors are addressed, widespread losses of the constituent organisms are likely.

Garry oak and associated ecosystems are home to 91 species that have been designated as “at risk” in British Columbia. Twenty-three of the species are threatened or endangered throughout their global range. Twenty-one of the species are listed as being at risk on a national scale, having extirpated (1 species), endangered (12 species), threatened (4 species), or special concern (4 species) designations from the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). Many more of the species are likely candidates for national listing upon assessment by COSEWIC. Indicators suggest that extirpation or extinction is possible or likely unless recovery actions are taken. Garry oak plant communities have been ranked as imperilled and critically imperilled within British Columbia.

Garry oak and associated ecosystems may play an increasingly important role with the progression of global warming. Much of what is currently Douglas-fir (*Pseudotsuga menziesii*) forest in coastal British Columbia may be replaced by Garry oak and related ecosystems within the next half century. Comprehensive ecosystem and species conservation are required to ensure that these biological resources persist within the landscape so they can occupy new habitat as it becomes available.

Growing alarm over past, current and potential future losses of ecosystems and species has spawned a multitude of activities by concerned citizens and governmental and non-governmental agencies. Overall concern has not translated into an equivalent level of substantial protection. Coordinated action is needed and an overall recovery strategy is a necessary prerequisite to a coordinated program. This document serves that function. A program dedicated to recovery of Garry oak ecosystems is a clear priority for many British Columbians and other Canadians. The work towards development of this recovery strategy was endorsed by a number of municipalities and regional districts located within the range of Garry oak ecosystems. This draft strategy has also been endorsed by three local governments and twenty-one local, provincial, and non-governmental agencies.

Recovery planning in Canada has historically taken a species-by-species approach. Current national initiatives are recognizing the importance of incorporating a wider scope in recovery planning than single species recovery. The proposed federal Species at Risk Act recognizes the essential role of habitat protection for conservation of species at risk and for preventing species from becoming at risk. The Act explicitly permits ecosystem-level planning for recovery of species at risk under appropriate circumstances. The Recovery of Nationally Endangered Wildlife (RENEW) program recognizes occupancy of multiple species at risk within a limited geographical area as a primary factor in determining the appropriateness of ecosystem-level planning.

This strategy takes a dual-level approach to recovery planning. First, the strategy addresses recovery of the full diversity of Garry oak and associated ecosystems and the essential ecosystem characteristics that sustain them. This broad, “coarse filter” approach is assumed to capture the conservation requirements of most species and is critical for addressing the needs of species at risk in the ecosystems. But although ecosystem-level

planning may be necessary for recovery of species at risk, it is generally insufficient. For this reason, a “fine filter” approach for directly addressing individual species is part of the recovery strategy.

This strategy outlines Phase I of the recovery program for Garry oak and associated ecosystems and their associated species at risk in Canada. Long-term recovery goals for the ecosystems and the species are:

1. To establish a network of Garry oak and associated ecosystem sites and landscape linkages that:
 - a. Is representative of the full range of ecosystem variation across the geographic range in Canada;
 - b. Sustains all the critical processes over the long term; and
 - c. Supports the full range of native biota over the long term.
2. To improve and secure the status of all species at risk in Garry oak and associated ecosystems, except those that are globally extinct, so that they no longer have at-risk status.

Phase I sets the framework for future recovery actions. Short-term objectives for Phase I, addressed over the next 5 years, are:

1. To develop the information base necessary for ecosystem and species recovery;
2. To protect and manage sites and species at risk to minimize immediate losses of ecosystems and species; and
3. To motivate public and private protection and stewardship activities by supplying critical information to the appropriate audiences.

Definition of quantitative recovery targets in Phase 1 of the recovery program is constrained by a number of factors. They include:

1. Information gaps due to the lack of detailed inventory, mapping, and local research;
2. The large number of species at risk and deficiency of information about them; and
3. The need for detailed assessment of recovery options as a consequence of extensive loss of habitat.

As a consequence of these constraints, Phase I refrains from defining quantitative recovery targets. The first strategic objective of Phase I addresses this knowledge gap. In the interim, the following general principles are incorporated into the strategy:

1. Because of the limited extent of remaining habitat, all extant Garry oak and associated ecosystems warrant conservation consideration; and
2. All species at risk in Garry oak and associated ecosystems warrant conservation attention.

Recovery goals for Phase II and subsequent phases of the recovery program will entail quantitative targets based upon knowledge gained in Phase I. Targets will be developed over the course of Phase I and explicitly defined in the recovery strategy for Phase II. Phase II, to commence in 2006, will:

1. Define quantitative recovery goals and objectives for landscape- and site-level protection, restoration, and management that will protect, restore and sustain essential ecosystem characteristics. Targets to be defined include sizes, shapes,

- and locations of protected sites and linkages, indicators of ecological processes, and attributes of floral and faunal communities;
2. Develop and implement strategies to meet the quantitative protection, restoration, and management goals and objectives;
 3. Define quantitative recovery goals and objectives for species at risk. Targets to be defined include numbers, sizes, and locations of populations of species at risk;
 4. Develop and implement strategies to meet the quantitative recovery goals and objectives for species at risk; and
 5. Continue to motivate public and private protection and stewardship activities by supplying critical information to the appropriate audiences.

Six strategic approaches are employed to meet the objectives of this strategy:

1. Inventory, mapping, and plant community classification: develop standardized plant community classification, and determine and map the historical and current extent of Garry oak and associated ecosystems;
2. Protection of ecosystems and essential ecosystem characteristics: Secure high priority sites towards the establishment of a network of protected areas that represent the full diversity of Garry oak and associated ecosystems throughout their geographic range and that are of sufficient size and appropriately situated to sustain essential ecosystem characteristics over the long term;
3. Restoration and management of protected areas, landscape linkages, buffers, and the general landscape: Facilitate the establishment of landscape linkages and buffers and promote the restoration and management of protected areas, landscape linkages, buffers, and the general landscape to sustain essential ecosystem characteristics over the long term;
4. Protection and recovery of species at risk: Complete assessments and initial planning and initiate actions towards sustaining and expanding populations of species at risk in Garry oak and associated ecosystems that are designated endangered, threatened, or of management concern;
5. Research: Expand basic and applied research relevant to conserving and restoring Garry oak and associated ecosystems; and
6. Communication, coordination, and public involvement: Ensure that conservation of Garry oak and associated ecosystems and their associated species at risk is incorporated into planning and programs of governmental and non-governmental agencies. Develop public awareness of, support for, and participation in recovery activities. Establish extension and public education programs to facilitate and inspire agency and public involvement. Facilitate communication, coordination, and information-sharing among recovery partners to ensure efficient, coordinated delivery of the recovery program.

Specific steps and suggested actions are outlined under each of the strategic approaches to meet the objectives of the strategy. Steps include the following:

1. Confirm and/or define new units in plant community classification;
2. Establish a GIS database;
3. Conduct detailed ecosystem inventory and mapping;
4. Analyze site and vegetation data and report the results;
5. Conduct wildlife habitat mapping for a set of selected indicator species and species at risk;

6. Map and analyze historical occurrences of Garry oak and associated ecosystems;
7. Map attributes of the adjacent natural and developed landscape;
8. Prepare an interim list of at least 10 priority sites for protection;
9. Work towards the expansion of the network of protected areas and securement of at least 10 priority sites within 5 years;
10. Develop a GIS-based prioritization methodology and site list;
11. Establish a research and management program to address invasive species of Garry oak and associated ecosystems;
12. Establish a research and management program to address fire and stand dynamics in Garry oak and associated ecosystems;
13. Support First Nations Traditional Ecological Knowledge research and management programs;
14. Establish a network of landscape linkages to connect protected areas of Garry oak and associated ecosystems with each other and with other ecosystems;
15. Establish buffers for protected areas of Garry oak and associated ecosystems;
16. Encourage restoration and ecosystem management of institutional grounds;
17. Encourage general restoration of urban, suburban, and rural properties throughout the region;
18. Establish a stewardship program for managers of public and private natural areas;
19. Promote the use of integrated silviculture approaches on woodlots to benefit Garry oak and associated ecosystems where appropriate;
20. Promote the development of an adequate supply of native plants for restoration and management activities;
21. Complete, or encourage or assist COSEWIC to complete as appropriate, status reports for species at risk that are not yet the subject of status reports and ensure that appropriate status reports are submitted to COSEWIC for evaluation;
22. Complete recovery plans for species at risk;
23. Initiate recovery actions, including inventory, research, threat abatement, habitat protection, habitat enhancement, propagation or captive breeding, re-introductions, and other measures as appropriate, for species at risk;
24. Establish a seed bank program for plant species at risk;
25. Promote and facilitate research on priority topics;
26. Develop and implement an extension program directed towards local governments throughout the range of Garry oak and associated ecosystems;
27. Develop and implement a public education program about Garry oak and associated ecosystems and the associated species at risk;
28. Improve communication and information-sharing among those involved in conservation of Garry oak and related ecosystems in British Columbia and elsewhere; and
29. Establish an organizational structure to efficiently and effectively implement the recovery program.

Implementation of the recovery program will be a demanding and complex enterprise. It will require the active participation of dozens of agency partners as well as individuals from the general public. Funding must be secured for program components, activities must be coordinated, and information and technical support must be available to program partners. The Garry Oak Ecosystems Recovery Team, which currently consists of 22

individuals representing 1 municipal, 1 regional, 3 provincial, and 3 federal agencies, 1 regional district board, 1 First Nation, 10 non-governmental organizations, 2 academic institutions, and 3 private enterprises, is the appropriate body to lead the recovery program. Two staff positions are required for effective implementation. Policies and protocols will be developed for the establishment of formal links with partner agencies and a strategic financial plan will outline budgets and resource-raising strategies. Priorities, potential partners, and preliminary costs estimates are outlined for each of the steps included in the recovery strategy.

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Section I. Introduction

The Need for a Recovery Plan

Garry oak (*Quercus garryana*) ecosystems, and the complex of closely related coastal bluff, maritime meadow, vernal pool, grassland, rock outcrop, and transitional forest ecosystems of southwest British Columbia, are important for their great beauty and their biological diversity. The ecosystems have provided the foundation for physical, aesthetic, and spiritual sustenance for human occupants since earliest times. The ecosystems are also home to an exceptional diversity of non-human organisms. The number of species that use Garry oak habitats rivals that of virtually any other ecosystem in Canada. The biological and other values vested in Garry oak ecosystems were treasured by early First Peoples and European settlers, and continue to be cherished by modern-day residents and visitors alike.

Over recent decades, habitat conversion of the oak and associated ecosystems to agricultural and urban uses has occurred at an alarming and accelerating rate. Less than 5 % of the original habitat remains in a near-natural condition (Hebda and Aitkens 1993a, Westland Resource Group 1999). Increasing rates of exurbanization, or conversion of rural lands to residential uses, have exacerbated the threats to sites outside of the urban core. Remnant patches are subjected to numerous influences that were not historically present. Habitat loss, fragmentation, and invasion by exotic species, altered fire regimes, and other factors pose serious and ongoing threats to Garry oak and associated ecosystems throughout their range in Canada. These factors have already caused degradation of the habitat that remains, and continued degradation is inevitable unless trends are reversed. The ecological changes, including shifts in composition, structure, and function of the ecosystems, limit the ecosystems' ability to support the species that depend upon them. Unless these ecosystem-wide factors are addressed, widespread losses of the constituent organisms are likely.

Garry oak and associated ecosystems are home to 91 species that have been designated as "at risk" in British Columbia (Appendix 1). Twenty-three of these species are threatened or endangered throughout their global range. Twenty one of the species are listed as being at risk on a national scale, having extirpated (1 species), endangered (12 species), threatened (4 species), or special concern (4 species) designations from the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). Many more of the species are likely candidates for national listing upon assessment by COSEWIC. Very small population sizes, limited numbers of occurrences, rapid or pronounced population declines, and other indicators associated with these species suggest that extirpation or extinction is possible or likely unless recovery actions are taken. Although some of these species, particularly those that reach the northern limits of their distribution in Canada, have always been rare, evidence indicates that general declines are widespread and in urgent need of attention. Garry oak plant communities, recognized as conservation targets by the British Columbia government, have been ranked as imperilled and critically imperilled within the province and thus in need of conservation attention.

Garry oak and associated ecosystems may play an increasingly important role in the future. Current climate and ecosystem models predict dramatic changes in Pacific Northwest ecosystems with the progression of global warming (Franklin *et al.* 1991, Hebda 1997). Initial modeling suggests that much of what is currently Douglas-fir (*Pseudotsuga*

menziesii) forest in coastal British Columbia may be replaced by Garry oak and related ecosystems within the next half century. Comprehensive ecosystem and species conservation are required to ensure that these biological resources persist within the landscape so they can occupy new habitat as it becomes available.

Growing alarm over past, current, and potential future losses of ecosystems and species has spawned a multitude of conservation activities by concerned citizens as well as governmental and non-governmental agencies. Although some gains have been made, overall concern has not translated into an equivalent level of substantial protection. Losses continue and the prognosis is not encouraging. Coordinated action is needed to clearly identify and prioritize conservation needs and strategically focus resources on those activities with the greatest promise of success. An overall recovery strategy, which defines goals, objectives, actions, and priorities in relation to ecological realities and social opportunities, is a necessary prerequisite to such a recovery program. This document is intended to fulfill that function.

A program dedicated to recovery of Garry oak ecosystems is a clear priority for many British Columbians and other Canadians. Many programs, policies, and activities demonstrate this concern. For example:

- The Garry Oak Meadow Preservation Society, formed in 1992, is dedicated to protecting and preserving Garry oak ecosystems in British Columbia;
- The City of Victoria assigned Heritage Landscape status to Garry oak ecosystems in 1992;
- The Government of British Columbia launched its “Ecosystems at Risk” brochure series with publication of a *Garry Oak Ecosystems* brochure (Erickson 1993);
- A resolution passed by the Union of British Columbia Municipalities in 1998 reads “...that the Provincial Government be encouraged to declare Garry Oaks in BC as its second protected tree after the Dogwood”;
- Two joint federal-provincial initiatives, the Georgia Basin Ecosystem Initiative (GBEI) and the Pacific Marine Heritage Legacy, are targeting Garry oak ecosystems as one of the priority habitats for protection efforts;
- Policies of the Federation of BC Naturalists, the Canadian Parks and Wilderness Society, and the Grasslands Conservation Council of British Columbia identify Garry oak meadows and associated grasslands as conservation targets;
- With funding from the National Fish and Wildlife Foundation in the US, a consortium of governmental and non-governmental agencies focused on protection and restoration of Garry oak habitats in British Columbia, Washington, and Oregon for conservation of landbird species of concern, including the Lewis’s woodpecker (*Melanerpes lewis*), western bluebird (*Sialia mexicana*), vesper sparrow (*Pooecetes gramineus*), and others. Partners in this initiative include the Nature Conservancy of Canada, Partners in Flight, and a number of agencies in the United States (De Groot 2000);
- The Regional District of Nanaimo identifies Garry oak ecosystems as a significant resource of high priority in the draft *Parks and Open Space Plan for Nanoose Bay* (Regional District of Nanaimo 2001); and
- Protection of Garry oak habitat on Salt Spring Island has been a major focus of activity of a number of governmental and non-governmental organizations, including Salt Spring Island Conservancy, The Land Conservancy of British

Columbia, The Nature Trust of British Columbia, and the Parks and Protected Areas Branch of the BC Ministry of Water, Land and Air Protection (formerly BC Parks), over the last few years.

Countless projects and programs, ranging from invasive species removal in neighbourhood parks by Girl Guides, to major acquisitions of Garry oak habitat by partnerships of governmental and non-governmental organizations, are testament to the widespread concern for Garry oak ecosystems.

In May of 1999, Delegates to the First International Garry Oak Meadow Symposium held in Victoria, British Columbia, unanimously passed 2 resolutions:

1. The Garry oak meadow ecosystem deserves to be recognized as a nationally endangered ecosystem; and
2. A recovery plan should be developed and implemented to provide direction for protecting, sustaining, and restoring Garry oak ecosystems.

The Garry Oak Ecosystems Recovery Team (GOERT), a partnership of a number of governmental and non-governmental agencies, was founded in response to the second resolution.

The work of GOERT towards developing a recovery plan was endorsed by a number of municipalities and regional districts located within the range of Garry oak ecosystems, including the City of Duncan, the Districts of Highlands and Saanich, the Town of Ladysmith, and the Regional District of Comox-Strathcona. For example, a resolution passed by Duncan City Council, 28 February 2000, reads “THAT Council support the efforts of the Garry Oak Ecosystems Recovery Team to ensure a future for our Garry Oak Ecosystem treasure of southern British Columbia and indeed a treasure of the entire nation...” World Wildlife Fund Canada, The Garry Oak Meadow Preservation Society, Environment Canada, and the former BC Ministry of Environment, Lands, and Parks, by financially supporting the development of this strategy, have indicated their interest in seeing such a plan put into place.

Many agencies have demonstrated their interest in, and support for, the recovery program outlined in this strategy. Letters of congratulation to GOERT upon completion of the draft strategy from the Honourable David Anderson, Minister of the Environment, and letters affirming the value of the strategy from Eric Lee, Chief Executive Officer of Parks Canada Agency, and Doug Dryden, Director of the former Wildlife Branch of the BC Ministry of Environment, Lands and Parks, reaffirmed the interest of senior governments in this recovery initiative. Formal endorsements of the draft strategy have been received from the Provincial Capital Commission, City of Colwood, Township of Esquimalt, Regional District of Comox-Strathcona, and Capital Regional District Parks. To date, 13 non-governmental organizations have also endorsed the draft strategy. The many agencies that have supported and continue to support the initiative with active representation on the recovery team demonstrate the broad-based commitment to the development and implementation of a coordinated program for ecosystem recovery.

Recovery Planning in Canada

Recovery planning in Canada has historically taken a species-by-species approach. On a national level, COSEWIC evaluates risk of extinction or national extirpation for taxa under consideration (National Recovery Working Group 2001). These status evaluations are conducted for individual species, or less frequently for subspecies or populations. Higher levels of biological organization are not considered. Subsequent recovery planning and implementation, coordinated by Recovery of Nationally Endangered Wildlife (RENEW), has, until very recently, similarly approached recovery exclusively at the level of individual species, subspecies, or populations. The 1996 Accord for the Protection of Species at Risk (hereafter referred to as the “Accord”), signed by all provinces and territories and the federal government, commits signatories to protection of species that are at risk on a national level. Because the Accord recognizes the role of COSEWIC in assessing status, subspecies and populations are the focus of attention. Within British Columbia, provincial-level status assignments are performed by the provincial Conservation Data Centre (CDC) of the Ministry of Sustainable Resource Management and the Biodiversity Branch of the Ministry of Water, Land and Air Protection based upon rarity and imperilment. In addition to species, subspecies and populations, the provincial focus also includes rare plant communities.

Current national initiatives are recognizing the importance of incorporating a wider scope in recovery planning than single species recovery. Integration of these new approaches into recovery policies and programs is in development. The proposed federal Species at Risk Act (SARA) recognizes the essential role of habitat protection in the following statements (Bill C-5, preamble):

“...stewardship activities contributing to the conservation of wildlife species and their habitat should be supported to prevent species from becoming at risk...”

“...the habitat of species at risk is key to their conservation...”

Under SARA, although status determinations will still be at the level of species or below, broader-level approaches to recovery planning are explicitly permitted. The RENEW program is currently being redefined accordingly. Multi-species, ecosystem and landscape approaches are recognized as appropriate approaches, in some circumstances, because of the following considerations (National Recovery Working Group 2001):

1. Multiple species at risk may occupy a limited geographical area. Recovery actions for multiple species within a given area must be integrated at some point in the planning process;
2. Species may have conflicting needs which can be addressed proactively with a broad approach; and
3. Some threats, such as climate change and invasive species, operate at large scales and must be tackled accordingly.

Furthermore, SARA and the Accord both emphasize the importance of taking measures to prevent species from becoming at risk. This imperative requires that conservation actions be applied on the broadest of scales, an approach that clearly requires taking an ecosystem- or landscape-level approach.

Three recovery initiatives demonstrate approaches to recovery planning focussed on levels of organization above that of the single species. The *National Recovery Plan for Acadian Flycatcher* (*Empidonax virescens*) and *Hooded Warbler* (*Wilsonia citrina*) (Friesen and Martin 2000) is the first multi-species plan developed under RENEW. *Tallgrass Communities of Southern Ontario: A Recovery Plan* (Rodger 1998) focuses on ecosystem-level considerations. Finally, coordinated efforts in the South Okanagan-Similkameen Valleys of British Columbia have generated a number of documents (*e.g.* Hlady 1990, BC Ministry of Environment, Lands and Parks 1998, South Okanagan-Similkameen Conservation Program 2000, South Okanagan-Similkameen Conservation Program 2001) and numerous conservation activities. This program addresses landscape-scale issues encompassing varied ecosystems and numerous species at risk.

Recovery plans under the revised RENEW framework consist of 2 parts. The recovery team prepares the first part, the recovery strategy. It identifies the goals and objectives for recovery, provides the rationale for the goals and objectives, and identifies key strategies to meet the goals and objectives. Programs outlined in recovery strategies are of 5-year duration. The second part of a recovery plan consists of 1 or more recovery action plans (RAPs). These action plans are developed either by the recovery team or by recovery action groups (RAGs) working in collaboration with the recovery team. RAPs identify actions required to carry out the program outlined in the recovery strategy. The activities must therefore correspond to goals, objectives, and strategic approaches identified in the strategy.

Approach of This Strategy

This strategy takes a dual-level approach to recovery planning. First and foremost, the strategy develops an ecosystem-level approach. GOERT has identified processes and attributes, called essential ecosystem characteristics (Harwell *et al.* 1999), that are critical for sustainability of Garry oak and associated ecosystems but are at risk in the current context (Fuchs 2001). The strategy addresses recovery of the full diversity of Garry oak and associated ecosystems, and the essential ecosystem characteristics that sustain them, in Canada. Protection of representative areas of the full range of ecosystems, in conjunction with restoration and management activities necessary to sustain essential ecosystem characteristics, is the most efficient approach, and indeed the only viable approach, to protecting the vast majority of species. This broad approach is assumed to capture the conservation requirements of most species, including those species known to be present in the ecosystems, as well as those species, generally belonging to lesser-known taxonomic groups, that have not yet been identified or inventoried. This is known as the “coarse filter” approach to biodiversity conservation (Anderson *et al.* 1999).

Ecosystem-level planning is also critical for addressing the needs of species at risk in Garry oak and associated ecosystems. Individual species at risk benefit from an ecosystem approach in the following ways:

1. Conserving and sustaining ecosystems provides habitat and resources for extant populations of these species, as well as potential habitat and resources to accommodate population expansion, range shifts, and possible re-introductions;

2. Strategies developed for dealing with ecosystem-level risk factors can provide tools for addressing many site-specific threats to populations of species at risk; and
3. Ecosystem-wide inventory and analysis can provide critical insights into factors influencing distribution and abundance of species at risk. Such factors may not come to light without a broader focus.

Although ecosystem-level planning may be necessary for recovery of species at risk, it is generally insufficient. Species at risk often have extremely specialized habitat or resource needs, intrinsic or extrinsic risk factors that are not addressed by an ecosystem approach, or other characteristics that require focussed attention. Furthermore, many species at risk currently occupy only a few sites or have extremely restricted ranges. Even if the habitat, resource requirements, and threats to the species are congruent with those addressed at the level of the ecosystem, recovery actions must be taken at specific localities. For all of these reasons, a “fine filter” approach of directly addressing individual species (Anderson *et al.* 1999) is part of the recovery strategy.

Ideally, integration of species-level recovery into the broader recovery program allows more systematic, comprehensive, and hopefully effective programs. However, the task of developing and implementing such an integrated program is complex. Effort and resource allocation must be strategically balanced between the 2 levels. A particular challenge is to design strategies that, at the least, do not compromise one scale of recovery in the interest of the other and, at the best, complement both levels of recovery. Two examples illustrate this point:

1. *Integrating the species into the ecosystem plan:* Invasive exotic species can cause serious negative impacts. Control of these species may be essential for sustaining ecosystem health. However, the most efficient or effective treatment for an invasive species may have undesirable side effects for species at risk. Although the ecosystem may, overall, be resilient enough to accommodate the disturbance associated with the treatment, rare species can be particularly vulnerable. For example, broadcast spraying of a microbial pest agent *Bacillus thuringiensis* ssp. *kurstaki* (*Btk*) to control gypsy moth (*Lymantria dispar*) has been employed in Garry oak ecosystems in British Columbia. The gypsy moth has the potential to devastate oak populations and thus cause severe ecosystem-level impacts (Davidson *et al.* 1998). Concern over the effect of spraying on non-target species, specifically Lepidoptera and insectivorous birds, generated a research program to investigate the extent of such effects (Ovaska and Sopuck 1999, Boulton *et al.* 2000). Unfortunately, the study design precluded detection of effects on uncommon and rare species. True integration of recovery of species at risk into ecosystem-level recovery requires that sufficient resources be allocated to address both levels of concern.
2. *Integrating the ecosystem into the species plan:* Recovery of a cavity-nesting bird species such as the western bluebird (*Sialia mexicana*), threatened by limited availability of wildlife trees to use as nest sites, might entail a nest box program (Hanna and Dunn 1996). Such programs have had great success for recovery of some cavity-nesting species. However, integration of ecosystem-level considerations adds an additional imperative to the enterprise. To fulfil the greater objectives of ecosystem recovery, recovery of the species in question should also

involve a program for conservation of wildlife trees throughout the ecosystem. Conservation of wildlife trees would not only address specific nesting needs of the bird species under consideration; it would also protect an ecological attribute that provides a valued resource to numerous bird and other species, and plays a critical role in ecosystem function.

Such integration of ecosystem- and species-level planning is incorporated into this strategy.

The format of this recovery strategy is adapted from that recommended for recovery strategies prepared under the umbrella of RENEW (National Recovery Working Group 2001). The intent is to facilitate evaluation, acceptance, and implementation of the recovery program within the RENEW program. The strategy presents goals and objectives that address broad-based threats to Garry oak and associated ecosystems and opportunities for addressing the threats. RAGs are employed to partition the diverse, complex program into relatively manageable segments. The strategy also presents an approach for recovery of the species at risk found within the ecosystems. Species are grouped taxonomically to enhance efficiency of the recovery program because of the great number of species at risk. Each species receives explicit attention, but taxonomically-based RAGs are established to deal with groups of species.

Status of Garry Oak and Associated Ecosystems and Species at Risk

Background and status information for Garry oak and associated ecosystems are available in the document entitled *Towards a Recovery Strategy for Garry Oak and Associated Ecosystems in Canada: Ecological Assessment and Literature Review* (Fuchs 2001). This review also summarizes background and status information, as of March 2001, about species at risk in Garry oak and associated ecosystems. Updated status information about species at risk is presented in Appendix 1 of this strategy. Status reports are also available for the following species at risk:

Plants:

- Deltoid balsamroot (*Balsamorhiza deltoidea*) (Ryan and Douglas 1996a, Ryan and Douglas 1999a, Douglas and Ryan 2001);
- Rigid apple moss (*Bartramia stricta*) (Belland 1997a, Belland 1997b);
- Golden paintbrush (= golden indian paintbrush) (*Castilleja levisecta*) (Ryan and Douglas 1995a, Douglas and Ryan 1999, Ryan and Douglas 1999b);
- Coastal wood fern (*Dryopteris arguta*) (Jamison and Douglas 1998a, Jamison and Douglas 1998b);
- Macoun's meadowfoam (*Limnanthes macounii*) (Ceska and Ceska 1988);
- Seaside birds-foot lotus (= seaside bird's-foot trefoil) (*Lotus formosissimus*) (Ryan and Douglas 1996c);
- Prairie lupine (*Lupinus lepidus* var. *lepidus*) (Ryan and Douglas 1996b);
- Tall woolly-heads (*Psilocarphus elatior*) (Douglas *et al.* 2000);
- Slender woolly-heads (*Psilocarphus tenellus* var. *tenellus*) (Illingworth and Douglas 1996a);

- Water-plantain buttercup (*Ranunculus alismifolius* var. *alismifolius*) (Illingworth and Douglas 1996b, Douglas and Illingworth 1998, Illingworth and Douglas 1999);
- Bear's-foot sanicle (= snake-root) (*Sanicula arctopoides*) (Donovan and Douglas 2000, Donovan and Douglas 2001);
- Purple sanicle (*Sanicula bipinnatifida*) (Penny and Douglas 2000, Penny and Douglas 2001);
- White-top aster (*Sericocarpus rigidus* = *Aster curtus*) (Douglas and Illingworth 1996, Douglas and Illingworth 1997, Douglas and Illingworth 1999);
- Bearded owl-clover (*Triphysaria versicolor* ssp. *versicolor*) (Penny *et al.* 1996, Penny and Douglas 1998, Penny and Douglas 1999); and
- Yellow montane violet (*Viola praemorsa* ssp. *praemorsa*) (Ryan and Douglas 1995b, Douglas and Ryan 1999).

Invertebrates:

- Island marble (*Euchloe ausonides* undescribed subspecies) (Shepard 1998, Shepard 2000d);
- Taylor's checkerspot (= Edith's Checkerspot, *taylori* subspecies) (*Euphydryas editha taylori*) (Shepard 2000c, Shepard 2000d);
- Dun skipper (*Euphyes vestris vestris*) (Shepard 2000a, Shepard 2000d); and
- Island blue (*Plebejus saepiolus insulanus* = *Plebejus saepiolus insulanus*) (Shepard 2000b, Shepard 2000d).

Vertebrates:

- Sharp-tailed snake (*Contia tenuis*) (Spalding 1993, Ovaska and Engelstoft 1998);
- Gopher snake (*Pituophis catenifer*) (Waye and Shewchuk 1999);
- Lewis's woodpecker (*Melanerpes lewis*) (Cooper *et al.* 1998, Vellend and Connolly 1999);
- Purple martin (*Progne subis*) (Fraser *et al.* 1997); and
- Barn owl (*Tyto alba*) (Campbell and Campbell 1984, Kirk 1999).

Goals, objectives, and strategic approaches in this strategy are largely derived from the information in these reports, and hence the reader is referred to them for background information. The information contained in them is not repeated or summarized herein, except in direct relation to select components of the strategy. Citations for these reports are included in the literature cited section of this strategy.

Legislative and Regulatory Context

No extant legislation compels any level of government to protect Garry oak or associated ecosystems. In practice, ecosystem protection is closely related to where and how development occurs because most of the land is held by private landowners within a rapidly urbanizing area. Land use planning falls under the jurisdiction of local governments, and as a consequence local governments play critical roles in the type and extent of environmental protection. Local governments, including regional districts, municipalities, and the Islands Trust, are enabled by provincial legislation to exercise powers pertaining to zoning, subdivision, and development approval in the interest of environmental protection (McPhee *et al.* 2000). Specific requirements of developers and other landowners must be consistent with provisions included in Official Community

Plans. Requirements may include provisions for gathering comprehensive ecological information, protection of soil, restoration of degraded lands subsequent to development, development clustering, ecologically-based stormwater management and protection of natural hydrological regimes, protection of rare species and sensitive areas with parkland dedication and conservation covenants, and other measures. Municipalities may also enact bylaws restricting the rights of all landowners to cut trees.

To the limited extent that Garry oak and associated ecosystems are located on public and private lands managed for commercial forestry, they are afforded some protection by the Forest Practices Code of British Columbia. Legislation pertaining to forest practices is currently under review by the provincial government. Provisions under the existing Code specify that planning pay special attention to rare forest types within forestry planning units on Crown Land. The Identified Wildlife Management Strategy, enabled by the Code, includes rare species and rare plant communities within its definition of identified wildlife. The strategy identifies the limiting habitat of designated species and plant communities, and specifies allowable and prohibited activities within these habitat areas. To date, only 1 Garry oak plant community has been targeted under the strategy. Lewis's woodpecker (*Melanerpes lewis*), extirpated from southwestern British Columbia but extant in the interior, has also been identified as a conservation target. The Private Land Forest Practices Regulation, also enabled under the Code, provides for protection of rare species and plant communities (Beaudry 2001). Specific provisions have not yet been developed.

The 1996 Accord commits all provincial, territorial and federal jurisdictions to establish legislation and programs to provide legal protection for species at risk. To date, no such protective legislation has been passed by either the Canadian or British Columbia government. The proposed federal Species at Risk Act would prohibit the killing, harming, harassing, capturing, or taking of threatened or endangered species and destruction of their residences. In addition, relevant jurisdictions (federal government for federal lands; provinces and territories for other lands within their borders) may be enabled or required to protect critical habitat of listed species. Habitat protection would employ a combination of stewardship, incentive, legislative, and regulatory measures. The federal Migratory Birds Convention Act protects migratory birds, their nests, and their eggs from direct harm but affords no protection for habitat. Similarly, the Wildlife Act of British Columbia protects native vertebrate species from collection, handling, and trade unless a permit is obtained, and protects occupied nests of all native birds and nests of a few bird species year-round, but does not require protection of habitat for the species.

A variety of legislatively-enabled tools are available that can facilitate voluntary habitat stewardship by private landowners. Conservation covenants, easements, *profits à prendre*, leases, land management agreements, and life estates are vehicles by which landowners can transfer specified rights or responsibilities to conservation organizations to protect environmental values on their land. In some cases, donations of lands or specified interests in lands can also confer tax advantages to owners. The Islands Trust Natural Areas Tax Exemption Initiative and the Ecological Gifts program of the Canadian Wildlife Service of Environment Canada represent programs with provisions for exemptions or reductions of property and income taxes, respectively, for stewardship initiatives by private landowners.

Section II. Recovery Strategy

Recovery Goals, Recovery Objectives, and Strategic Approaches

This strategy outlines Phase I of the recovery program for Garry oak and associated ecosystems and their associated species at risk in Canada. The following long-term recovery goals are identified for Garry oak and associated ecosystems and the species at risk found in the ecosystems:

1. To establish a network of Garry oak and associated ecosystem sites and landscape linkages that:
 - a. Is representative of the full range of ecosystem variation across the geographic range in Canada;
 - b. Sustains all the critical processes over the long term; and
 - c. Supports the full range of native biota over the long term.
2. To improve and secure the status of all species at risk from Garry oak and associated ecosystems, except those that are globally extinct, so that they no longer have at-risk status.

Phase I sets the framework for future recovery actions. Short-term objectives for Phase I, addressed over the next 5 years, are:

1. To develop the information base necessary for ecosystem and species recovery;
2. To protect and manage sites and species at risk to minimize immediate losses of ecosystems and species; and
3. To motivate public and private protection and stewardship activities by supplying critical information to the appropriate audiences.

Definition of measurable recovery goals, and hence criteria for assessment of recovery status, is the means by which the ultimate success of recovery programs is gauged.

Definition of quantitative recovery targets for Garry oak and associated ecosystems is constrained by a number of factors. These include the following:

1. *Information gaps*: Meaningful quantitative targets must be based on scientific data. Information about Garry oak and associated ecosystems in Canada is extremely limited. Detailed inventory and mapping have not been conducted, and extant information has not been integrated into a common database. Historical extent has not been determined. Floral and faunal distributions and abundances are poorly known. Very little ecological research has been conducted in the ecosystem complex, and hence ecological assessments rely largely on ecological theory and on research from Garry oak and other oak and prairie ecosystems in other regions;
2. *Large number of species at risk*: Ninety-one species have been listed as being at risk in Garry oak and associated ecosystems (Appendix 1). The sheer number of species poses challenges for recovery planning. Furthermore, background information is exceedingly deficient. Only 24 of the 91 species are subjects of status reports, and COSEWIC has evaluated only 22 out of the many species potentially eligible for COSEWIC designation. For most of the species, particularly invertebrates and plants, habitat associations, ecology, and biology are poorly understood or unknown; and

3. *Extensive loss of habitat*: Rough estimates suggest that only about 1-5 % of the original Garry oak habitat remains in a near-natural condition (Hebda and Aitkens 1993a, Westland Resource Group 1999). Remnant patches are embedded primarily within matrices of agricultural and urban lands. The land base available for protection and restoration is consequently extremely limited, and hence assessment of recovery potential will require detailed examination of available options.

As a consequence of these constraints, Phase I refrains from defining quantitative recovery targets. The first strategic objective of Phase I addresses this knowledge gap. In the interim, the following general principles are incorporated into the strategy:

1. Because of the limited extent of remaining habitat, all extant Garry oak and associated ecosystems warrant conservation consideration; and
2. All species at risk in Garry oak and associated ecosystems warrant conservation attention.

Recovery goals for Phase II and subsequent phases of the recovery program will entail quantitative targets based upon knowledge gained in Phase I. Targets will be developed over the course of Phase I and explicitly defined in the recovery strategy for Phase II. Phase II, to commence in 2006, will:

1. Define quantitative recovery goals and objectives for landscape- and site-level protection, restoration, and management that will protect, restore and sustain essential ecosystem characteristics. Targets to be defined include sizes, shapes, and locations of protected sites and linkages, indicators of ecological processes, and attributes of floral and faunal communities;
2. Develop and implement strategies to meet the quantitative protection, restoration, and management goals and objectives;
3. Define quantitative recovery goals and objectives for species at risk. Targets to be defined include numbers, sizes, and locations of populations of species at risk;
4. Develop and implement strategies to meet the quantitative recovery goals and objectives for species at risk; and
5. Continue to motivate public and private protection and stewardship activities by supplying critical information to the appropriate audiences.

Six strategic approaches are employed to meet the objectives of this strategy:

Inventory, mapping, and plant community classification

Develop standardized plant community classification, and determine and map the historical and current extent of Garry oak and associated ecosystems.

Protection of ecosystems and essential ecosystem characteristics

Secure high priority sites towards the establishment of a network of protected areas that represent the full diversity of Garry oak and associated ecosystems throughout their geographic range and that are of sufficient size and appropriately situated to sustain essential ecosystem characteristics over the long term.

Restoration and management of protected areas, landscape linkages, buffers, and the general landscape

Facilitate the establishment of landscape linkages and buffers and promote the restoration and management of protected areas, landscape linkages, buffers, and the general landscape to sustain essential ecosystem characteristics over the long term.

Protection and recovery of species at risk

Complete assessments and initial planning and initiate actions towards sustaining and expanding populations of species at risk in Garry oak and associated ecosystems that are designated endangered, threatened, or of management concern.

Research

Expand basic and applied research relevant to conserving and restoring Garry oak and associated ecosystems.

Communication, coordination, and public involvement

Ensure that conservation of Garry oak and associated ecosystems is incorporated into planning and programs of governmental and non-governmental agencies. Develop public awareness of, support for, and participation in recovery activities. Establish extension and public education programs to facilitate and inspire agency and public involvement. Facilitate communication, coordination, and information-sharing among recovery partners to ensure efficient, coordinated delivery of the recovery program.

Stepdown Outline of Strategic Approaches, Specific Steps, and Suggested Actions

Strategic Approach A. Inventory, mapping, and plant communities

Step A.1. Establish inventory, mapping and plant communities RAG and produce inventory, mapping and plant communities RAP

Step A.2. Develop standardized plant community classification

- a. Clarify the plant community concept to be used for vegetation classification
- b. Gather existing inventory data
- c. Compare data to existing plant classifications
- d. Supplement with new data
- e. Confirm existing and/or define new units in plant community classification
- f. Incorporate new community types into CDC ranking and tracking program

Step A.3. Establish GIS database

- a. Establish host for GIS system
- b. Develop and test a GIS architecture
- c. Provide for data integration and ongoing data management
- d. Provide for data sharing and map product delivery
- e. Gather and integrate existing data

- f. Integrate data from inventory and research outlined in this strategy

Step A.4. Conduct detailed ecosystem inventory and mapping

- a. Compile existing data
- b. Produce digitized working map from existing data, aerial photographs, and expert knowledge
- c. Conduct field reconnaissance
- d. Develop a working legend for mapping
- e. Conduct field sampling, including collection of objective site and vegetation data, field designation of plant communities, documentation of disturbance factors, collection of data for wildlife habitat mapping, and focused searches for rare plants
- f. Capture data in digital format
- g. Produce final maps

Step A.5. Analyze site and vegetation data and report results

Step A.6. Conduct wildlife habitat mapping for a set of selected indicator species and species at risk

- a. Set criteria for selection of indicator species and species at risk for mapping
- b. Select the list of target species
- c. Prepare species accounts, including background information and habitat requirements, for target species
- d. Conduct wildlife inventories to supplement available information
- e. Develop habitat suitability and capability criteria and ratings
- f. Conduct field sampling to ground-truth preliminary ratings
- g. Review and revise habitat ratings
- h. Prepare final suitability and capability habitat ratings, and produce report and wildlife habitat maps

Step A.7. Map and analyze historical occurrences of Garry oak and associated ecosystems

- a. Gather existing information
- b. Map occurrences on aerial photographs
- c. Label occurrences and transfer to a base map
- d. Set up databases
- e. Digitize map
- f. Conduct GIS analysis to calculate changes in occurrences

Step A.8. Map attributes of the adjacent natural and developed landscape

- a. Gather existing information
- b. Map occurrences on aerial photographs
- c. Label occurrences and transfer to a base map
- d. Set up databases
- e. Digitize map

Strategic Approach B. Protection of ecosystems and essential ecosystem characteristics

Step B.1. Establish conservation planning and site protection RAG and produce conservation planning and site protection RAP

Step B.2. Prepare interim list of at least 10 priority sites for protection

- a. Integrate existing data into CDC database
- b. Collect and integrate additional relevant information
- c. Prepare maps of point and polygon occurrences of rare elements associated with Garry oak ecosystems
- d. Develop criteria for prioritizing sites
- e. Select at least 10 first-priority sites
- f. Determine optimal reserve designs
- g. Monitor status of designated locations and sites
- h. Update site records as inventory information becomes available
- i. Update priority list on an annual basis

Step B.3. Work towards the expansion of the network of protected areas and securement of at least 10 priority sites within 5 years

- a. Develop and publicize a vision for a protected area network of Garry oak and associated ecosystems
- b. Distribute priority site list to governmental and non-governmental agencies
- c. Develop landscape protection strategies for each priority area
- d. Work for the implementation of landscape protection strategies and their continued integration into other programs

Step B.4. Develop GIS-based prioritization methodology and site list

- a. Review the work completed to date on conservation of Garry oak and associated ecosystems and associated species at risk
- b. Investigate different site prioritization, conservation planning, and reserve design methodologies and software
- c. Select, adapt, and/or develop a framework for conservation gap analysis, determination of priorities for additional sites for protection, and design of reserve cores, buffers and linkages
- d. Test and run planning exercise to set protection priorities

Strategic Approach C. Restoration and management of protected areas, landscape linkages, buffers, and the general landscape

Step C.1. Establish restoration and management RAG and develop restoration and management RAP

Step C.2. Establish a research and management program to address invasive species of Garry oak and associated ecosystems

- a. Establish invasive species steering committee
- b. Establish links with Canadian and American programs addressing invasive species

For invasive plants:

- a. Design and implement broad-scale adaptive management program for invasive plants
 - Conduct comprehensive problem analysis and literature review about biology, ecology, and management of invasive plants
 - Develop decision-support tool for invasive species management
 - Test management approaches at a series of sites
 - Monitor effects of management interventions on native flora, invasive flora, native fauna, and other ecological variables
 - Revise decision support tool and adaptive management program on ongoing basis
- b. Promote prevention and management of invasions of exotic plants throughout the region
 - Investigate policy approaches to prevention and management
 - Produce and distribute fact sheets and field identification manual about invasive plants
 - Distribute decision support tool for invasive plants to land managers
 - Provide ongoing advice and technical support to land managers
 - Encourage land managers to use adaptive management
 - Conduct outreach to garden centres and general public about risks of gardening with exotic species and general risks of invasive species
- c. Develop invasive plants research program
 - Analyze distributions and ecological relationships of invasive species using inventory data
 - Investigate biological control options
 - Investigate impacts of treatment methods on native flora and fauna
 - Investigate ecosystem-level effects of invasive plants

For invasive invertebrates:

- a. Establish links with agencies with interest in jumping gall wasp and phylloxera research and management program
- b. Distribute information about Garry oak ecosystems to those agencies
- c. Support funding applications for jumping gall wasp and phylloxera monitoring programs
- d. Establish links with agencies involved in gypsy moth research and management
- e. Distribute information about Garry oak ecosystems to those agencies
- f. Distribute detailed information about species at risk that are potentially vulnerable to effects of *Btk* spraying to those agencies
- g. Investigate research and management options for introduced black slugs, earthworms, and other invasive invertebrates

For invasive vertebrates:

- a. Investigate research and management options for European starlings, eastern cottontails, eastern gray squirrels, and other invasive vertebrates.

Step C.3. Establish a research and management program to address fire and stand dynamics in Garry oak and associated ecosystems

- a. Establish a fire and stand dynamics steering committee
- b. Design and implement broad-scale adaptive management program

- Conduct comprehensive review of responses of local species to fire and fire exclusion
- Develop predictive model for responses of species to different fire regimes
- Determine rate and extent of woody encroachment
- Construct stand and plant community development models
- Construct model of historic seral stage distribution
- Determine priority sites for restoration
- Develop restoration objectives for the sites
- Develop operational and communications strategies for addressing public concerns about prescribed fire
- Test management approaches
- Monitor effects of management interventions
- Revise adaptive management program on ongoing basis
- c. Promote awareness about and management of woody encroachment to land managers
 - Produce and distribute extension materials about traditional use of fire, effects of fire exclusion, and restoration options
 - Provide ongoing advice and technical support to land managers
 - Encourage the use of adaptive management to land managers
- d. Develop a fire and stand dynamics research program
 - Investigate effects of different fire regimes on soil dynamics
 - Investigate regeneration of Garry oak in relation to site characteristics, disturbance history, and stand structure

Step C.4. Support First Nations Traditional Ecological Knowledge research and management programs

- a. Establish links with First Nations
- b. Distribute information about Garry oak and associated ecosystems and the species at risk in them
- c. Offer financial and technical support for research and management programs by First Nations related to Garry oak and associated ecosystems
- d. In collaboration with local First Nations, develop restoration and management strategies that recognize traditional uses of Garry oak ecosystems
- e. Publicize the importance of Garry oak and associated ecosystems for the culture and economy of local First Nations and as a land base for camas harvests and other traditional uses
- f. Develop strategies to ensure that the health of those consuming harvested resources is not compromised by site contamination

Step C.5. Establish a network of landscape linkages to connect protected areas of Garry oak and associated ecosystems with each other and with other ecosystems

For landscape linkages along streams and shorelines:

- a. Designate target streams, shorelines, and associated upland areas
- b. Establish links with stream-, shoreline-, and watershed-based stewardship groups and government agencies

- c. Develop publications about restoration and management of streamside and shoreline terrestrial habitat as landscape linkages
- d. Offer workshops to stewardship groups and agency personnel
- e. Assist stewardship groups and agencies to develop integrated management plans for target streams
- f. Apply adaptive management wherever possible

For landscape linkages along recreational trails and greenways:

- a. Designate target recreational trails and greenways
- b. Establish links with trail and greenways managers
- c. Develop publications about management of trails and greenways as landscape linkages
- d. Offer workshops to trails and greenways managers
- e. Assist managers to develop integrated management plans for target trails and greenways
- f. Apply adaptive management wherever possible

For landscape linkages along hydro and transportation corridors:

- a. Designate target highway, railroad, and hydro corridors
- b. Establish links with integrated vegetation management programs in other jurisdictions
- c. Establish links with managers of highway, railroad, and hydro corridors
- d. Develop best management practices and other publications about management of these corridors as landscape linkages
- e. Offer workshops to managers
- f. Assist managers to develop integrated management plans for target corridors
- g. Apply adaptive management wherever possible

Step C.6. Establish buffers for protected areas of Garry oak and associated ecosystems

- a. Designate target areas
- b. Define priority concerns and key messages for each area
- c. Develop and collect materials for distribution, including
 - How (and why) to turn a lawn into a Garry oak meadow
 - Sources of native plants
 - How to care for Garry oak trees
 - Do's and don'ts of watering, fertilising, mowing, and raking
 - Providing habitat for wildlife
 - The value of standing dead and downed wood
 - Landscaping to promote acorn dispersal by Steller's jays
 - Wildlife harassment by dogs, cats, and people
 - Invasive plants
 - The value of Garry oak and associated ecosystems
 - Other site-specific issues
- d. Develop and implement landowner and resident contact strategy
- e. Hold workshops for landowners
- f. Apply adaptive management wherever possible

Step C.7. Encourage restoration and ecosystem management of institutional grounds

- a. Designate target areas, including schools, colleges, and universities, federal, provincial and local government buildings, public works, churches, hospitals, cemeteries, and corporate properties
- b. Collect materials for distribution
- c. Develop publications about integrated management of institutional grounds
- d. Design and implement public and private institution contact strategy
- e. Offer workshops to managers
- f. Assist managers to develop restoration and integrated management plans
- g. Apply adaptive management wherever possible

Step C.8. Encourage general restoration of urban, suburban, agricultural, and other rural properties throughout the region

- a. Collect materials for distribution
- b. Establish links with Naturescape British Columbia
- c. Design and implement strategy to promote general restoration of urban, suburban, agricultural, and other rural properties throughout the region
- d. Offer workshops to the general public

Step C.9. Establish a stewardship program for managers of public and private natural areas

- a. Establish links with agencies involved with landowner contact programs
- b. Designate target sites
- c. Determine ownership of privately-owned target sites
- d. Develop stewardship materials including
 - Field manual of species at risk
 - Guides and templates for mapping and ecological assessment
 - Guides and templates for management planning and development of restoration and management prescriptions
 - Guides and templates for stewardship agreements and conservation covenants
- e. Collect additional materials for distribution
- f. Design and implement strategy for contacting land managers
- g. Offer workshops for land managers
- h. Facilitate the development of on-the-ground stewardship activities
- i. Apply adaptive management wherever possible

Step C.10. Promote the use of integrated silviculture approaches on woodlots to benefit Garry oak and associated ecosystems where appropriate

- a. Determine the extent of overlap of woodlots with range of Garry oak ecosystems and identify target sites in consultation with the District Woodlot Foresters of the BC Ministry of Forests
- b. Develop guidelines and recommendations for integrated forestry practices to benefit Garry oak and associated ecosystems

- c. Distribute guidelines and recommendations to District Woodlot Foresters or to District Managers if there is extensive overlap
- d. Request consideration and incorporation of guidelines and recommendations in operational plans of the forest tenure holders.

Step C.11. Promote development of adequate supply of native plants for restoration and management activities

- a. Establish steering committee
- b. Compile and disseminate information about germination, propagation, and outplanting requirements of native species
- c. Develop and implement strategy for research and development of native plant stock
- d. Develop and implement strategy for grower support during the period of sector development
- e. Develop ethical guidelines for seed and propagule collection and incorporation of genetic considerations into seed and plant transfer
- f. Develop and distribute public education materials that discuss comparative costs of native and non-native plants and seeds.

Strategic Approach D. Protection and recovery of species at risk

Step D.1. Establish a plants at risk RAG and develop a plants at risk RAP

Step D.2. Complete, or encourage or assist COSEWIC to complete as appropriate, status reports for all plants at risk that are not yet the subject of status reports, and ensure that appropriate status reports are submitted to COSEWIC for evaluation

(see Appendix 2 for an explanations of ranks and listings)

- a. First priority: G1 or G2 or T1 or T2: 2 species
- b. Second priority: G3 or T3: 4 species
- c. Third priority: S1 or SH or SX: 16 species
- d. Fourth priority: Red-listed species: 8 species
- e. Fifth priority: the remaining species: 4 species

Step D.3. Complete recovery plans, including definition of critical habitat if sufficient information is available or schedule of studies to enable such definition if insufficient information is available, for plants at risk

- a. First priority: G1 or G2 or T1 or T2: 3 species
- b. Second priority: G3 or T3 or COSEWIC Endangered or Extirpated species: 15 species
- c. Third priority: S1 or SH or SX or COSEWIC Threatened Species or Species of Special Concern: 18 species
- d. Fourth priority: Red-listed species: 9 species
- e. Fifth priority: The remaining species: 4 species

Step D.4. Initiate recovery actions, including inventory, research, threat abatement, habitat protection, habitat enhancement, propagation, re-introductions, and other measures as appropriate, for plants at risk

- a. First priority: G1 or G2 or T1 or T2: 3 species
- b. Second priority: G3 or T3 or COSEWIC Endangered or Extirpated species: 15 species
- c. Third priority: S1 or SH or SX or COSEWIC Threatened Species or Species of Special Concern: 18 species
- d. Fourth priority: Red-listed species: 9 species
- e. Fifth priority: The remaining species: 4 species

Step D.5. Establish seed bank program for plant species at risk

Step D.6. Establish an invertebrates at risk RAG and develop an invertebrates at risk RAP

Step D.7. Complete, or encourage or assist COSEWIC to complete as appropriate, status reports for all invertebrates at risk that are not yet the subject of status reports, and ensure that appropriate status reports are submitted to COSEWIC for evaluation

- a. First priority: G1 or G2 or T1 or T2: 3 species
- b. Second priority: G3 or T3: 3 species
- c. Third priority: S1 or SH or SX: 4 species
- d. Fourth priority: Red-listed species: 1 species
- e. Fifth priority: the remaining species: 1 species

Step D.8. Complete recovery plans, , including definition of critical habitat if sufficient information is available or schedule of studies to enable such definition if insufficient information is available, for invertebrates at risk

- a. First priority: G1 or G2 or T1 or T2: 5 species
- b. Second priority: G3 or T3 or COSEWIC Endangered or Extirpated species: 4 species
- c. Third priority: S1 or SH or SX or COSEWIC Threatened Species or Species of Special Concern: 4 species
- d. Fourth priority: Red-listed species: 1 species
- e. Fifth priority: The remaining species: 1 species

Step D.9. Initiate recovery actions, including inventory, research, threat abatement, habitat protection, habitat enhancement, captive breeding, re-introductions, and other measures as appropriate, for invertebrates at risk

- a. First priority: G1 or G2 or T1 or T2: 5 species
- b. Second priority: G3 or T3 or COSEWIC Endangered or Extirpated species: 4 species
- c. Third priority: S1 or SH or SX or COSEWIC Threatened Species or Species of Special Concern: 4 species
- d. Fourth priority: Red-listed species: 1 species
- e. Fifth priority: The remaining species: 1 species

Step D.10. Establish a vertebrates at risk RAG and develop a vertebrates at risk RAP

Step D.11. Complete, or encourage or assist COSEWIC to complete as appropriate, status reports for all vertebrates at risk that are not yet the subject of status reports, and ensure that appropriate status reports are submitted to COSEWIC for evaluation

- a. First priority: G1 or G2 or T1 or T2: 1 species
- b. Second priority: G3 or T3: 1 species
- c. Third priority: S1 or SH or SX: 2 species
- d. Fourth priority: Red-listed species: 0 species
- e. Fifth priority: the remaining species: 0 species

Step D.12. Complete recovery plans, including definition of critical habitat if sufficient information is available or schedule of studies to enable such definition if insufficient information is available, for vertebrates at risk

- a. First priority: G1 or G2 or T1 or T2: 0=1 species
- b. Second priority: G3 or T3 or COSEWIC Endangered or Extirpated species: 1 species
- c. Third priority: S1 or SH or SX or COSEWIC Threatened Species or Species of Special Concern: 3 species
- d. Fourth priority: Red-listed species: 0 species
- e. Fifth priority: The remaining species: 0 species

Step D.13. Initiate recovery actions, including inventory, research, threat abatement, habitat protection, habitat enhancement, captive breeding, re-introductions, and other measures as appropriate, for vertebrates at risk

- a. First priority: G1 or G2 or T1 or T2: 1 species
- b. Second priority: G3 or T3 or COSEWIC Endangered or Extirpated species: 1 species
- c. Third priority: S1 or SH or SX or COSEWIC Threatened Species or Species of Special Concern: 3 species
- d. Fourth priority: Red-listed species: 0 species
- e. Fifth priority: The remaining species: 0 species

Strategic Approach E. Research

Step E.1. Establish a research RAG and prepare a research RAP

Step E.2. Promote and facilitate research on priority topics

- a. Establish links with universities throughout British Columbia and colleges throughout southeastern Vancouver Island and with federal and provincial research agencies
- b. Highlight the need for research in Garry oak and associated ecosystems and distribute list of priority research topics to appropriate academic departments and faculty members and to agency researchers

- c. Identify potential funding sources
- d. Identify funding gaps and highlight these gaps to funding agencies
- e. Organize procedures for reviewing funding proposals
- f. Review research proposals upon request and support funding applications where appropriate
- g. Re-establish and expand the library collection pertaining to Garry oak and associated ecosystems;
- h. Review research results and recommend adjustment or expansion of the recovery program in accordance with the new information if appropriate
- i. Distribute relevant research results to recovery partners

Strategic Approach F. Communication, coordination, and public involvement

Step F.1. Establish communication, coordination, and public involvement RAG and prepare communication, coordination, and public involvement RAP

Step F.2. Develop and implement extension program directed towards local governments throughout the range of Garry oak and associated ecosystems

- a. Consult with elected representatives and planning staff from local governments to determine their information needs and how best to meet those needs
- b. Develop publications for local governments including:
 - Model policies for regional growth strategies, official community plans, development permit area requirements, development permit information, engineering standards, and tree protection bylaws
 - Best management practices for land use planning in Garry oak and associated ecosystems
 - Best management practices for minimizing ecological damage from construction activities in Garry oak and associated ecosystems
- c. Compile information specific to each jurisdiction such as:
 - Mapped occurrences of Garry oak and associated ecosystems within each jurisdiction
 - Mapped occurrences of species at risk, their biology and ecology, and protection needs
 - TEM and wildlife habitat mapping results when available
- d. Distribute information to elected representatives and local government staff
- e. Organize workshops and information sessions for elected representatives and local government staff
- f. Ensure that information is presented at the appropriate forums at each stage of the planning process
- g. Monitor adherence to policies and regulations with respect to Garry oak and associated ecosystems
- h. Provide information relevant to protection of Garry oak and associated ecosystems to community groups with direct interests in local development issues

Step F.3. Develop and implement public education program about Garry oak and associated ecosystems and the associated species at risk

- a. Develop and implement a survey to assess public interest in, and awareness about, Garry oak and associated ecosystems.
- b. Develop a promotional logo, theme, and mascot encapsulating conservation of Garry oak and associated ecosystems and the associated species at risk
- c. Establish a panel of celebrities to endorse and promote recovery of Garry oak and associated ecosystems
- d. Develop a media strategy including activities such as establishing a web page, issuing press releases, writing and soliciting articles for newspapers, magazines, and newsletters, soliciting radio and television interviews, producing and distributing posters and brochures, developing displays for use at public venues, and producing slide shows, videos, and films and organizing public viewings
- e. Develop communications network of community groups
- f. Organize or encourage others to organize indoor and outdoor educational activities
- g. Maintain a list of agencies requesting volunteer help and provide this information to individuals wishing to contribute volunteer time upon request
- h. Facilitate the establishment of groups to monitor and advocate on behalf of protected areas
- i. Encourage naturalists and others to look for species at risk and submit information through the GOERT website
- j. Work with industry representatives to develop marketing strategies specific to different sectors such as tourism and real estate and development
- k. Develop indoor and outdoor educational programs for children.

Step F.4. Improve communication and information-sharing among those involved in conservation of Garry oak and related ecosystems in British Columbia and elsewhere

- a. Hold symposia every other year
- b. Organize speakers and workshop series
- c. Establish list-serve
- d. Establish electronic or print newsletter

Step F.5. Establish an organizational structure to efficiently and effectively implement the recovery program

- a. Invite participation on GOERT team from local government and First Nations representatives
- b. Establish policies and protocols for the organizational structure, including definition of roles and responsibilities of GOERT, RAGs, and partner agencies, determination of appropriate delivery partners, and procedure for establishment of formal links with partner agencies
- c. Develop a prospectus for the recovery strategy and recovery program
- d. Establish formal links with recovery partners

- e. Establish web-based access for participants in recovery program to relevant agendas, minutes, reports, and other materials and documents
- f. Develop strategic financial plan for program administration and recovery activities
- g. Develop recovery program performance indicators
- h. Produce annual report
- i. Establish and fill the position of recovery program coordinator
- j. Establish and fill the position of public involvement and extension specialist

Narrative Description of Strategic Approaches, Specific Steps, and Suggested Actions from Stepdown Outline

Strategic Approach A: Inventory, mapping, and plant communities

Determine and map the historical and current extent of Garry oak and associated ecosystems and summarize ecological information pertaining to the status of the ecosystems.

Step A.1. Establish an inventory, mapping, and plant communities recovery action group and produce an inventory, mapping, and plant communities recovery action plan.

The combination of inventory, mapping, and plant community classification provides the essential foundation for conservation planning. Inventory informs about presence, abundance, and extent of biophysical attributes, including physiography, soils, vegetation, fauna, and other ecological features. Translation of inventory data into a Geographic Information System (GIS) allows spatial analyses of the data as well as production of map products. Analyses of inventory data can provide quantitative information about:

- Current and historic extent of Garry oak and associated ecosystems, rates of habitat loss, and the locations of remaining fragments relative to agricultural and urban developments;
- The diversity of the ecosystems and their distribution across the landscape;
- The relationships among individual plant and animal species (including species at risk), plant and animal communities, disturbance history, and site and landscape characteristics;
- Successional patterns and changes in stand structure in relation to disturbance and site and landscape characteristics;
- Distributions of invasive species in relation to site and landscape characteristics;
- Land ownership;

and many other critical conservation topics. Such information, in conjunction with results from other, non-spatial ecological research, forms the basis of many conservation activities, including:

- Establishing a network of protected areas representing the range of ecosystem types;
- Establishing a network of protected areas to provide suitable habitat for target species, including rare species;
- Defining critical habitat for species at risk, and determining minimum sizes of protected areas to minimize the risk of local extinctions of species at risk and other target species;
- Establishing a network of landscape linkages to enable movements of species among protected areas and hence sustain species in fragmented landscapes;
- Identifying potential sites for ecosystem restoration or reintroductions of species at risk;
- Identifying appropriate restoration targets and management techniques given specific site conditions;
- Determining the spatial distribution of critical ecological processes;
- Monitoring ecosystem responses to management; and
- Implementing extension activities targeted to land owners and land managers.

The inventory and mapping data currently available for Garry oak and associated ecosystems are insufficient for comprehensive conservation planning. Extensive sampling by Roemer (1972) and Erickson (1996a), mapping at 2 sites based upon Erickson's classification (1996a), and a region-wide map-based inventory conducted as part of the Sensitive Ecosystems Inventory (SEI; Ward *et al.* 1998) provide foundation work for a comprehensive ecosystem inventory. Further work is required to complete detailed mapping of the full complement of ecosystems, including small remnant patches embedded in the fragmented landscape, throughout their geographic range.

Step A.2. Develop a standardized plant community classification for Garry oak and associated ecosystems.

Classification of plant communities is a fundamental aspect of summarizing, analysing, and mapping ecosystems. Garry oak and associated ecosystems are topographically, edaphically, and floristically complex. Hence, conservation planning that addresses ecological diversity requires a classification system that recognizes the natural complexity of the ecosystems. A number of classification systems for Garry oak ecosystems and Garry oak plant communities have been developed (see summary in Fuchs 2001). These classifications reflect different spatial and temporal sampling protocol, analysis methodologies, and theoretical frameworks. Classification of rock outcrop, coastal bluff, and coastal grassland ecosystems is virtually nonexistent, although partial treatment is in development (Erickson pers. comm.). Plant communities in Garry oak and associated ecosystems currently recognized by the CDC are ranked as imperilled and critically imperilled. New types to be recognized would undoubtedly warrant similar ranking. A standardized classification system,

informed by the units developed in extant classifications, is required that meets the criteria for conservation objectives and is applicable to the full range of ecosystems.

Suggested actions for completing this step include:

- a. Clarify the plant community concept to be used for vegetation classification;
- b. Gather existing inventory data: known sources of data that have been collected according to detailed provincial standards (Luttmerding *et al.* 1990) should be compiled;
- c. Compare data to existing plant classifications: existing classifications should be compared and evaluated in relation to inventory data;
- d. Supplement data with new data: insufficient data may be available for satisfactory classification of Garry oak ecosystems. In addition, data from associated ecosystems are required to extend the classification beyond Garry oak habitats;
- e. Confirm existing and/or define new units in plant community classification; and
- f. Incorporate new community types into CDC ranking and tracking program.

Step A.3.

Establish a GIS database for Garry oak and associated ecosystems.

An advantage of GIS mapping, in addition to its analytic potential, is its ability to capture a wide range of diverse, complex, and technical information in a visually appealing format. Because of this, GIS mapping represents an essential tool for effective communication to a range of stakeholders. Potential users of GIS map products include federal, provincial, and local governments, non-governmental organizations, corporate and other commercial interests, students, and the general public. Within the recovery program itself, GIS is fundamental to the inventory, mapping, and plant communities activities, but also comprises a critical component of many other recovery initiatives outlined in this strategy.

Suggested actions for completing this step include:

- a. Establish host for the GIS system: a number of agencies, including the BC Conservation Data Centre, the Capital Regional District, and others, operate GIS systems. Arrangements need to be made with the most appropriate agency to host the data for Garry oak and associated ecosystems;
- b. Develop and test a GIS architecture appropriate for the needs of the recovery program and compatible with CDC database systems;
- c. Provide for data integration and ongoing data management;
- d. Provide for data sharing and map product delivery: GIS data might be directly exported to users with their own GIS systems. For example, data layers could potentially be included in GIS habitat maps currently being developed by all regional districts on Vancouver Island. A number of other governmental and non-governmental agencies use GIS habitat mapping in their work and are potential users of Garry oak data layers. Alternatively, hard copy maps products might be provided to

users. A web-based interface for GIS mapping can also be a highly effective tool for transfer of geographical information. Users can click on areas of interest, zoom in and out, view selected data layers, and link to other sources of information. Establishment of such systems has been identified as a priority initiative of the provincial government and will be available to provincial agencies in the near future;

- e. Gather and integrate existing data, including SEI, rare element records from the CDC, site records from the CDC, various species and ecosystem inventories, land ownership, data from restoration and research projects, and other sources; and
- f. Integrate data from inventory and research outlined in this strategy.

Step A.4. Conduct detailed inventory and mapping.

Biophysical mapping should be conducted throughout the range of Garry oak and associated ecosystems. Protocol should follow the provincial Terrestrial Ecosystem Mapping (TEM) standards (Resources Inventory Committee 1998). Map units should be derived from the vegetation classification developed in Step A.2. In order for mapping to represent ecosystem diversity to a sufficiently high standard, field checking must:

- Inspect at least 75 % of ecosystem polygons, ideally 100 % of the polygons, including a high ratio of “full-plot,” detailed sampling. Inspections should also verify and adapt extant GIS models if appropriate;
- Capture seasonal variation in the appearances of different plant species. This may require 2 site visits per polygon;
- Include all polygons containing occurrences of species at risk; and
- Be conducted by skilled field personnel who are able to identify species at risk.

Suggested actions for completing this step include:

- a. Compile existing data;
- b. Produce working map from existing data, aerial photographs, and expert knowledge;
- c. Conduct field reconnaissance;
- d. Develop a working legend for mapping, based upon existing and/or newly developed classification units for plant communities as appropriate (Step A.2);
- e. Conduct field sampling, including collection of objective site and vegetation data, field designation of plant community from existing and/or newly developed plant community classification (Step A.3), documentation of disturbance factors, and collection of data for wildlife habitat mapping (Step A.6). Focused searches for rare plants should also be incorporated into the ecosystem inventory or conducted as separate inventories, in consultation with the plants at risk RAG (Step D.1);
- f. Capture data in digital format; and
- g. Produce final maps.

Step A.5. Analyze site and vegetation data and report results.

Data analysis should investigate a number of variables and relationships, including:

- The relationships of plant communities to disturbance and site characteristics;
- The relationships of rare plants to plant communities, invasive species, disturbance, and site characteristics;
- The extent, distribution, and land tenure (federal, provincial, local government, First Nations, private) of different ecosystems; and
- Patterns in abundance and distribution of invasive species in relation to disturbance, site characteristics, native plant communities, and other factors.

Step A.6. Conduct wildlife habitat mapping for a set of selected indicator species and species at risk.

The “fine filter” level of conservation planning requires that critical habitat for species at risk be defined and protected. Additional habitat should also be protected to allow for population expansions, range shifts, and possible sites for reintroductions. Detailed inventories of these species and of their current and potential habitats provide critical information for such habitat protection.

Additional species should also be the focus of habitat mapping. Some wildlife species, such as primary cavity nesters, play keystone roles in ecosystems and enhance conditions for other species. Predators, dispersers, and pollinators perform critical ecological functions. Other species may also serve as indicators of the state of essential ecosystem characteristics. For example, species that require large areas of habitat, and species that are limited in dispersal ability, are sensitive to the effects of habitat fragmentation. Protection of habitat for these species can help ensure healthy ecosystem function and thus sustainability for the ecosystems over the long term.

Wildlife habitat mapping identifies habitats that are currently occupied or could potentially be occupied by the target species. Two types of mapping are employed. Suitability mapping defines habitat that is able in its current condition to provide the life requisites for the target species (Resources Inventory Committee 1999). Capability mapping defines habitat that is potentially able to provide those life requisites, irrespective of the current condition of the habitat.

Suitability and capability habitat mapping should be conducted for selected species of Garry oak and associated ecosystems. Protocol for mapping should follow the provincial Wildlife Habitat Rating standards (Resources Inventory Committee 1999).

Suggested actions for completing this step include:

- a. Set criteria for selection of indicator species and species at risk for mapping;

- b. Select the list of target species;
- c. Prepare species accounts, including background information and habitat requirements, for target species;
- d. Conduct wildlife inventories to supplement available information;
- e. Develop habitat suitability and capability criteria and ratings;
- f. Conduct field sampling to ground-truth preliminary ratings;
- g. Review and revise habitat ratings; and
- h. Prepare final suitability and capability habitat ratings, and produce report and wildlife habitat maps.

Step A.7. Map and analyze historical occurrences of Garry oak and associated ecosystems.

Rough estimates indicate that dramatic losses of Garry oak and associated ecosystems have occurred since European settlement, but actual losses have not been calculated. Mapping of historical extent of Garry oak ecosystems are necessary for assessments of ecosystem status and full definition of the problem and the challenges faced. Information about historical distributions of different ecosystems can also:

- Give guidance to protection efforts. Priority can be given to those ecosystems that have suffered the greatest decline;
- Provide insight into patterns of decline of species at risk; and
- Provide direction to restoration efforts by suggesting potential sites for restoration and restoration targets at those sites.

Historical occurrences of Garry oak and associated ecosystems should be mapped and analyses should investigate changes over time. A study currently in progress at the University of Victoria is examining landscape characteristics in relation to landscape management pre- and post-European settlement. This work should be continued and expanded.

Suggested actions for completing this step include:

- a. Gather information, such as soils mapping, archival survey information, archival photographs, oral histories, and aerial photographs;
- b. Map occurrences on aerial photographs;
- c. Label occurrences and transfer to a base map;
- d. Set up databases;
- e. Digitize the map; and
- f. Conduct GIS analyses to calculate changes in occurrences.

Step A.8. Map attributes of the adjacent natural and developed landscape.

Linear features including streams, highways, railroads, and hydro lines should be mapped. In addition, the landscape adjacent to Garry oak and associated ecosystems should be characterized and mapped. This information provides the foundation for the following activities:

- Potential landscape linkages can be identified (Step C.5). Linear feature such as streams, shorelines, recreational trails and greenways, highways, railroads, and hydro corridors may serve such purposes; and
- General information about the character of the matrix landscape can be used to suggest targets for restoration and stewardship programs, such

as suitable areas around the perimeters of protected areas, and less developed urban and suburban areas (Steps C.6 – C.9).

Spatially explicit information about the character of the matrix as well as character and location of landscape linkages is also required for landscape-level research including:

- Investigating the ability of matrix landscapes to help support minimum viable populations of species;
- Investigating the ability of wildlife to travel between patches of natural or semi-natural habitat; and
- Analysis and modeling of historic trends and ecological processes on a landscape scale.

These analyses can provide guidance for habitat protection, habitat restoration, and other conservation activities. Although they are not listed as a specific recovery activity in the strategy, they are included in Step E.2 as recommended research topics.

Suggested actions for completing this step include:

- a. Gather existing information;
- b. Map occurrences on aerial photographs;
- c. Label occurrences and transfer to a base map;
- d. Set up databases; and
- e. Digitize the map.

Strategic Approach B: Protection of ecosystems and essential ecosystem characteristics.

Secure high priority sites towards the establishment of a network of sites that represents the full diversity of Garry oak and associated ecosystems throughout their geographic range and that are of sufficient size and appropriately situated to sustain essential ecosystem characteristics over the long term.

Step B1. Establish a conservation planning and site protection recovery action group and produce a conservation planning and site protection recovery action plan.

Ideally, a network of protected sites should be secured to ensure sustainability of Garry oak and associated ecosystems over the long term. These sites would encompass repeated examples of all ecosystem types, distributed across the landscape, in order to:

- Hedge against potentially disastrous consequences from the unpredictable loss of 1 or more sites should those sites represent unique ecosystems;
- Ensure that the maximum number of native species is protected by protecting a broad range of environmental conditions (coarse filter function);
- Protect the range of genetic variability within component native species, to help safeguard species' adaptability to climate or other environmental changes;
- Retain source populations of native species able to recolonize habitats after local extinctions, including extinctions caused by random

demographic, genetic, or environmental events, or by human-caused disturbances; and

- Retain source populations of native species able to colonize new areas of suitable habitat should environmental change, such as climate change, create such openings.

The design of a network of protected sites must take a number of factors into consideration. Protected sites should be strategically situated to facilitate movements of species among protected areas. Because many species of Garry oak and associated ecosystems also use resources from other types of ecosystems, site placement should also consider the range of other ecosystem types across the landscape. The size of protected areas is a critical factor in their long-term sustainability. Protected areas must be large enough to sustain viable populations of component species. In addition, protected areas should be of sufficient size to accommodate spatial and temporal variation in the disturbance regime, or the minimum dynamic area. A network of protected areas should also include occurrences of, and potential habitat for, a set of target species. In particular, critical habitat for species at risk should be integrated into the conservation plans. Protected sites should be of high quality, with a minimum of degradation from human-caused disturbances.

Protecting more sites with habitat for target species, and ensuring that protected sites are as large, close to other natural areas, and as high quality as possible, must be accomplished. However, insufficient data are currently available to develop a systematic approach to site protection. Without inventory data indicating how the ecosystems are distributed, wildlife habitat mapping to indicate the distribution of habitat for target species, analyses suggesting optimal configurations to facilitate species' movements and habitat areas necessary to support minimum viable populations, gap analyses of occurrences of rare elements, and other information, ecologically strategic planning is not possible. Furthermore, options are limited by the fact that less than 5 % of the original Garry oak habitat remains in a near-natural condition (Hebda and Aitkens 1993a, Westland Resource Group 1999). Even if all remaining habitat were to be protected, this would still fall far short of the 12 % of land area recommended by the World Commission on Environment and Economy (Brundtland 1987), and adopted as a target by many jurisdictions worldwide, including the Canadian (Government of Canada 1990) and British Columbia (British Columbia 1993) governments. Currently, less than 1 % of the historical Garry oak habitat in the Capital Regional District, the heart of the Canadian range of Garry oak, is protected (Westland Resource Group 1999).

Step B.2. Prepare an interim list of at least 10 priority sites for protection.

A high priority of this strategy is to secure as many remnant Garry oak sites as possible. Sites are rapidly being lost to development. Protection efforts cannot wait until more complete information permits an ecologically strategic, comprehensive approach. Throughout the region, protected sites include federal parks, provincial parks and ecological reserves, regional

parcs, and municipal parks. Recent acquisitions include federal holdings acquired under the Pacific Marine Heritage Legacy and lands purchased by The Land Conservancy of BC, the Nature Conservancy of Canada, and The Nature Trust of British Columbia, with the support of many governmental, non-governmental, and corporate partners. These initiatives must continue.

An interim list of priority sites should be drawn from the Catalogue of Site Records, prepared by the CDC on behalf of the Georgia Basin Ecosystem Conservation Partnership. The catalogue describes sites of high conservation value that have been identified for potential acquisition by a consortium of governmental and non-governmental agencies. Sites are described and rated for biodiversity significance, connectivity, representativeness, protection urgency, and other values.

Suggested actions for completing this step include:

- a. Integrate existing data into the CDC database. Data to be integrated include ground-truth data from the SEI and other data from a few TEM mapping projects that have been conducted at Garry oak sites;
- b. Collect and integrate additional relevant information pertaining to Garry oak and associated ecosystems;
- c. Prepare maps of point and polygon occurrences of rare elements, including plant communities, plant species, and animal species, associated with Garry oak ecosystems;
- d. Develop criteria for ranking landscapes and specific sites for protection;
- e. Select at least 10 first-priority locations;
- f. Determine optimal reserve designs involving acquisition of particular sites, conservation covenants, management prescriptions, restoration activities, and other activities;
- g. Monitor status of designated locations and sites;
- h. Update site records as more inventory information becomes available; and
- i. Update priority list on an annual basis.

Step B.3. Work towards the expansion of the network of protected areas and securement of at least 10 priority sites within 5 years.

As many sites as possible should be secured by agencies whose primary mandate is ecological conservation. Given the extent and rate of past and current habitat loss, remnant sites must be protected before the opportunity for ecosystem recovery is no longer available. Site ownership by agencies with ecological conservation as their primary mandate affords the strongest protection. Stewardship agreements and conservation covenants with private landowners can also afford protection to natural areas, but multiple land-use objectives, difficulties in monitoring and enforcement, and unpredictable levels of commitment that come with changes in ownership reduce the effectiveness of these approaches to site conservation. However, they do afford some degree of protection, and are also included in this strategy.

Suggested actions for completing this step include:

- a. Develop and publicize a vision for a protected area network of Garry oak and associated ecosystems;
- b. Distribute priority site list, including specific values at each site, to governmental and non-governmental agencies;
- c. Develop landscape protection strategies for each priority area including acquisition, covenants, management, restoration, and other measures where appropriate; and
- d. Work for the implementation of individual landscape protection strategies and their continued integration into the broader Garry oak ecosystems conservation initiatives and other programmes.

Step B.4. Develop a GIS-based prioritization methodology and site list.

A number of models have been developed for systematically identifying and evaluating networks of protected areas in relation to explicit conservation goals (*e.g.* Redford *et al.* 1997, Warman and Sinclair 2000). A similar exercise should be conducted for Garry oak and associated ecosystems in Canada. This exercise should be initiated upon completion of TEM and wildlife habitat mapping. Results from other relevant research should also be included. For example, landscape-level research discussed in Step A.8 should be incorporated. Identification of potential Garry oak sites as a consequence of climate change (Step E.1) should also be incorporated into the model.

Suggested actions for completing this step include:

- a. Review the conservation work completed to date on Garry oak and associated ecosystems and associated species at risk;
- b. Investigate different site prioritization, conservation planning, and reserve design methodologies and software. In particular, the “ecoregional planning” approach currently in progress for the entire Willamette Valley – Puget Trough – Georgia Basin ecoregion should be examined. This joint program of the Nature Conservancy of Canada and The Nature Conservancy (US) will develop a portfolio of sites designed to meet comprehensive conservation goals. Because this initiative spans Canada and the United States and includes a wide range of ecosystem types, it is considerably wider in scope than that proposed in this strategy. However, it may provide a useful model if adapted to the priorities of this strategy;
- c. Select, adapt, and/or develop a framework for conservation gap analysis, determination of priorities for additional sites for protection, and design of reserve cores, buffers and linkages; and
- d. Test and run planning exercise to set protection priorities.

It is expected that the revised list of priority sites will be integrated into the next iteration of the recovery plan, and that the planning exercise will be periodically repeated in the future as more data are gathered. Hence, these actions are not discussed further in this strategy.

Strategic Approach C: Restoration and management of protected areas, landscape linkages, buffers, and the general landscape.

Facilitate the establishment of landscape linkages and buffers and promote the restoration and management of protected areas, landscape linkages, buffers and the general landscape to sustain essential ecosystem characteristics over the long term.

Step C.1. Establish a restoration and management recovery action group and develop a restoration and management recovery action plan.

Securing a network of protected areas is only a first step towards recovery of Garry oak and associated ecosystems. Appropriate management of the protected areas must be employed to sustain essential ecosystem characteristics. Ecological impacts from invasions of exotic species, disruption of the natural fire regime, and numerous other potentially harmful influences necessitate management actions to protect and restore ecosystem composition, structure, and function.

Although it is clear that exotic species and changes to the disturbance regime pose serious threats to the ecosystems, the precise nature and extent of the impacts are largely unknown. Focussed research is required to address these knowledge gaps. Furthermore, a high degree of uncertainty exists about the efficacy and impacts of management approaches under a range of ecological conditions. Management techniques that address one ecological threat may exacerbate another threat. For example, prescribed fire is effective for inhibiting woody encroachment, but some invasive plants are favoured by fire. Management techniques need to be developed and rigorously tested. Adaptive management provides the appropriate framework for simultaneously applying and testing management techniques. Management actions are used as probes to test hypotheses about ecological systems and responses to manipulation. In an adaptive management regime, management actions are applied within an experimental framework, responses are monitored, results are evaluated, and management is subsequently adjusted in accordance with the new information.

Restoration and appropriate management of areas outside of protected areas are also essential for recovery of Garry oak and associated ecosystems. Habitat loss has severely fragmented remnant ecosystems. Landscape linkages connecting protected areas and buffers surrounding the areas are essential for ameliorating the effects of habitat fragmentation. Protecting and enhancing the natural values of the matrix landscape can also augment the role of protected areas to sustain species and ecological function throughout the landscape.

Considerable opportunities for collaborative research and adaptive management are available through the Restoration of Natural Systems program at the University of Victoria. This program is ideally positioned to develop and offer the expertise required for the restoration initiatives outlined in this strategy.

Step C.2. Establish a research and management program to address invasive species of Garry oak and associated ecosystems.

Invasive species pose a serious, ubiquitous, and increasing threat to Garry oak and associated ecosystems (Fuchs 2001). The invasions pose threats to the overall sustainability of the ecosystems by altering ecosystem processes such as resource supply, trophic structure, and disturbance regimes.

Invasions of exotic species are a major threat to almost all plants and a number of animals at risk for which risk factors have been assessed.

Limited research has been devoted to invasive plants in Garry oak and associated ecosystems. Research effort has been devoted primarily to biology and management of Scotch broom (*Cytisus scoparius*) and, to a lesser extent, gorse (*Ulex europaeus*). The Canadian Forest Service, Simon Fraser University, and the University of British Columbia have been involved in this research. Research addressing herbaceous exotics is underway by the Universities of British Columbia and Victoria.

Current management responses to invasive plants in protected areas range from non-existent to insufficient. Mechanical removal of Scotch broom has been the primary activity. A number of other invasive woody plants have also been tackled in some locations. Invasive grasses and other herbs have not yet been addressed by managers. Much of the removal of invasive species is done by volunteers. In general, control of invasive species is constrained by lack of awareness on the part of land managers, insufficient agency resources, a limited and inadequately developed toolbox of management options, and uncertainty about the most appropriate management strategy at a given site.

In British Columbia, the Weed Control Act provides for the designation of noxious weeds by the BC Ministry of Agriculture, Food and Fisheries. Noxious weeds pose threats to agricultural interests and generally will not be designated once they are widespread (www.agf.gov.bc.ca). Although control of designated noxious weeds is required of landowners, the focus of agency efforts is upon education rather than enforcement. Forty-five species are currently designated as noxious weeds either on a provincial level or within specified regional districts. Of the species posing the most serious threats to Garry oak and associated ecosystems, only gorse has been designated as a noxious weed.

Introduced insects have caused considerable damage to Garry oak trees in British Columbia. Development of a biological control program by the Canadian Forest Service effectively brought the winter moth (*Operophtera brumata*) under control. Concern over continuing damage to oak trees, particularly from the jumping gall wasp (*Neuroterus saltatorius*) and the oak leaf phylloxera (*Phylloxera glabra*) prompted the formation of the multi-agency Capital Regional District Garry Oak Steering Committee in 1990. A research and monitoring program was initiated by the steering committee and implemented by the Canadian Forest Service. Evidence indicates that parasitoids, predators, and natural genetic resistance will limit

the destruction caused by these insects. However, monitoring of the situation should continue. Unfortunately, in recent years, agency resources have been withdrawn from these programs.

More recent introductions of the potentially devastating gypsy moth (*Lymantria dispar*) generated a diverse array of research, public education, and management programs involving numerous non-profit and federal, provincial, and regional government agencies. Control has most commonly entailed broadcast aerial spraying of *Bacillus thuringiensis* ssp. *kurtaski* (*Btk*), a microbial pest agent. In general, this recovery strategy recommends that these programs continue, and that gypsy moth management remain a priority activity for all levels of government. Because broadcast spraying of *Btk* poses potential threats to non-target species, particularly species at risk, in Garry oak ecosystems, this strategy recommends that the following be emphasized in gypsy moth research and management programs:

- Investigation of policy approaches to prevention of gypsy moth introductions;
- Continuing research into development and application of species-specific and site-specific control methods;
- Comprehensive monitoring that permits detection of spray impacts on species at risk; and
- Integration of the needs of species at risk into management strategies.

No research or management efforts have addressed other invasive invertebrates, which include earthworms and the introduced black slug *Arion ater*. Similarly, invasive vertebrates have received little research or management attention. Despite the severe impacts of the European starling (*Sturnella vulgaris*), eastern cottontail (*Sylvilagus floridanus*), and other vertebrates, few agency resources have been allocated towards addressing these problems in Garry oak and associated ecosystems. The University of Guelph is examining habitat use and rate of spread of eastern gray squirrels (*Sciurus carolinensis*) in British Columbia. No control has been attempted. The Biodiversity (formerly Wildlife) Branch of the BC Ministry of Water, Land and Air Protection has been trapping Virginia opossums (*Didelphis virginiana*) on Hornby Island since 1994.

An aggressive program focused on research and management of invasive species is a critical component of ecosystem and species recovery. For some invasive species, eradication may not be possible, and management will likely entail strategies for minimizing the negative impacts of the invasions.

Suggested actions for completing this step include:

- a. Establish an invasive species steering committee to address invasive species of Garry oak and associated ecosystems; and
- b. Establish links with Canadian and American programs addressing invasive species: The Invasive Plants of Canada (IPCAN) program is dedicated to combating the spread of invasive plants, primarily by compiling information, developing databases for computer mapping and analysis, and promoting local actions by naturalist groups

(infoweb.magi.com/~ehaber/origin.html). In 2001, the Joint Council Meeting of the Ministers of Wildlife, Forestry, and Fisheries and Aquaculture requested the development of a draft national plan addressing invasive alien species. In response to this request, the Canadian Wildlife Service is currently conducting a national assessment of information needs pertaining to invasive species. The INVADERS database at the University of Montana tracks distributions of exotic plants throughout the Pacific Northwest and encourages application of this information to management efforts (invader.dbs.umt.edu/). The United States Government is currently developing a high-level integrated program dealing with invasive species (National Invasive Species Council 2000).

For invasive plants:

- a. Design and implement a broad-scale adaptive management program to apply and test management actions at different sites throughout the region. The following activities are recommended to accomplish this:
 - Conduct a comprehensive problem analysis and literature review about biology, ecology, and management of all invasive plants of Garry oak and associated ecosystems;
 - Develop a decision-support tool for invasive species management, addressing exotic and native species composition (including species at risk), site conditions, agency resources, and other variables;
 - Test management approaches at a series of sites throughout the region;
 - Monitor the effects of management interventions on native flora, invasive flora, native fauna, and other ecological variables; and
 - Revise the decision support tool and the adaptive management program on an ongoing basis based on monitoring results. In addition, refine decision support tool based on new ecological insights gained from Steps A.5 and E.1 of this strategy when results are available.
- b. Promote prevention and management of invasions of exotic plants throughout the region. The following activities are recommended to accomplish this:
 - Investigate policy approaches, such as noxious weed designations, to prevention and management of invasive plants;
 - Produce and distribute extension materials including fact sheets and a field manual for identification of invasive species;
 - Distribute decision support tool to public and private land managers;
 - Provide ongoing advice and technical support to land managers;
 - Encourage land managers to use adaptive management; and
 - Conduct outreach to garden centres and the general public about the risks of gardening with exotic species and the general risks of invasive species.
- c. Develop an invasive plants research program. The following research topics are suggested:
 - Analyze distributions and ecological relationships of invasive species using inventory data;
 - Investigate biological control options;

- Investigate the impacts of treatment methods on native flora and fauna; and
- Investigate ecosystem-level effects of invasive plants, including impacts on soil nutrients and on the fire cycle.

For invasive invertebrates:

- a. Establish links with agencies, including the Canadian Forest Service, with past and potential interest in the jumping gall wasp and phylloxera research and management program;
- b. Distribute information about Garry oak ecosystems and the species at risk within them to those agencies;
- c. Support funding applications for jumping gall wasp and phylloxera monitoring programs;
- d. Establish links with governmental and non-governmental agencies involved in gypsy moth research and management;
- e. Distribute general information about Garry oak ecosystems to those agencies;
- f. Distribute detailed information, including biological, ecological, and occurrence information, about species at risk that are potentially vulnerable to the effects of *Btk* spraying to those agencies; and
- g. Investigate research and management options for introduced black slugs, earthworms, and other invasive invertebrates.

For invasive vertebrates:

- a. Investigate research and management options for European starlings, eastern cottontails, eastern gray squirrels, and other invasive vertebrates.

Step C.3. Establish a research and management program to address fire and stand dynamics in Garry oak and associated ecosystems.

Despite extensive research and management south of the US border, little local attention has been paid to the role of fire in plant community structure, stand dynamics, or restoration of historical stand structures in Garry oak and associated ecosystems. Studies in progress by the Universities of Victoria and British Columbia are investigating historical use of fire by First Peoples on landscape structure and effects of prescribed fire on herbaceous plants. No research has examined rates, extent, or effects of woody encroachment, or the nature of current stand dynamics relative to historic dynamics. Management attempts to restore historic stand structures have been virtually non-existent.

A fire and stand dynamics research and management program is required to elucidate and restore disturbance dynamics and historic stand structures and seral stage distributions.

Suggested actions for completing this step include:

- a. Establish a fire and stand dynamics steering committee to address fire and stand dynamics in Garry oak and associated ecosystems;
- b. Design and implement a broad-scale adaptive management program to apply and test management actions at different sites throughout the region. The following activities are recommended to accomplish this:

- Conduct a comprehensive review of the responses of native and non-native plant and animal species of Garry oak ecosystems to fire and to fire exclusion;
 - Develop a predictive model for responses of species, including species at risk, to different fire regimes;
 - Determine the rate and extent of woody encroachment in Garry oak and associated ecosystems;
 - Construct stand and plant community development models for Garry oak and associated ecosystems;
 - Construct a model of historic seral stage distribution;
 - Determine priority sites for restoration, based in part upon degree of encroachment and projected rate of further encroachment;
 - Develop restoration objectives for the sites, based in part upon desired stand structure. Incorporate spatial variation into the restoration plan by using rotational management if possible and if appropriate;
 - Develop operational and communications strategies for addressing public concerns about prescribed fire. Issues to be addressed include impacts on air quality and public safety;
 - Test management approaches, including prescribed fire, manual removal of woody species, and other methods, at priority sites. The decision-support tool for invasive species management and the predictive model for responses of species, including species at risk, should be employed in selecting appropriate treatments at each site. Regulatory restrictions on open burning will also influence treatment options;
 - Monitor the effects of management interventions on native flora, invasive flora, native fauna, and other ecological variables; and
 - Revise the adaptive management program on an ongoing basis based on monitoring results. In addition, refine the program based on new ecological insights gained from Steps A.5 and E.1 of this strategy.
- c. Promote awareness about and management of woody encroachment to land managers throughout the region. The following activities are recommended to accomplish this:
- Produce and distribute extension materials describing traditional use of fire by First Peoples, the ecological effects of fire exclusion, and restoration options;
 - Provide of ongoing advice and technical support to land managers; and
 - Encourage the use of adaptive management to land managers.
- d. Develop a fire and stand dynamics research program. Research topics should include:
- Effects of different fire regimes on soil dynamics; and
 - Garry oak regeneration in relation to site characteristics, identities and densities of acorn consumers, disturbance history, and stand structure.

Step C.4. Support First Nations Traditional Ecological Knowledge and Traditional Ecological Management programs.

Ecological management of Garry oak and associated ecosystems by local First Peoples played a key role in shaping and sustaining the ecosystems over historical time. Changes in land management regimes subsequent to European settlement have resulted in significant changes to ecosystem composition, structure, and function. Ecological restoration requires an understanding of the historical interrelationships between ecosystems and traditional cultural practices. Some Traditional Ecological Knowledge has been lost over the last century, but some is retained with community elders. It is important to establish strong collaborative relationships with local First Nations before this knowledge is lost.

Cultural and ecological restoration can be complementary activities. Community-based programs can be vehicles for rekindling, reviving, and reapplying Traditional Ecological Knowledge. Local First Nations should be supported to develop programs that integrate research, community education, and management pertaining to Garry oak and associated ecosystems. Possible activities include:

- Historical research, including:
 - archival research; and
 - interviews with elders.
- Experimental research, including:
 - ecology of food and other resource plants; and
 - ecological impacts of traditional management activities.
- Community education, including:
 - identification of native and exotic species; and
 - traditional use and management of native plants and animals.
- Community activities, including:
 - traditional community harvests of native wild plants; and
 - community feasts of traditional foods.
- Ecological restoration and management, including:
 - development of native plant nurseries specializing in resource plants;
 - planting and maintenance of native species, especially resource plants;
 - removal of invasive species; and
 - application and evaluation of prescribed fire.

Cultural and ecological restoration activities pertaining to Garry oak and associated ecosystems should be facilitated and supported. Collaborative projects, such the research, community education, community activity, and restoration programs being developed by the Songhees First Nation and the University of Victoria, should be encouraged.

Garry oak and associated ecosystems may play an important role in the treaty process currently in progress between First Nations of the Georgia Basin, the Government of British Columbia, and the Government of Canada. The historical importance of the ecosystems for the culture and

economy of local First Nations may be key considerations in the treaty negotiations. Public lands currently under Crown ownership, including Garry oak sites, may be transferred to First Nations. Furthermore, First Nations with or without treaties may in future assert more influence over the management of traditionally harvested and managed areas. Camas harvests and other traditional uses may be reinstated on lands retained by the Crown as well as transferred lands. The importance of protecting and restoring Garry oak ecosystems as a land base for such activities should be publicized. Restoration and management strategies should be developed, in collaboration with First Nations, that recognize traditional uses. In this respect, ecosystem assessment and restoration to ensure that there is no contamination of food resources is a high priority.

Suggested actions for completing this step include:

- a. Establish links with First Nations with traditional territories that include Garry oak or associated ecosystems;
- b. Distribute information about Garry oak and associated ecosystems and the species at risk in them to the First Nations;
- c. Offer financial and technical support for research and management programs related to Garry oak and associated ecosystems;
- d. In collaboration with local First Nations, develop restoration and management strategies that recognize traditional uses of Garry oak ecosystems;
- e. Publicize the importance of Garry oak and associated ecosystems for the culture and economy of local First Nations and as a land base for camas harvests and other traditional uses; and
- f. Develop strategies to ensure that the health of those consuming harvested resources is not compromised by site contamination. Strategies may include soil analysis to identify contaminated sites, prevention of ongoing or potential future contamination, site cleanup, or other measures.

Step C.5. Establish a network of landscape linkages to connect protected areas of Garry oak and associated ecosystems with each other and with other ecosystems.

Ecosystem recovery requires that wildlife species are able to move between remnant patches of natural habitat. Linkages that connect protected areas can facilitate such movements if they are managed for appropriate ecological values. A network of linkages should be established to link Garry oak and associated ecosystems. Because many species of these ecosystems also use other natural habitats, linkages should also link Garry oak and associated ecosystems with other ecosystems. Linear features in the landscape, including highways, railroad lines, hydro corridors, streams, shoreline, and recreational trails and greenways systems represent potential landscape linkages. Managers should be encouraged to integrate ecological considerations into their management schemes for these areas.

Stream restoration and enhancement have recently been receiving considerable attention throughout the region. Numerous community-based

stewardship groups have been working in partnership with the federal Department of Fisheries and Oceans and the provincial Fisheries Renewal BC. The Fisheries Renewal BC program has been discontinued, but programs to date have generally focused on watershed issues, and as such the sphere of interest has included terrestrial habitat. The new provincial Fish Protection Act, which forbids urban development within 15-30 m of the height of the bank on the side of the stream, reinforces the importance of integrating upland into stream-focussed restoration efforts. Recreational trails and greenways through urban areas, managed by regional and municipal parks agencies, generally provide natural habitat to some degree, but their functionality as landscape linkages is seldom explicitly addressed or evaluated. A number of programs in the US have been spearheading the use of native plants for integrated vegetation management along roadways (*e.g.* Harper-Lore and Wilson 2000), but there have been few local efforts. The BC Ministry of Transportation and Highways recently incorporated native plantings into landscaping along the redeveloped Island Highway (Martin 1999). Municipal governments have included native species in a few landscaping projects along municipal roads. Landscape linkages, in which restoration and management are explicitly designed to meet specific objectives, should be established throughout the region. In the short term, corridor planning and design will be based upon existing information. In longer term, corridor planning and design will be integrated into GIS-based conservation planning activities (Step B.4) and implemented in future phases of the recovery program.

Suggested actions for completing this step include:

For landscape linkages along streams and shorelines:

- a. Designate target streams, shorelines, and associated upland areas;
- b. Establish links with stream-, shoreline- and watershed-based stewardship groups and government agencies such as the Department of Fisheries and Oceans and local governments;
- c. Develop publications about restoration and management of streamside and shoreline terrestrial habitat as landscape linkages for species of Garry oak and associated ecosystems. Explicitly address the needs of species at risk and other selected target species wherever possible;
- d. Offer workshops to stewardship groups and agency personnel about Garry oak and associated ecosystems, the value of landscape linkages, and integrated management;
- e. In consultation with stewardship groups and agencies, develop integrated management plans for target streams and shorelines; and
- f. Apply adaptive management wherever possible:
 - Implement integrated management within an experimental framework;
 - Monitor the effectiveness of management initiatives on vegetation and one or more target wildlife species; and
 - Revise the adaptive management program on an ongoing basis based on monitoring results. In addition, refine the program based on new ecological insights gained from Steps A.5 and E.1 of this strategy.

For landscape linkages along recreational trails and greenways:

- a. Designate target recreational trails and greenways;
- b. Establish links with managers of recreational trails and greenways;
- c. Develop publications about restoration and management of trails and greenways as landscape linkages for species of Garry oak and associated ecosystems. Explicitly address the needs of species at risk and other selected target species wherever possible;
- d. Offer workshops to managers about Garry oak and associated ecosystems, the value of landscape linkages, and integrated management;
- e. In consultation with managers of recreational trails and greenways, develop integrated management plans for target trails and greenways; and
- f. Apply adaptive management wherever possible.
 - Implement integrated management within an experimental framework;
 - Monitor the effectiveness of management initiatives on vegetation and one or more target wildlife species; and
 - Revise the adaptive management program on an ongoing basis based on monitoring results. In addition, refine the program based on new ecological insights gained from Steps A.5 and E.1 of this strategy.

For landscape linkages along hydro and transportation corridors:

- a. Designate target highway, railroad, and hydro corridors;
- b. Establish links with integrated vegetation management programs in other jurisdictions, such as the Integrated Roadside Vegetation management Program at the University of Northern Iowa and the Office of Natural Environment at the US Federal Highway Administration;
- c. Establish links with managers of highway, railroad, and hydro corridors;
- d. Develop best management practices and other publications about management of these corridors as landscape linkages for species of Garry oak and associated ecosystems. Explicitly address the needs of species at risk and other selected target species wherever possible;
- e. Offer workshops to managers about Garry oak and associated ecosystems, the value of landscape linkages, and integrated management;
- f. In consultation with vegetation managers, develop integrated management plans for target corridors; and
- g. Apply adaptive management wherever possible:
 - Implement integrated management within an experimental framework;
 - Monitor the effectiveness of management initiatives on vegetation and one or more target wildlife species; and
 - Revise the adaptive management program on an ongoing basis based on monitoring results. In addition, refine the program based on new ecological insights gained from Steps A.5 and E.1 of this strategy.

Step C.6. Establish buffers for protected areas of Garry oak and associated ecosystems.

The size of remnant patches of habitat influences the ability of the patches to support populations of species over time. Populations that are confined to small patches are more likely to suffer local extinctions than those in larger patches. Remnant patches of Garry oak and associated ecosystems in Canada are small. The effective area of these remnant patches can be increased if areas surrounding the patches can also provide some degree of favourable habitat. Furthermore, the protected areas themselves are vulnerable to negative influences, such as invasive species, pollutants, and runoff of water and fertilizers, from adjacent areas. Landowners and other residents adjacent to protected areas should be encouraged to restore and manage their properties to minimize negative influences and maximize positive influences to the adjacent natural habitat. Two local initiatives provide models for this type of effort. The Nature Conservancy of Canada and the District of Central Saanich contact neighbours of Garry oak preserves and distribute educational materials to them, thereby encouraging “good neighbour” attitudes and responsible stewardship behaviour.

Suggested actions for completing this step include:

- a. Designate target areas adjacent to protected areas;
- b. Define priority concerns and key messages for each area. Explicitly address the needs of species at risk and other selected target species wherever possible;
- c. Develop and collect materials for distribution. The Garry Oak Meadow Preservation Society and other agencies have produced brochures and other publications covering some relevant topics. Topics to be addressed might include:
 - How (and why) to turn a lawn into a Garry oak meadow;
 - Sources of native plants;
 - How to care for Garry oak trees;
 - Do’s and don’ts of watering, fertilizing, mowing, and raking;
 - Providing habitat for wildlife;
 - The value of standing dead and downed wood;
 - Landscaping to promote acorn dispersal by Steller’s jays;
 - Wildlife harassment by dogs, cats, and people;
 - Invasive plants;
 - The value of Garry oak and associated ecosystems; and
 - Other site-specific issues.
- d. Develop and implement a landowner and resident contact strategy;
- e. Offer workshops to landowners about Garry oak and associated ecosystems, the value of buffers for protected areas, and private land stewardship; and
- f. Apply adaptive management wherever possible:
 - In cooperation with landowners, implement restoration and ecological management within an experimental framework;
 - Monitor the effectiveness of management initiatives on vegetation and one or more target wildlife species; and

- Revise the adaptive management program on an ongoing basis based on monitoring results. In addition, refine the program based on new ecological insights gained from Steps A.5 and E.1 of this strategy.

Step C.7. Encourage restoration and ecosystem management of institutional grounds.

Many public and private institutions hold relatively large parcels of land. Public and private institutions should be encouraged to incorporate ecological objectives into their landscape and grounds maintenance programs. Restoration of Garry oak and associated ecosystems on such properties has the potential to provide habitat for a variety of wildlife species. This habitat may help support wildlife populations and thereby decrease risks of local extinctions. In addition, such restored properties may provide patches of stepping-stone habitat for wildlife, thus facilitating wildlife dispersal across the landscape.

Few institutions have embarked on restoration and ecological management programs, but initiatives are growing in number. The Greenways initiative of the Provincial Capital Commission encourages ecological management of institutional grounds. The Greening School Grounds Program actively promotes such activities at elementary schools throughout southeastern Vancouver Island. To date, more than 18 schools have participated in greening programs. The District of Saanich has adopted the principles of Naturescape British Columbia, a program that promotes restoration, preservation, and enhancement of wildlife habitat in urban and rural landscapes. Saanich is currently developing a plan for implementing Naturescape principles on public lands. Saanich has also initiated a program, the Garry Oak Restoration Project, to establish demonstration restoration sites on municipal lands and on the grounds of other public institutions in partnership with the respective responsible agencies. These initiatives should be supported and expanded. All projects should be encouraged to include explicit ecological objectives in their management plans.

Suggested actions required for completing this step include:

- a. Designate target areas. Properties under consideration should include:
 - Schools;
 - Colleges and universities;
 - Federal, provincial, and local government buildings;
 - Public works;
 - Churches;
 - Hospitals;
 - Cemeteries; and
 - Corporate properties.
- b. Collect materials for distribution. Topics to be addressed are similar to those addressed in Step C.6. Explicitly address the needs of species at risk and other selected target species wherever possible;
- c. Develop publication about integrated management of institutional grounds;

- d. Design and implement a public and private institution contact strategy;
- e. Offer workshops to managers about Garry oak and associated ecosystems, the value of enhancing natural values on institutional grounds, and integrated vegetation management;
- f. In consultation with managers of institutional grounds, develop restoration and integrated vegetation management plans for institutional grounds; and
- g. Apply adaptive management wherever possible:
 - Implement restoration and ecological management within an experimental framework;
 - Monitor the effectiveness of management initiatives on vegetation and one or more target wildlife species; and
 - Revise the adaptive management program on an ongoing basis based on monitoring results. In addition, refine the program based on new ecological insights gained from Steps A.5 and E.1 of this strategy.

Step C.8. Encourage general restoration of urban, suburban, agricultural, and other rural properties throughout the region.

The nature of the matrix landscape surrounding patches of natural habitat has a great role to play in the sustainability of Garry oak and associated ecosystems. Fragmentation effects can be reduced if the general landscape can help support larger population sizes of species, thus reducing risks of local extinctions. Furthermore, control of invasive species, reductions in watering and fertilizing, and other behaviours can reduce negative impacts on remnant ecosystems and the landscape in general. Restoration of agricultural lands offers the opportunity for reintroductions of native species that depend upon grasslands or open woodlands. Species at risk that depend upon these habitats, including the streaked horned lark (*Eremophila alpestris strigata*), vesper sparrow (*Pooecetes gramineus affinis*), western meadowlark (*Sturnella neglecta*), Lewis's woodpecker, and western bluebird (*Sialia mexicana*), have been entirely or nearly extirpated from the region (Fuchs 2001).

The Naturescape British Columbia program promotes restoration, preservation, and enhancement of wildlife habitat in urban and rural landscapes. Materials specific to Garry oak ecosystems should be distributed to supplement the Naturescape program. Privately-owned properties, landscaped as Garry oak restoration sites, could serve as demonstration sites to encourage others to do the same. A resident of urban Victoria has set up her yard as a demonstration site and has received considerable public attention.

Suggested actions for completing this step include:

- a. Collect materials for distribution. Topics to be addressed are similar to those addressed in Step C.6;
- b. Establish links with Naturescape British Columbia;
- c. Design and implement a strategy to promote general restoration of urban, suburban, agricultural, and other rural properties throughout the region focussed on Garry oak ecosystems; and

- d. Offer workshops to the general public about Garry oak and associated ecosystems, the value of enhancing natural values in urban and suburban areas, and private land stewardship.

Step C.9. Establish a stewardship program for managers of public and private natural areas.

Natural areas, including designated protected areas as well as other private lands with natural values, comprise the foundation for ecosystem recovery and persistence of species over time. However, ecological sustainability of such natural areas is not assured without appropriate stewardship actions.

Natural areas without protected status may undergo land use changes that compromise or eliminate their natural values. Conservation-minded owners of these areas should be educated about, and encouraged to consider, the range of protection options available to landowners. Options include non-binding stewardship agreements with non-profit organizations, conservation covenants that require or prohibit specified activities of current and future title-holders, and outright donations of land to public or private conservation agencies. Tax incentives, such as the federal Ecogifting program and the Islands Trust Natural Areas Tax Exemption Initiative, may be applicable in some cases and hence provide additional encouragement for landowners to take conservation measures.

Active stewardship of natural areas is also essential for the long-term protection and recovery of ecological values, including essential ecosystem characteristics as well as species at risk. Invasions of exotic species and changes to the historical disturbance regime have caused, and continue to cause, significant ecological changes. Active management is required to mitigate or reverse past ecological degradation and prevent further degradation. Additional human impacts, such as damage to the soil or vegetation from recreational use, construction-related damage, and removal of standing dead or downed wood, may require remedial action and planning to minimize future damage. Where rare species are present, site-specific planning and management are required to protect the population from direct harm and to protect features of the habitat that provide critical resources. Management of rare species might also entail habitat enhancement or other activities to encourage population expansion. Similar planning and management may also be employed for other selected target species.

Managers of public and private natural areas should be encouraged to develop and implement ecosystem management plans that address the full range of ecological issues. Managers should also be encouraged to place first priority on ecological values in management planning. Currently, many parks agencies do not have management plans in place and perform little or no active management. In many cases, recreational usage jeopardizes the survival of populations of rare species or otherwise compromise ecological health. However, an awareness of the importance of ecosystem management is growing. For example, ecosystem management policy and practice is in

development for the Parks and Protected Areas Branch of the BC Ministry of Water, Land and Air Protection. Capital Regional District Parks is developing detailed management plans for its parks. A few municipal parks also have ecosystem management plans in place or in development.

A number of non-profit organizations have developed educational materials and programs to inform landowners and the general public about stewardship options. The West Coast Environmental Law Association, the Habitat Acquisition Trust Foundation, the Cowichan Community Land Trust, various local conservancies, and other organizations have developed a number of publications and provide excellent programs and services. Most of the focus of these initiatives is upon encouraging a stewardship ethic among landowners and educating landowners about protection options. Few programs offer specific guidance for management of Garry oak and associated ecosystems, although some programs, such as one recently offered by the Saltspring Island Conservancy, are moving in this direction. The extension program of the SEI also includes specific management recommendations for Garry oak and associated ecosystems (McPhee *et al.* 2000).

A stewardship program should be developed for managers of public and private natural areas of Garry oak and associated ecosystems. This program should work in partnership with existing organizations and initiatives. Publications should be developed and distributed as part of the stewardship program. Publications should provide information about Garry oak and associated ecosystems, species at risk in the ecosystems, and threats to the ecosystems. They should also provide guidance about how to plan and implement management regimes that will protect the ecosystems and the resident species.

Suggested actions for completing this step include:

- a. Establish links with agencies involved in landowner and manager contact programs;
- b. Designate target sites from CDC maps of point and polygon occurrences of rare elements associated with Garry oak ecosystems (Step B.2);
- c. Determine the ownership of privately-owned target sites from land registry records;
- d. Develop stewardship materials including:
 - A field manual of species at risk of Garry oak and associated ecosystems, including information about habitat, threats, and management;
 - A guide and template for mapping and ecological assessment of Garry oak and associated ecosystems;
 - Guides and templates for management planning and development of restoration and management prescriptions for Garry oak and associated ecosystems that explicitly consider protection of essential ecosystem characteristics, rare species, and other important elements and ecological factors. Recreational impacts, including damage from

- hiking, mountain biking, siting of park benches and other park developments, and other activities should be addressed; and
- Guides and templates for stewardship agreements and conservation covenants for Garry oak and associated ecosystems that explicitly consider protection of essential ecosystem characteristics, rare species, and other important elements and ecological factors. Covenants and agreements held by organizations such as the Habitat Acquisition Trust Foundation, the Garry Oak Meadow Preservation Society, the Islands Trust Fund, The Land Conservancy of BC, and the Nature Conservancy of Canada may provide useful models.
- e. Collect additional materials for distribution, including publications about stewardship options, invasive species, the role of fire, and other information about Garry oak and associated ecosystems;
 - f. Design and implement a strategy for contacting owners and managers of private and public natural areas;
 - g. Offer workshops to managers and owners about Garry oak and associated ecosystems, species at risk in the ecosystems, threats to the ecosystems, and management and stewardship techniques;
 - h. Facilitate the development of on-the-ground stewardship activities, for example by supporting funding applications for stewardship programs where appropriate; and
 - i. Apply adaptive management wherever possible:
 - Implement management planning and implementation within an experimental framework;
 - Monitor the effectiveness of management initiatives on vegetation and one or more target wildlife species; and
 - Revise the adaptive management program on an ongoing basis based on monitoring results. In addition, refine the program based on new ecological insights gained from Steps A.5 and E.1 of this strategy.

Step C.10 Promote the use of integrated silviculture approaches on woodlots to benefit Garry oak and associated ecosystems where appropriate.

Integrated forestry practices may be applied to benefit Garry oak and associated ecosystems in some commercial woodlots. Conifers now dominate some sites that were formerly dominated by Garry oak. Opportunities may exist to protect some components of the oak ecosystems within mixed forestry plantations.

Suggested actions for completing this step include:

- a. Determine the extent of overlap of woodlots with range of Garry oak ecosystems and identify target sites in consultation with the District Woodlot Foresters of the BC Ministry of Forests;
- b. Develop guidelines and recommendations for integrated forestry practices to benefit Garry oak and associated ecosystems;
- c. Distribute guidelines and recommendations to District Woodlot Foresters or to District Managers if there is extensive overlap; and
- d. Request consideration and incorporation of guidelines and recommendations in operational plans of the forest tenure holders.

Step C.11. Promote the development of an adequate supply of native plants and seeds for restoration and management activities.

Recovery of Garry oak and associated ecosystems requires that a diversity of native plant species be readily available for both large-scale and small-scale restoration and management projects. Such supplies have not been readily available. The Canadian Forest Service has provided a limited supply of woody plant stock, primarily to municipal parks agencies, since the mid-1990's. A number of municipalities also manage nursery operations that sometimes include native plant species. A few commercial growers specializing in native plants have come and gone, and a few remain in business. In general, development of this sector has been constrained by limited profitability. As a consequence, supplies are of insufficient quantity and variety to address current demand in a consistent fashion, and severely inadequate to meet the requirements for ecosystem recovery outlined in this strategy.

Challenges facing growers of native plants include the following:

- *Insufficient research and development:* Although germination and propagation requirements are well known for some species, they are less-well known or virtually unknown for others. Information about many native grasses, which will likely constitute foundation species for restoration efforts, is particularly deficient. Considerable research has been conducted in the United States regarding propagation of and restoration with Garry oak-associated prairie grasses (*e.g.* Davenport 1997, Dunn 1998), but studies in progress at the Universities of Victoria and British Columbia are among the few such research initiatives in Canada;
- *Ethical considerations:* In developing plant stocks, growers may collect seeds and propagules from wild populations. Such collections may stress the wild populations or limit their regeneration potential. Uncommon and rare species, in which removal of plants, plant parts, or seeds may represent a significant portion of the total wild stock, are particularly vulnerable to these negative impacts;
- *Public and agency demand:* Demand tends to concentrate on the more showy species and non-native grasses. Supply development for a variety of species is necessary for ecological restoration, but difficult to accomplish without sufficient demand; and
- *Public and agency perception:* Costs of native plants are expected to be comparable to, or lower than, those of ornamental and non-native grass species. Product development for the non-native species has benefited from centuries of research and development, homogenization and standardization of growing requirements, and selective breeding for profitability. The costs of some native species are comparable to those of ornamentals, but costs of others remain high. Costs of native seeds such as grasses remain relatively high. Although these costs may come down in the future, costs of many plants and seeds are likely to remain relatively high for some time to come. Biodiversity concerns dictate that principles and practices of genetic conservation must be integrated into breeding and propagation programs, precluding breeding exclusively for

profitability. Furthermore, ecological, not just economic, objectives must guide species selection and development.

A program should be established to support sector development. Research and development, grower support, and public education are required to ensure an adequate supply of native plants for recovery of Garry oak and associated ecosystems. Options to be considered should include:

- Development of one or more public or private facilities dedicated to research about and propagation of native plants for restoration of Garry oak and associated ecosystems;
- Generalized support to public and private growers to increase the availability of native stock; and
- The development and promotion of programs that salvage and replant native plants from construction sites.

Suggested actions for completing this step include:

- a. Establish a steering committee consisting of industry, academic, governmental, and non-governmental representatives;
- b. Compile and disseminate information about germination, propagation, and outplanting requirements of native species of Garry oak and associated ecosystems;
- c. Develop and implement a strategy for research and development of native plant stock;
- d. Develop and implement a strategy for grower support during the period of sector development;
- e. Develop ethical guidelines for seed and propagule collection and incorporation of genetic considerations into plant and seed transfer. The BC Ministry of Forests is currently developing guidelines for such activities. These should be evaluated for applicability to species of Garry oak and associated ecosystems; and
- f. Develop and distribute public education materials that discuss comparative costs of native and non-native plants and seeds.

Strategic Approach D: Protection and recovery of species at risk.

Complete assessments and initial planning and initiate actions towards sustaining and expanding populations of species at risk of Garry oak and associated ecosystems that are designated endangered, threatened, or of management concern.

By addressing habitat fragmentation, invasive species, and woody encroachment as a consequence of fire exclusion, Strategic Approaches A-C address threats to virtually all species at risk from Garry oak and associated ecosystems for which threats have been assessed. In addition, a number of actions directed towards species at risk are integrated into the preceding approaches and steps. They include:

- Inclusion of occurrences of species at risk into the GIS database for Garry oak and associated ecosystems;
- Concentration upon field-checking polygons containing species at risk in the TEM mapping program;

- Focused searches for rare plants incorporated into the TEM mapping program or conducted as separate inventories;
- Analysis of TEM mapping data to include an investigation of the relationships of rare plants to plant communities, disturbance, and site characteristics;
- Wildlife habitat mapping to include a focus on species at risk;
- Interim and long-term conservation planning and site protection program to include occurrences of, and critical habitat for, species at risk among the prioritization criteria;
- Explicit consideration of species at risk in development of a decision-support tool for invasive species management and application of an invasive species adaptive management program;
- Ensuring that agencies involved with gypsy moth management are informed about the needs of species at risk that are potentially vulnerable to management programs;
- Explicit consideration of species at risk in predictive model of species' responses to different fire regimes and incorporation of the needs of species at risk into fire and stand dynamics adaptive management program;
- Integration of the needs of species at risk into establishment of landscape linkages and buffers for protected areas;
- Integration of the needs of species at risk into restoration and management of institutional grounds; and
- Specific focus on species at risk integrated into stewardship programs for managers of public and private natural areas, including:
 - Designation of target sites determined in part by occurrences of species at risk;
 - Development of a field manual of species at risk; and
 - Development of guides and templates for mapping, ecological assessment, management planning, restoration and management prescriptions, stewardship agreements, and conservation covenants that explicitly consider species at risk.

Additional actions dealing with species at risk are incorporated into this strategy in Strategic Approach F:

- Incorporation of information about species at risk into extension program directed towards local governments (Step F.2);
- Incorporation of information about species at risk into public education programs (Step F.2); and
- Encouragement of naturalists and others to look for species at risk and submit information through the GOERT website (Step F.3).

Although these actions will go a long way towards recovery of species at risk, they do not preclude the need to individually address the recovery requirements of each species. Furthermore, a number of the actions specified above require direction and information that can best be supplied by focussed species-level recovery activities.

With 91 species at risk in Garry oak and associated ecosystems (Appendix 1), recovery planning and implementation for each individual species

appears an almost unmanageable task. This strategy recommends that the following methods be used to identify recovery priorities and organize the recovery process:

1. Some of the species that occur in Garry oak and associated ecosystems rely to a significant extent on other ecosystems on Vancouver Island or elsewhere in British Columbia. Although these species should be considered within the broad context of Garry oak and associated ecosystems, responsibility for their recovery *per se* should not be included under the umbrella of this strategy. It is anticipated that recovery teams will be established for these species outside of the direct coordination of this recovery program. The Garry Oak Ecosystems Recovery Team will coordinate efforts with such recovery teams and will offer leadership recovery of these species within Garry oak and associated ecosystems. The following species with occurrences in Garry oak and associated species are excluded from species-level planning in this strategy:

- Plants:
 - Dune bentgrass (*Agrostis pallens*);
 - Greensheathed sedge (*Carex feta*);
 - Lace fern (*Cheilanthes gracillima*);
 - Mountain sneezeweed (*Helenium autumnale* var. *grandiflorum*);
 - Mousetail (*Myosurus apetalus* var. *borealis*);
 - Needle-leaved navarretia (*Navarretia intertexta*);
 - Pine broomrape (*Orobanche pinorum*);
 - White lip rein orchid (*Piperia candida*);
 - California-tea (*Rupertia physodes*);
 - Cup clover (*Trifolium cyathiferum*); and
 - Howell's violet (*Viola howellii*).
- Invertebrates:
 - Earthworm (*Arctiostrotus perrieri*); and
 - Dun skipper (*Euphyes vestris vestris*).
- Vertebrates:
 - Sharp-tailed snake (*Contia tenuis*);
 - Gopher snake (*Pituophis catenifer* spp. *catenifer*);
 - Band-tailed pigeon (*Columba fasciata*);
 - Yellow-billed cuckoo (*Coccyzus americanus*);
 - Barn owl (*Tyto alba*);
 - Lewis's woodpecker (*Melanerpes lewis*), except for the Georgia depression population which is included under the umbrella of the strategy;
 - Purple martin (*Progne subis*);
 - Townsend's big-eared bat (*Corynorhinus townsendii*);
 - Vancouver Island ermine (*Mustela erminea anguinae*); and
 - Roosevelt elk (*Cervus elaphus roosevelti*).

Although these species are excluded from species-level recovery planning under the umbrella of this strategy, they should be included in

all of the actions that integrate species-level considerations into ecosystem-level actions. They should also be considered in species-level recovery when habitat or other needs either conflict with or complement those of the species under consideration.

Included under the umbrella of this strategy are federally or provincially listed species, subspecies, varieties, and populations with historic or extant ranges in British Columbia falling exclusively or primarily within Garry oak or associated ecosystems. They are listed in Steps D.3 and D.4, D.8 and D.9, and D.12 and D.13. Habitat and range are virtually unknown for some of the species, particularly invertebrates, with occurrences in Garry oak and associated ecosystems. These species are included in this strategy at this time. Additional information may indicate that they should be excluded in the future. Similarly, additional information may indicate that one or more of the species currently excluded from the umbrella of the strategy should be included in the future.

Appendix 1 indicates which of all the species at risk in Garry oak and associated ecosystems are, and which are not, the focus of species-level recovery planning under the umbrella of this strategy.

2. Species included under the umbrella of this strategy should be partitioned into logical groupings to increase efficiency and manageability of recovery planning and implementation. For the purposes of this strategy, grouping is along broad taxonomic lines. Separate recovery action groups and recovery action plans are recommended for plants, invertebrates, and vertebrates. Even with this breakdown, each recovery action group and plan must deal with a great number of species. It is recommended that the recovery action groups consider further divisions of species, such as division into groupings with similar habitat requirements, after more detailed assessment is made of the species under consideration.
3. Species should be prioritized for recovery planning and implementation. Priorities are described below. In general, greatest priority is given to species with greater risk status on a global scale. COSEWIC and provincial listings and ranks are also used as criteria. Because very few species have thus far been assessed by COSEWIC, relative priority may shift for a number of species subsequent to COSEWIC assessment.
4. Only 22 of the 91 species under consideration have thus far been the subjects of status reports. These reports provide the background information for determination of recovery goals, objectives, and actions. Hence, status reports are recommended for all species at risk included under the umbrella of this recovery strategy. Subsequent recovery planning for each species will follow the completion of a status report for that species. Recovery may be deemed to be infeasible for one or more species (National Recovery Working Group 2001). If so,

justification for such assessment will be prepared following the completion of the status report.

Step D.1. Establish a plants at risk recovery action group and develop a plants at risk recovery action plan.

Step D.2. Complete, or encourage or assist COSEWIC to complete as appropriate, status reports for all plants at risk that are not yet the subject of status reports, and ensure that appropriate status reports are submitted to COSEWIC for evaluation, in the following order of priority:

(see Appendix 2 for an explanations of ranks and listings)

1. G1 or G2 or T1 or T2:
 - a. Sulphur lupine (*Lupinus oregonus* var. *kincaidii*); and
 - b. White meconella (*Meconella oregana*).
2. G3 or T3:
 - a. Purple godetia (*Clarkia purpurea* ssp. *quadrivulnera*);
 - b. Kellogg's rush (*Juncus kelloggii*);
 - c. Rosy owl-clover (*Orthocarpus bracteosus*); and
 - d. Macrae's clover (*Trifolium dichotomum*).
3. S1 or SH or SX:
 - a. Twisted moss sp. (*Tortula laevipila* var. *meridionalis*);
 - b. Foothill sedge (*Carex tumulicola*);
 - c. Muhlenberg's cent aury (*Centaurium muehlenbergii*);
 - d. Brook spike-primrose (*Epilobium torreyi*);
 - e. Globe gilia (*Gilia capitata* var. *capitata*);
 - f. Gray's desert-parsley (*Lomatium grayi*);
 - g. Bog bird's-foot trefoil (*Lotus pinnatus*);
 - h. Dense-flowered lupine (*Lupinus densiflorus* var. *densiflorus*);
 - i. Coast microseris (*Microseris bigelovii*);
 - j. Lindley's microseris (*Microseris lindleyi*);
 - k. Dwarf sandwort (*Minuartia pusilla*);
 - l. Fragrant popcorn-flower (*Plagiobothrys figuratus*);
 - m. Lobb's water-buttercup (*Ranunculus lobbii*);
 - n. Scouler's campion (*Silene scouleri* ssp. *grandis*);
 - o. Small-flowered tonella (*Tonella tenella*); and
 - p. California hedge-parsley (*Yabea microcarpa*).
4. Red-listed species:
 - a. Carolina meadow foxtail (*Alopecurus carolinianus*);
 - b. Paintbrush owl-clover (*Castilleja ambigua*);
 - c. Erect pigmyweed (*Crassula connata* var. *connata*);
 - d. Dense spike-primrose (*Epilobium densiflorum*);
 - e. Scalegod (*Idahoia scapigera*);
 - f. Fragrant popcorn-flower (*Plagiobothrys tenellus*);
 - g. California buttercup (*Ranunculus californicus*); and
 - h. Howell's triteleia (*Triteleia howellii*).
5. The remaining species:
 - a. Winged water-starwort (*Callitriche marginata*);
 - b. Spanish-clover (*Lotus unifoliolatus* var. *unifoliolatus*);

- c. Manroot (*Marah oreganus*);
- d. Poison oak (*Toxicodendron diversilobum*).

Step D.3. Complete recovery plans for plants at risk, including definition of critical habitat if sufficient information is available or schedule of studies to enable such definition if insufficient information is available, in the following order of priority:

1. G1 or G2 or T1 or T2:
 - a. Golden paintbrush (= golden Indian paintbrush) (*Castilleja levisecta*);
 - b. Sulphur lupine (*Lupinus oreganus* var. *kincaidii*); and
 - c. White meconella (*Meconella oregana*).
2. G3 or T3 or COSEWIC Endangered or Extirpated species:
 - a. Deltoid balsamroot (*Balsamorhiza deltoidea*);
 - b. Rigid apple moss (*Bartramia stricta*);
 - c. Purple godetia (*Clarkia purpurea* ssp. *quadrivulnera*);
 - d. Kellogg's rush (*Juncus kelloggii*);
 - e. Macoun's meadow-foam (*Limnanthes macounii*);
 - f. Seaside birds-foot lotus (= seaside bird's-foot trefoil) (*Lotus formosissimus*);
 - g. Prairie lupine (*Lupinus lepidus* var. *lepidus*);
 - h. Rosy owl-clover (*Orthocarpus bracteosus*);
 - i. Tall woolly-heads (*Psilocarphus elatior*), Pacific population;
 - j. Water-plantain buttercup (*Ranunculus alismifolius* var. *alismifolius*);
 - k. Bear's-foot sanicle (*Sanicula arctopoides*);
 - l. White-top aster (*Seriocarpus rigidus* = *Aster curtus*);
 - m. Macrae's clover (*Trifolium dichotomum*);
 - n. Bearded owl-clover (*Tryphysaria versicolor* ssp. *versicolor*); and
 - o. Yellow montane violet (*Viola praemorsa* ssp. *praemorsa*).
3. S1 or SH or SX or COSEWIC Threatened Species or Species of Special Concern:
 - a. Twisted moss sp. (*Tortula laevipila* var. *meridionalis*);
 - b. Foothill sedge (*Carex tumulicola*);
 - c. Muhlenberg's centaury (*Centaureum muehlenbergii*);
 - d. Coastal wood fern (*Dryopteris arguta*);
 - e. Brook spike-primrose (*Epilobium torreyi*);
 - f. Globe gilia (*Gilia capitata* var. *capitata*);
 - g. Gray's desert-parsley (*Lomatium grayi*);
 - h. Bog bird's-foot trefoil (*Lotus pinnatus*);
 - i. Dense-flowered lupine (*Lupinus densiflorus* var. *densiflorus*);
 - j. Coast microseris (*Microseris bigelovii*);
 - k. Lindley's microseris (*Microseris lindleyi*);
 - l. Dwarf sandwort (*Minuartia pusilla*);
 - m. Fragrant popcorn-flower (*Plagiobothrys figuratus*);
 - n. Lobb's water-buttercup (*Ranunculus lobbii*);
 - o. Purple sanicle (*Sanicula bipinnatifida*);
 - p. Scouler's campion (*Silene scouleri* ssp. *grandis*);
 - q. Small-flowered tonella (*Tonella tenella*); and
 - r. California hedge-parsley (*Yabea microcarpa*).

4. Red-listed species:
 - a. Carolina meadow foxtail (*Alopecurus carolinianus*);
 - b. Paintbrush owl-clover (*Castilleja ambigua*);
 - c. Erect pigmyweed (*Crassula connata* var. *connata*);
 - d. Dense spike-primrose (*Epilobium densiflorum*);
 - e. Scalepod (*Idahoia scapigera*);
 - f. Fragrant popcorn-flower (*Plagiobothrys tenellus*);
 - g. Slender woolly-heads (*Psilocarphus tenellus* var. *tenellus*);
 - h. California buttercup (*Ranunculus californicus*); and
 - i. Howell's triteleia (*Triteleia howellii*).
5. The remaining species:
 - a. Winged water-starwort (*Callitriche marginata*);
 - b. Spanish-clover (*Lotus unifoliolatus* var. *unifoliolatus*);
 - c. Manroot (*Marah oreganus*); and
 - d. Poison oak (*Toxicodendron diversilobum*).

Step D.4. Initiate recovery actions, including inventory, research, threat abatement, habitat protection, habitat enhancement, propagation, re-introductions, and other measures as appropriate, for plants at risk in the following order of priority:

1. G1 or G2 or T1 or T2:
 - a. Golden paintbrush (= golden Indian paintbrush) (*Castilleja levisecta*);
 - b. Sulphur lupine (*Lupinus oreganus* var. *kincaidii*); and
 - c. White meconella (*Meconella oregana*).
2. G3 or T3 or COSEWIC Endangered or Extirpated species:
 - a. Deltoid balsamroot (*Balsamorhiza deltoidea*);
 - b. Rigid apple moss (*Bartramia stricta*);
 - c. Purple godetia (*Clarkia purpurea* ssp. *quadrivulnera*);
 - d. Kellogg's rush (*Juncus kelloggii*);
 - e. Macoun's meadow-foam (*Limnanthes macounii*);
 - f. Seaside birds-foot lotus (= seaside bird's-foot trefoil) (*Lotus formosissimus*);
 - g. Prairie lupine (*Lupinus lepidus* var. *lepidus*);
 - h. Rosy owl-clover (*Orthocarpus bracteosus*);
 - i. Tall woolly-heads (*Psilocarphus elatior*), Pacific population;
 - j. Water-plantain buttercup (*Ranunculus alismifolius* var. *alismifolius*);
 - k. Bear's-foot sanicle (*Sanicula arctopoides*);
 - l. White-top aster (*Seriocarpus rigidus* = *Aster curtus*);
 - m. Macrae's clover (*Trifolium dichotomum*);
 - n. Bearded owl-clover (*Tryphysaria versicolor* ssp. *versicolor*); and
 - o. Yellow montane violet (*Viola praemorsa* ssp. *praemorsa*).
3. S1 or SH or SX or COSEWIC Threatened Species or Species of Special Concern:
 - a. Twisted moss sp. (*Tortula laevipila* var. *meridionalis*);
 - b. Foothill sedge (*Carex tumulicola*);
 - c. Muhlenberg's centaury (*Centaurium muehlenbergii*);
 - d. Coastal wood fern (*Dryopteris arguta*);
 - e. Brook spike-primrose (*Epilobium torreyi*);

- f. Globe gilia (*Gilia capitata* var. *capitata*);
 - g. Gray's desert-parsley (*Lomatium grayi*);
 - h. Bog bird's-foot trefoil (*Lotus pinnatus*);
 - i. Dense-flowered lupine (*Lupinus densiflorus* var. *densiflorus*);
 - j. Coast microseris (*Microseris bigelovii*);
 - k. Lindley's microseris (*Microseris lindleyi*);
 - l. Dwarf sandwort (*Minuartia pusilla*);
 - m. Fragrant popcorn-flower (*Plagiobothrys figuratus*);
 - n. Lobb's water-buttercup (*Ranunculus lobbii*);
 - o. Purple sanicle (*Sanicula bipinnatifida*);
 - p. Scouler's campion (*Silene scouleri* ssp. *grandis*);
 - q. Small-flowered tonella (*Tonella tenella*); and
 - r. California hedge-parsley (*Yabea microcarpa*).
4. Red-listed species:
- a. Carolina meadow foxtail (*Alopecurus carolinianus*);
 - b. Paintbrush owl-clover (*Castilleja ambigua*);
 - c. Erect pigmyweed (*Crassula connata* var. *connata*);
 - d. Dense spike-primrose (*Epilobium densiflorum*);
 - e. Scalepod (*Idahoia scapigera*);
 - f. Fragrant popcorn-flower (*Plagiobothrys tenellus*);
 - g. Slender woolly-heads (*Psilocarphus tenellus* var. *tenellus*);
 - h. California buttercup (*Ranunculus californicus*); and
 - i. Howell's triteleia (*Triteleia howellii*).
5. The remaining species:
- a. Winged water-starwort (*Callitriche marginata*);
 - b. Spanish-clover (*Lotus unifoliolatus* var. *unifoliolatus*);
 - c. Manroot (*Marah oreganus*); and
 - a. Poison oak (*Toxicodendron diversilobum*).

Step D.5. Establish a seed bank program for plant species at risk in cooperation with the Canadian Botanical Gardens Consortium for Biodiversity.

Because of the great number of species at risk in Garry oak and associated ecosystems and the backlog in recovery planning for them, extirpations of extant populations may occur before recovery programs are in place. As a precautionary measure, seed banking should be initiated as soon as possible. The Canadian Botanical Consortium for Biodiversity, which is currently developing a seed bank program for conservation of plants at risk in Canada (www.rbg.ca/cbcn/en/biodiversity/cbgcb/index.html), is the likely partner for this effort. To ensure inclusive genetic representation, seeds from plants distributed throughout the extant Canadian range of each species should be collected for banking. Prioritization of species should follow the same criteria as those for species recovery described in Step D.3. The Consortium is also developing other forms of *ex situ* conservation, including live plant banking and DNA banking. These options should also be investigated in cooperation with the Consortium for plants of Garry oak and associated ecosystems.

Step D.6. Establish an invertebrates at risk recovery action group and prepare an invertebrates at risk recovery action plan.

Step D.7. Complete, or encourage or assist COSEWIC to complete as appropriate, status reports for all invertebrates at risk that are not yet the subject of status reports, and ensure that appropriate status reports are submitted to COSEWIC for evaluation, in the following order of priority:

1. G1 or G2 or T1 or T2:
 - a. leaf bug (*Clivenema fusca*);
 - b. leaf bug (*Ceratocapsus downesi*); and
 - c. Boisduval's blue, *blackmorei* subspecies (*Icaricia icariodes blackmorei*).
2. G3 or T3:
 - a. Moss' elfin, *mossii* subspecies (*Incisalia mossii mossii*);
 - b. Bremner's fritillary, *bremnerii* subspecies (*Speyeria zerene bremnerii*); and
 - c. Common ringlet, *insulana* subspecies (*Coenonympha californiana insulana*).
3. S1 or SH or SX:
 - a. seed bug (*Scolopostethus tropicus*);
 - b. scentless plant bug (*Harmostes dorsalis*);
 - c. shield-backed bug (*Camirus porosus*); and
 - d. robber fly (*Nicocles rufus*).
4. Red-listed species:
 - a. robber fly (*Scleropogon bradleyi*).
5. The remaining species:
 - a. Propertius dusky wing (*Erynnis propertius*).

Step D.8. Complete recovery plans for invertebrates at risk, including definition of critical habitat if sufficient information is available or schedule of studies to enable such definition if insufficient information is available, in the following order of priority:

1. G1 or G2 or T1 or T2:
 - a. leaf bug (*Clivenema fusca*);
 - b. leaf bug (*Ceratocapsus downesi*);
 - c. Island marble (*Euchloe ausonides*, undescribed subspecies);
 - d. Boisduval's blue, *blackmorei* subspecies (*Icaricia icariodes blackmorei*); and
 - e. Taylor's checkerspot (= Edith's Checkerspot, *taylori* subspecies) (*Euphydryas editha taylori*).
2. G3 or T3 or COSEWIC Endangered or Extirpated Species:
 - a. Moss' elfin, *mossii* subspecies (*Incisalia mossii mossii*);
 - b. Island blue (= greenish blue, *insulanus* subspecies) (*Plebejus saepiolus insulanus* = *Plebeius saepiolus insulanus*);
 - c. Bremner's fritillary, *bremnerii* subspecies (*Speyeria zerene bremnerii*); and
 - d. Common ringlet, *insulana* subspecies (*Coenonympha californiana insulana*).
3. S1 or SH or SX or COSEWIC Threatened Species or Species of Special Concern:

- a. seed bug (*Scolopostethus tropicus*);
 - b. scentless plant bug (*Harmostes dorsalis*);
 - c. shield-backed bug (*Camirus porosus*); and
 - d. robber fly (*Nicocles rufus*).
4. Red-listed species:
 - a. robber fly (*Scleropogon bradleyi*).
 5. The remaining species:
 - a. Propertius dusky wing (*Erynnis propertius*).

Step D.9. Initiate recovery actions, including inventory, research, threat abatement, habitat protection, habitat enhancement, captive breeding, re-introductions, and other measures as appropriate, for invertebrates at risk in the following order of priority:

1. G1 or G2 or T1 or T2:
 - a. leaf bug (*Clivenema fusca*);
 - b. leaf bug (*Ceratocapsus downesi*);
 - c. Island marble (*Euchloe ausonides* undescribed subspecies);
 - d. Boisduval's blue, *blackmorei* subspecies (*Icaricia icariodes blackmorei*); and
 - e. Taylor's checkerspot (= Edith's Checkerspot, *taylori* subspecies) (*Euphydryas editha taylori*).
2. G3 or T3 or COSEWIC Endangered or Extirpated Species:
 - a. Moss' elfin, *mossii* subspecies (*Incisalia mossii mossii*);
 - b. Island blue (= greenish blue, *insulanus* subspecies) (*Plebejus saepiolus insulanus* = *Plebeius saepiolus insulanus*);
 - c. Bremner's fritillary, *bremnerii* subspecies (*Speyeria zerene bremnerii*); and
 - d. Common ringlet, *insulana* subspecies (*Coenonympha californica insulana*).
3. S1 or SH or SX or COSEWIC Threatened Species or Species of Special Concern:
 - a. seed bug (*Scolopostethus tropicus*);
 - b. scentless plant bug (*Harmostes dorsalis*);
 - c. shield-backed bug (*Camirus porosus*); and
 - d. robber fly (*Nicocles rufus*).
4. Red-listed species:
 - a. robber fly (*Scleropogon bradleyi*).
5. The remaining species:
 - a. Propertius dusky wing (*Erynnis propertius*).

Step D.10. Establish a vertebrates at risk recovery action group and prepare a vertebrates at risk recovery action plan.

Step D.11. Complete, or encourage or assist COSEWIC to complete as appropriate, status reports for all vertebrates at risk that are not yet the subject of status reports, and ensure that appropriate status reports are submitted to COSEWIC for evaluation, in the following order of priority:

1. G1 or G2 or T1 or T2:

- a. Streaked horned lark (*Eremophila alpestris strigata*).
2. G3 or T3:
 - a. Vesper sparrow, *affinis* subspecies (*Pooecetes gramineus* ssp. *affinis*).
3. S1 or SH or SX:
 - a. Western bluebird (*Sialia mexicana*), Georgia Depression population; and
 - b. Western meadowlark (*Sturnella neglecta*), Georgia Depression population.
4. Red-listed species: (none); and
5. All the rest: (none).

Step D.12. Complete recovery plans for vertebrates at risk, including definition of critical habitat if sufficient information is available or schedule of studies to enable such definition if insufficient information is available, in the following order of priority:

1. G1 or G2 or T1 or T2:
 - b. Streaked horned lark (*Eremophila alpestris strigata*).
2. G3 or T3 or COSEWIC Endangered or Extirpated Species:
 - a. Vesper sparrow, *affinis* subspecies (*Pooecetes gramineus affinis*).
3. S1 or SH or SX or COSEWIC Threatened Species or Species of Special Concern:
 - a. Lewis's woodpecker (*Melanerpes lewis*), Georgia Depression population;
 - b. Western bluebird (*Sialia mexicana*), Georgia Depression population; and
 - c. Western meadowlark (*Sturnella neglecta*), Georgia Depression population.
4. Red-listed species: (none); and
5. All the rest: (none).

Step D.13. Initiate recovery actions, including inventory, research, threat abatement, habitat protection, habitat enhancement, captive breeding, re-introductions, and other measures as appropriate, for vertebrates at risk in the following order of priority:

1. G1 or G2 or T1 or T2:
 - a. Streaked horned lark (*Eremophila alpestris strigata*);
2. G3 or T3 or COSEWIC Endangered or Extirpated Species:
 - a. Vesper sparrow, *affinis* subspecies (*Pooecetes gramineus affinis*).
3. S1 or SH or SX or COSEWIC Threatened Species or Species of Special Concern:
 - a. Lewis's woodpecker (*Melanerpes lewis*), Georgia Depression population;
 - b. Western bluebird (*Sialia mexicana*), Georgia Depression population; and
 - c. Western meadowlark (*Sturnella neglecta*), Georgia Depression population.
4. Red-listed species: (none); and
5. All the rest: (none).

Strategic Approach E. Research

Expand basic and applied research relevant to conserving and restoring Garry oak and associated ecosystems.

Step E.1. Establish a research recovery action group and prepare a research recovery action plan.

Little research has been conducted in Garry oak and associated ecosystems in Canada. Considerable research effort is required to build the knowledge base necessary for the protection and recovery of the ecosystems and the component species. Strategic Approaches A-D of this strategy incorporate many of the research needs. Research topics addressed in other parts of this strategy include:

- Plant community classification;
- Ecological relationships among rare plants, invasive plants, plant communities, disturbance, and site characteristics;
- Ecological relationships between selected wildlife species and habitat attributes;
- Historical distributions of Garry oak ecosystems;
- Biology, management, and ecological effects of invasive plants, invertebrates, and vertebrates, and impacts of management regimes on other ecosystem components;
- Impacts of different fire regimes, including those that existed before and subsequent to European settlement, on stand dynamics and other ecological variables;
- Rate and extent of woody encroachment in Garry oak and associated ecosystems in British Columbia;
- Impacts of different fire management regimes, or other methods of controlling woody encroachment, on ecosystem components;
- Garry oak regeneration in relation to site characteristics, disturbance history, and stand structure;
- Traditional Ecological Knowledge and traditional landscape management techniques;
- Effectiveness of landscape linkages, buffers, ecological landscaping of institutional grounds, and natural areas management programs on vegetation and target wildlife species;
- Germination and propagation requirements of native plants; and
- Focussed research about species at risk, including research necessary to define critical habitat.

Additional research is required to understand how Garry oak and associated ecosystems function, assess the health of the ecosystems, and thus assist ecosystem recovery. In particular, topics pertaining to essential ecosystem characteristics are priority research topics. Research topics of potential benefit to ecosystem recovery include the following:

- Impacts of patch size, connectivity, and other landscape attributes on species diversity, local extinction processes, dispersal patterns, and other variables;

- Landscape analyses and modeling of ecological processes and historic trends;
- Identity, biology, and ecology of pollinators and seed dispersers;
- Trophic relationships among species;
- Soil processes, including nutrient dynamics, the identity and function of mycorrhizal fungi, the identity and function of soil fauna, and the role of the cryptobiotic crust;
- Impacts of disturbances to hydrological regimes on soil attributes, plant species composition, and other ecosystem components;
- Historic composition of plant communities, prior to changes to the disturbance regime, introductions of exotic species, and other influences that followed European settlement;
- Successional relationships in plant community composition and stand structure, incorporating the use of monitoring plots established at sites that are relatively free of degradation;
- Ecological role of tree cavities and standing dead and downed wood;
- Minimum viable population analysis of selected target wildlife species and the habitat area and spatial relationships of habitat patches required to support the species;
- Oak diseases and tree health assessments; and
- Impacts and management of black-tailed deer (*Odocoileus hemionus*). Deer populations are currently extremely high on southern Vancouver Island with apparent detrimental impacts on native plant species.

Process models should be developed to describe inputs and outputs to ecosystems and identify critical ecological attributes and relationships that influence the processes. Process models also provide the basis for defining quantitative indicators of essential ecosystem characteristics. Models should be developed for processes including:

- Fire and other disturbance regimes;
- Invasions of exotic species;
- Population dynamics of keystone and indicator species, including Garry oaks;
- Trophic interactions, pollination, and dispersal;
- Hydrology; and
- Nutrient cycling.

Research is also required to examine the relationships between climate and ecosystem and species distributions. Investigation of past distributions with paleo-ecological studies, coupled with predictions generated by climate and ecosystem models, can help identify potential distributions of Garry oak and associated ecosystems. Sites outside of the highly urbanized and fragmented zone that are capable of supporting the ecosystems may be identified. Such sites may be suitable for restoration and management for Garry oak ecosystems and possible reintroductions of species at risk. The sites have the potential to be larger and considerably less expensive than those currently occupied by Garry oak and associated ecosystems.

Step E.2. Promote and facilitate research on priority topics.

Research on the priority topics listed above should be promoted and facilitated within the context of this recovery program. Results should be applied to the recovery program where applicable. Research results should also be disseminated to partners in the recovery program.

Suggested actions for completing this step include:

- a. Establish links with universities throughout British Columbia and colleges throughout southeastern Vancouver Island and with federal and provincial research agencies;
- b. Highlight the need for research in Garry oak and associated ecosystems to appropriate academic departments and faculty members at the colleges and universities and agency researchers, and distribute the list of priority research topics;
- c. Identify potential funding sources, such as the Natural Sciences and Engineering Research Council, the Social Sciences and Humanities Research Council, and funds administered by various nongovernmental organizations;
- d. Identify funding gaps in relevant research programs, and highlight these gaps to funding agencies;
- e. Organize procedures for reviewing funding proposals, including considerations of research standards that support the necessary conservation biology research and minimizing potential conflicts of interest;
- f. Review and/or organize outside reviews of research proposals upon request and where appropriate support funding applications for relevant research proposals;
- g. Re-establish and expand the library collection, initiated in 1999, pertaining to Garry oak and associated ecosystems. This collection, housed at the Royal British Columbia Museum until closure of the museum library in 2002, should be housed, expanded and catalogued to provide a comprehensive resource for researchers;
- h. Review research results and recommend adjustment or expansion of the recovery program in accordance with the new information if appropriate; and
- i. Distribute relevant research results to recovery partners.

Strategic Approach F: Communication, coordination, and public involvement.

Ensure that conservation of Garry oak and associated ecosystems is incorporated into agency planning and programs. Develop public awareness of, support for, and participation in recovery activities. Establish extension and public education programs to facilitate and inspire agency and public involvement. Facilitate communication, coordination, and information-sharing among recovery partners to ensure efficient, coordinated delivery of the recovery program.

Step F.1. Establish a communication, coordination, and public involvement recovery action group and prepare a communication, coordination, and public involvement recovery action plan.

Recovery of Garry oak and associated ecosystems, and the many species at risk that inhabit them, will require strong public and agency support and participation as well as effective coordination of public and agency efforts. Development of public and agency support requires that key concepts and information be gathered and developed, and that these be appropriately packaged and disseminated to target audiences. Coordination of public and agency efforts requires that priority activities be identified and communicated to partners, advice and technical support be available, information exchange among partners be facilitated, and that programs be facilitated and tracked as they progress.

Public education and extension efforts related to Garry oak ecosystems are not new. Conservation of Garry oak ecosystems is already a component of extension and public education programs of a number of public and non-profit agencies. The Garry Oak Meadow Preservation Society and many natural history societies, land trusts, conservancies, and other conservation organizations throughout the region organize educational field trips to Garry oak and associated ecosystems, organize lectures related to Garry oak ecosystems, and distribute printed materials about Garry oak ecosystems at public events, shopping malls, and other venues. Parks agencies such as Capital Regional District Parks hold similar public education programs. This District of Saanich has initiated 2 interagency public education projects: the Garry Oak Restoration Project, which is establishing demonstration restoration sites, and the Garry Oak Ecosystems Education Kit Committee, which is producing a Garry oak education kit for schoolteachers and other educators. The 1993 Garry-oak Meadow Colloquium and the 1999 International Garry Oak Meadow Symposium and Community Festival, both held in Victoria, provided vital forums for exchange of information among professional and non-professional delegates. The CDC provides information about the rare species and plant communities of Garry oak ecosystems to planners, consultants, government agencies, and other clients on a daily basis. The BC Ministry of Sustainable Resource Management and Environment Canada are currently engaged in a comprehensive extension program, directed largely at local government planning staff, associated with the Sensitive Ecosystems Inventory. Information about inventory results, conservation guidelines for sensitive ecosystems, and legislative and policy toolboxes is disseminated through publications, workshops, and ongoing technical support.

Despite these many efforts, more needs to be done. Population growth within the region is among the fastest in North America (CRD Regional Planning Services and Westland Resource Group 1999). As a result, urban development continues to extend an ever-greater influence over the remnant stands of natural habitat. Conservation initiatives to date have been insufficient to prevent losses of ecosystems and populations of species at risk.

A number of critical extension activities have already been identified in this strategy. They include:

- Establishing a web-based interface for GIS mapping;
- Publicizing a vision for a protected area network of Garry oak and associated ecosystems;
- Distributing the list of priority sites for protection, including specific values at each site, to governmental and non-governmental agencies;
- Establishing links with Canadian and American programs addressing invasive species;
- Providing information, advice, and ongoing technical support to land managers to encourage management of invasive plants;
- Outreach to garden centres and the general public about the risks of gardening with exotic species;
- Establishing links with agencies involved with management of invasive insects and distributing information about Garry oak ecosystems and species at risk in the ecosystems to those agencies;
- Providing information, advice, and ongoing technical support to land managers regarding the ecological effects of fire exclusion and restoration and management options;
- Developing communications strategies for addressing public concerns about prescribed fire;
- Establishing links with First Nations and distribution of information about Garry oak and associated ecosystems and species at risk in them to the First Nations;
- Publicizing the importance of Garry oak and associated ecosystems for the culture and economy of local First Nations and as a land base for camas harvests and other traditional uses;
- Establishing links with integrated vegetation management programs in other jurisdictions;
- Developing integrated vegetation management programs with watershed-based stewardship groups, Department of Fisheries and Oceans, and local governments for restoration of upland streamside and shoreline habitat as landscape linkages;
- Developing integrated vegetation management programs with managers and stewards of recreational trails and greenways that incorporate management for use as landscape linkages;
- Developing integrated vegetation management programs with managers of hydro and transportation corridors that incorporate management for use as landscape linkages;
- Developing a resident and landowner contact program for restoration and management of buffers for protected areas;
- Developing a stewardship program for managers of institutional grounds;
- Developing a program to promote restoration and ecological management on the part of private landowners and residents throughout the region;
- Developing a stewardship program for managers of public and private natural areas;

- Promoting the use of integrated silviculture approaches to benefit Garry oak and associated ecosystems on woodlots;
- Promoting sector development to ensure an adequate supply of native plants and seeds for restoration and management activities;
- Establishing links with colleges and universities to promote research on priority topics;
- Highlighting gaps in research funding to funding agencies; and
- Developing a resource library pertaining to Garry oak and associated ecosystems.

The need for development and publication of specific extension materials, to be used in conjunction with materials that already exist, has also been identified in this strategy. The materials include:

- Decision-support tool for invasive species management;
- Fact sheets and field manual about invasive species;
- Materials describing traditional use of fire, the ecological effects of fire exclusion, and restoration options;
- Publications about restoration and management of streamside terrestrial habitat that incorporates management for use as landscape linkages;
- Publications about integrated vegetation management of recreational trails and greenways as landscape linkages;
- Best management practices and other publications about integrated vegetation management of hydro and transportation corridors that incorporates management for use as landscape linkages;
- Brochures or booklets for urban, suburban, and rural landowners about the following topics:
 - How (and why) to turn a lawn into a Garry oak meadow;
 - Sources of native plants;
 - How to care for Garry oak trees;
 - Providing habitat for wildlife;
 - The value of standing dead and downed wood;
 - Landscaping to promote acorn dispersal by Steller's jays;
 - Wildlife harassment by dogs, cats, and people; and
 - Invasive plants;
- Field manual about species at risk;
- Guides and templates for mapping and ecological assessment of Garry oak and associated ecosystems for managers of natural areas;
- Guides and templates for management planning and development of restoration and management prescriptions for Garry oak and associated ecosystems;
- Guides and templates for stewardship agreements and conservation covenants for Garry oak and associated ecosystems;
- Guidelines and recommendations for integrated forestry practices on woodlots;
- Information summaries about germination, propagation, and outplanting requirements of native plants; and
- Publication about the comparative costs of native and non-native plants and seeds.

The activities and products outlined above are targeted primarily towards audiences who have a direct hand, or potentially have a hand, in research, restoration, and management activities. Two other major audiences, however, also need to be addressed and emphasized in public education and extension programs for recovery of Garry oak and associated ecosystems. Because local governments hold jurisdiction over land use planning, they play pivotal roles in determining the nature and extent of urban development and consequent habitat loss of Garry oak and associated ecosystems, and hence in the ultimate success or failure of the recovery program. Compelling and cogent information about the value of Garry oak and associated ecosystems, the needs of species at risk, restoration and management options, and protection and stewardship tools must be made available to local governments. A program is also needed to capture public attention, and to galvanize public attention into active support and broad participation in Garry oak conservation efforts. Such public support could stimulate and reinforce efforts of local governments to incorporate Garry oak conservation into land-use policies and practices.

Step F.2. Develop and implement an extension program directed towards local governments throughout the range of Garry oak and associated ecosystems.

A program should be developed to ensure that local governments receive ecological information about Garry oak and associated ecosystems and the resident species at risk, that specific pertinent information is communicated to local governments when relevant to the planning process, that conservation policies and regulations are followed, and that ongoing technical support is available to local governments for use in local land-use planning.

Suggested actions for completing this step include:

- a. Consult with elected representatives and planning staff from local governments to determine their information needs and how best to meet those needs;
- b. Develop publications for local governments including:
 - Model policies for regional growth strategies, official community plans, development permit area requirements, development permit information, engineering standards, and tree protection bylaws;
 - Best management practices for land use planning in Garry oak and associated ecosystems; and
 - Best management practices for minimizing ecological damage from construction activities in Garry oak and associated ecosystems.
- c. Compile information specific to each jurisdiction such as:
 - Mapped occurrences of Garry oak and associated ecosystems within each jurisdiction;
 - Mapped occurrences of species at risk, their biology and ecology, and protection needs; and
 - TEM and wildlife habitat mapping results when available.

- d. Distribute information including information listed above and other information about Garry oak and associated ecosystems to elected representatives and local government staff;
- e. Offer workshops and information sessions for elected representatives and local government staff;
- f. Stay abreast of the planning and development process throughout the region and ensure that information is presented at the appropriate forums at each stage of the process, including:
 - Regional Growth Strategies;
 - Official Community Plans;
 - Development Permit Applications;
 - Subdivision applications;
 - Rezoning applications; and
 - Relevant bylaws.
- g. Monitor adherence to policies and regulations with respect to Garry oak and associated ecosystems by local governments and local government staff. Efforts should be coordinated with the Garry Oak Meadow Preservation Society, and various natural history societies, conservancies, stewardship groups, neighbourhood associations, and other groups that also serve this function; and
- h. Provide information relevant to protection of Garry oak and associated ecosystems to ratepayers and neighbourhood associations, schools, and others with direct interests in local development issues.

Step F.3. Develop and implement a public education program about Garry oak and associated ecosystems and the associated species at risk.

A program is needed to inspire in the general public an appreciation for Garry oak and associated ecosystems and the associated species at risk. This program would attempt to instil a commitment to conservation and motivate positive action towards protection and recovery of the ecosystems and species. Some components of the program would target specific constituencies, such as students, homebuyers, tourists, and the public at large.

Suggested actions for completing this step include:

- a. Develop and implement a survey to assess public interest in, and awareness about, Garry oak and associated ecosystems. Results will be used to define and develop priority actions and approaches for raising public awareness. A follow-up survey at a later stage of the recovery program will provide critical information for gauging the effectiveness of the public education activities.
- b. Develop a promotional logo, theme, and mascot encapsulating conservation of Garry oak and associated ecosystems;
- c. Establish a panel of celebrities to endorse and promote recovery of Garry oak and associated ecosystems;
- d. Develop a media strategy including activities such as:
 - Establish a web page;
 - Issue press releases;

- Write and solicit articles for newspapers, magazines, and newsletters of non-governmental organizations, community associations, and other organizations;
 - Solicit radio and television interviews and reports;
 - Produce and distribute posters and brochures displaying the promotional logo, theme, and mascot;
 - Develop displays for use at community events, malls, and other public venues; and
 - Produce slide shows, videos, and films and organize venues for public viewing.
- e. Develop a communications network of community groups for disseminating educational and promotional materials, mobilizing volunteer assistance, and other functions. Community groups of potential interest include:
- Natural history societies;
 - Land trusts and conservancies;
 - Stewardship groups;
 - Neighbourhood and ratepayers associations;
 - Service clubs;
 - Scouts and guides; and
 - Garden clubs, botanical societies, and native plant societies.
- f. Organize, or encourage others to organize, indoor and outdoor educational activities such as:
- Field trips and site tours;
 - Native plant demonstration gardens and workshops on gardening with native plants;
 - Public lectures;
 - Community festivals; and
 - Displays and signage at indoor and outdoor public facilities.
- g. Maintain a list of agencies requesting volunteer help and provide this information to individuals wishing to contribute volunteer time upon request;
- h. Facilitate the establishment of groups to monitor and advocate on behalf of protected areas of Garry oak and associated ecosystems. A number of groups, including the Mount Tolmie Conservancy Association, the Hornby Island Conservancy, the Friends of Ecological Reserves, and the Friends of Beacon Hill, John Dean, Knockan Hill, Summit, and Mt. Douglas Parks, currently serve these functions for some protected areas.
- i. Encourage naturalists and other members of the general public to look for species at risk and establish a form on GOERT website for input of observation information;
- j. Work with industry representatives to develop marketing strategies specific to different sectors, such as:
- Tourism: Garry oak and associated ecosystems should be promoted for their general scenic values. Specific sites should also be promoted as targeted tourist destinations. Maps, brochures, and other materials should be prepared and distributed; and
 - Real estate and development: Ecologically sensitive design should be promoted within the development sector and to the home-buying

- public. Research results documenting higher real estate values with proximity to natural areas (Curran and Draeseke 2000) should be publicized to local governments, industry, and the general public.
- k. Develop indoor and outdoor educational programs for children. Tasks include:
- Develop educational curricula and materials, such as the Garry Oak Ecosystem Education Kit initiated by the District of Saanich;
 - Distribute curricula and materials to teachers and environmental educators; and
 - Organize projects, workshops, theatre performances, and other events for school classes, parks agencies, and others.

Step F.4. Improve communication and information-sharing among those involved in conservation of Garry oak and related ecosystems in British Columbia and elsewhere.

Exchanges of ideas and information are vital for stimulating interest among those involved with recovery activities. Such exchanges also help ensure that programs integrate the best available information, and provide fertile ground for development of creative new solutions to conservation problems. The scope of this recovery strategy is limited to the Canadian range of Garry oaks, but Garry oak ecosystems do not stop at the border. Considerable research and management effort has been, and continues to be, applied to the ecosystems and the component species at risk in the United States. Communication, cooperation, and information-sharing activities should be extended to individuals and agencies in the United States as well as in Canada.

Suggested actions required for completing this step include:

- a. Hold symposia every other year to discuss the progress of the recovery program in Canada, research and management developments in the United States, and other topics of interest;
- b. Organize an ongoing speaker and workshop series to discuss topics related to Garry oak and associated ecosystems and species at risk from the ecosystems;
- c. Establish a list-serve for discussion of issues related to recovery of Garry oak and associated ecosystems and the species at risk in them; and
- d. Establish a newsletter, using electronic or print media, focussed on Garry oak and associated ecosystems. GOERT currently distributes an infrequent email newsletter to a few hundred people.

Step F.5. Establish an organizational structure to efficiently and effectively implement the recovery program.

Implementation of the recovery program outlined in this strategy will be a demanding and complex enterprise. It will require the active participation of dozens of agency partners (Sections III and IV and Appendix 6) as well as individuals from the general public. Recovery action groups must be formed

and recovery action plans written. Funding must be secured for program components (Section III and Appendix 7), activities must be coordinated, and information and technical support must be available to program partners. Extension and public education activities require ongoing outreach to target audiences.

Program leadership should be built upon the wealth of experience of a broad-based team. GOERT has provided this kind of leadership to recovery planning since its inception in 1999, and is the appropriate body to continue with the implementation phase of the recovery program. GOERT's membership currently includes 22 individuals representing 1 municipal, 1 regional, 3 provincial, and 3 federal agencies, 1 regional district board, 1 First Nation, 10 non-governmental organizations, 2 academic institutions, and 3 private enterprises. Ideally, greater representation from local governments and from First Nations would be included. Overall, however, GOERT embodies the broad range of expertise that can infuse the program with the inclusive and dynamic leadership required. GOERT will be the scientific authority behind the recovery program and will be responsible for overseeing the implementation program.

The program will also require dedicated staff to manage day-to-day operations. Two positions are required for effective implementation. A program coordinator is required to provide day-to-day leadership, technical support, and administration for the program. The coordinator will facilitate the organization of recovery action groups and production of recovery action plans, assist delivery partners with funding issues, review proposals and program reports, and evaluate the recovery program on an annual basis. The public involvement and extension specialist will be responsible for implementation of the outreach programs and will serve as the point of public contact for the recovery program.

Because GOERT is not a legal entity, it is unable to enter into contracts or administer financial transactions. Program partners will be required to administer their financial affairs. A delivery partner or partners will administer the management of the recovery program itself. The Garry Oak Meadow Preservation Society has administered the finances of the recovery team to date, and will likely continue in this role for all or part of the recovery program.

Suggested actions for completing this step include:

- a. Invite participation on the GOERT team from local government and First Nations representatives. Invitations have previously been extended, but ongoing contact and invitations to participate should be extended. Funding may need to be secured to cover travel costs for participants from out of town;
- b. Establish policies and protocols for the organizational structure. Policies and protocols must be developed to define the roles and responsibilities of GOERT, RAGs, and partner agencies. Considerations to be addressed include the following:

- Definition of relative roles and responsibilities of GOERT, RAGs, and partner agencies with respect to decision-making, accountability, raising and administration of funds, and other issues;
 - Determination of appropriate delivery partners (see Sections III and IV for suggested partners and Appendix 6 for contact information); and
 - Procedure for establishment of formal links with partner agencies, including statements indicating support for the recovery strategy and program.
- c. Develop a prospectus for the recovery strategy and recovery program;
 - d. Establish formal links with partner agencies;
 - e. Establish web-based access for members of the recovery team, recovery action groups, and partner agencies to recovery program meeting agendas, meeting minutes, reports, and other program materials and documents;
 - f. Develop a strategic financial plan, including budgets and resource-raising strategies, for program administration and for recovery activities in cooperation with other RAGs defined in the recovery strategy (see Section III for preliminary cost estimates and Appendix 7 for potential funding sources). A business plan approach to budgeting will be used. A consistent, structured format, which will relate budget line items through to actions and objectives, will be used to develop and integrate budgets for all projects;
 - g. Develop recovery program performance indicators, such as
 - Evaluation of goals, objectives, strategic approaches, and activities in relation to new information;
 - Establishment of RAGs, development of RAPs, and completion of actions within timelines proposed in the strategy; and
 - Description and analysis of public and agency participation in the recovery program, including in-kind and contributed financial resources.
 - h. Produce annual report including information summaries from the scientific literature and ongoing research, and program evaluation in relation to performance indicators;
 - i. Establish and fill the position of program coordinator for implementation of the recovery program; and
 - j. Establish and fill the position of public involvement and extension specialist.

Section III. Priorities, Potential Partners, and Preliminary Cost Estimates

Potential partners are suggestions only. No commitment on the part of the potential partners is implied. Participation of organizations not listed in this table is welcome and encouraged. Because the provincial government is undergoing restructuring at this time, information listed here pertaining to provincial agencies may not be current.

Dollar figures are preliminary cost estimates only. Recovery action groups will develop business plans including more detailed budgets.

Strategic Approach	Specific Step	Priority	Potential Partners¹	5-year cost estimate (x \$10000), program administration	5-year cost estimate (x \$1,000), program actions
A. Inventory, mapping and plant communities	A.1. Establish inventory, mapping, and plant communities RAG and produce inventory, mapping, and plant communities RAP	urgent	CDC CWS GOERT MOF MSRM RBCM WWHI	10 + 5/year = 35	
	A.2. Develop standardized plant community classification	urgent	CDC experts GOERT MOF MSRM		15
	A.3. Establish GIS database	urgent	CDC CRD GOERT MSRM		100 + 10/year = 150

Strategic Approach	Specific Step	Priority	Potential Partners¹	5-year cost estimate (x \$10000), program administration	5-year cost estimate (x \$1,000), program actions
	A.4. Conduct detailed ecosystem inventory and mapping	urgent	CDC GOERT MOF MSRM WWHI		120
	A.5. Analyze site and vegetation data and report results	urgent	CDC experts GOERT grad student MOF MSRM		50
	A.6. Conduct wildlife habitat mapping for a set of selected indicator species and species at risk	necessary	CDC CWS experts GOERT MSRM RBCM WWHI		30
	A.7. Map and analyze historical occurrences of Garry oak and associated ecosystems	beneficial	GOERT MSRM WWHI		50
	A.8. Map attributes of the adjacent natural and developed landscape	necessary	GOERT MSRM WWHI		10

Strategic Approach	Specific Step	Priority	Potential Partners¹	5-year cost estimate (x \$10000), program administration	5-year cost estimate (x \$1,000), program actions
B. Protection of ecosystems and essential ecosystem characteristics	B.1. Establish conservation planning and site protection RAG and produce conservation planning and site protection RAP	urgent	CDC CRD Parks CWS GOERT HCTF ITF MSRM NGOs PCA PPAB	10 + 5/year = 35	
	B.2. Prepare interim list of at least 10 priority sites for protection	urgent	CDC CRD Parks CWS GOERT HCTF ITF MSRM NGOs PCA PPAB		30 + 5/year = 55

Strategic Approach	Specific Step	Priority	Potential Partners ¹	5-year cost estimate (x \$10000), program administration	5-year cost estimate (x \$1,000), program actions
	B.3. Work towards the expansion of the network of protected areas and securement of at least 10 priority sites within 5 years	urgent	CDC CRD Parks CWS GOERT HCTF ITF MSRM NGOs PCA PPAB		15,000
	B.4. Develop GIS-based prioritization methodology and site list	necessary	CDC CRD Parks CWS GOERT grad student HCTF ITF MSRM NCC PCA PPAB		50

Strategic Approach	Specific Step	Priority	Potential Partners¹	5-year cost estimate (x \$10000), program administration	5-year cost estimate (x \$1,000), program actions
C. Restoration and management of protected areas, landscape linkages, buffers, and the general landscape	C.1. Establish restoration and management RAG and develop restoration and management RAP	urgent	CRD Parks DND GOERT ITF municipalities NGOs PCA PCC PPAB RDs RNS	10 + 5/year = 35	
	C.2. Establish a research and management program to address invasive species of Garry oak and associated ecosystems	urgent	AAC BB CFS colleges CRD Parks CWS DND GOERT IPM ITF MAFF MOF PCA PPAB RNS SFU UBC UVIC		300/year = 1,500

Strategic Approach	Specific Step	Priority	Potential Partners ¹	5-year cost estimate (x \$10000), program administration	5-year cost estimate (x \$1,000), program actions
	C.3. Establish research and management program to address fire and stand dynamics in Garry oak and associated ecosystems	urgent	BB CFS colleges CRD Parks CWS DND GOERT ITF MOF PCA PPAB RNS SFU UBC UVIC		100/year = 500
	C.4. Support First Nations Traditional Ecological Knowledge research and management programs	necessary	colleges CWS FN GOERT HCTF RBCM RNS SFU UBC UVIC		50/year = 250

Strategic Approach	Specific Step	Priority	Potential Partners ¹	5-year cost estimate (x \$10000), program administration	5-year cost estimate (x \$1,000), program actions
	C.5. Establish a network of landscape linkages to connect protected areas of Garry oak and associated ecosystems with each other and with other ecosystems	necessary	BC Hydro colleges CRD Parks ENR FOC GOERT ITF MOTH municipalities NGOs PCA PCC PPAB RDs RNS		45 + 10/year = 95
	C.6. Establish buffers for protected areas of Garry oak and associated ecosystems	necessary	colleges CRD Parks GOERT ITF municipalities Naturescape BC NGOs PCA PPAB PCC RNS SFU UBC UVIC		120 + 10/year = 170

Strategic Approach	Specific Step	Priority	Potential Partners¹	5-year cost estimate (x \$10000), program administration	5-year cost estimate (x \$1,000), program actions
	C.7. Encourage restoration and ecosystem management of institutional grounds	beneficial	colleges DND GOERT Greening Schoolgrounds Naturescape BC NGOs PCC RNS SFU UBC UVIC		10/year = 50
	C.8. Encourage general restoration of urban, suburban, agricultural, and other rural properties throughout the region	beneficial	colleges GOERT Naturescape BC NGOs PCC RNS SFU UBC UVIC		10/year = 50

Strategic Approach	Specific Step	Priority	Potential Partners¹	5-year cost estimate (x \$10000), program administration	5-year cost estimate (x \$1,000), program actions
	C.9. Establish a stewardship program for managers of public and private natural areas	urgent	CDC colleges CRD Parks DND GOERT Naturescape BC NGOs PCA PCC PPAB RNS SFU UBC UVIC		50 + 10/year = 100
	C.10. Promote the use of integrated silviculture approaches on woodlots to benefit Garry oak and associated ecosystems where appropriate	beneficial	GOERT MOF MSRM		15

Strategic Approach	Specific Step	Priority	Potential Partners¹	5-year cost estimate (x \$10000), program administration	5-year cost estimate (x \$1,000), program actions
	C.11. Promote the development of an adequate supply of native plants for restoration and management activities	necessary	AAC botanical gardens CFS colleges GOERT growers herbaria MAFF MCSE NPSBC RBCM RNS SFU UBC UVIC		100/year = 500
D. Protection and recovery of species at risk	D.1. Establish a plants at risk RAG and develop a plants at risk RAP	urgent	BB CDC CRD Parks CWS experts GOERT herbaria PCA PPAB RBCM	10 + 5/year = 35	

Strategic Approach	Specific Step	Priority	Potential Partners¹	5-year cost estimate (x \$10000), program administration	5-year cost estimate (x \$1,000), program actions
	D.2. Complete, or encourage or assist COSEWIC to complete as appropriate, status reports for all plants at risk that are not yet the subject of status reports, and ensure that appropriate status reports are submitted to COSEWIC for evaluation	urgent	BB CDC COSEWIC CRD Parks CWS experts GOERT herbaria PCA PPAB RBCM		340
	D.3. Complete recovery plans, including definition of critical habitat if sufficient information is available or schedule of studies to enable such definition if insufficient information is available, for plants at risk	urgent	BB CDC CRD Parks CWS experts GOERT herbaria PCA PPAB RBCM		490

Strategic Approach	Specific Step	Priority	Potential Partners ¹	5-year cost estimate (x \$10000), program administration	5-year cost estimate (x \$1,000), program actions
	D.4. Initiate recovery actions, including inventory, research, threat abatement, habitat protection, habitat enhancement, propagation, re-introductions, and other measures as appropriate, for plants at risk	urgent	BB CDC CRD Parks CWS experts GOERT herbaria PCA PPAB RBCM		To be determined
	D.5. Establish seed bank program for plant species at risk	beneficial	BB CBGCB CDC CRD Parks CWS experts GOERT herbaria PCA PPAB RBCM		To be determined
	D.6. Establish an invertebrates at risk RAG and prepare an invertebrates at risk RAP	urgent	BB CDC CWS experts GOERT PCA RBCM	10 + 5/year = 35	

Strategic Approach	Specific Step	Priority	Potential Partners ¹	5-year cost estimate (x \$10000), program administration	5-year cost estimate (x \$1,000), program actions
	D.7. Complete, or encourage or assist COSEWIC to complete as appropriate, status reports for all invertebrates at risk that are not yet the subject of status reports, and ensure that appropriate status reports are submitted to COSEWIC for evaluation	urgent	BB CDC COSEWIC CWS experts GOERT PCA RBCM		120
	D.8. Complete recovery plans, including definition of critical habitat if sufficient information is available or schedule of studies to enable such definition if insufficient information is available, for invertebrates at risk	urgent	BB CDC CWS experts GOERT PCA RBCM		150
	D.9. Initiate recovery actions, including inventory, research, threat abatement, habitat protection, habitat enhancement, captive breeding, re-introductions, and other measures as appropriate, for invertebrates at risk	urgent	BB CDC CWS experts GOERT PCA RBCM		To be determined
	D.10. Establish a vertebrates at risk RAG and prepare an invertebrates at risk RAP	urgent	BB CDC CWS experts GOERT PCA RBCM	10 + 5/year = 35	

Strategic Approach	Specific Step	Priority	Potential Partners¹	5-year cost estimate (x \$10000), program administration	5-year cost estimate (x \$1,000), program actions
	D.11. Complete, or encourage or assist COSEWIC to complete as appropriate, status reports for all vertebrates at risk that are not yet the subject of status reports, and ensure that appropriate status reports are submitted to COSEWIC for evaluation	urgent	BB CDC COSEWIC CWS experts GOERT PCA RBCM		40
	D.12. Complete recovery plans, including definition of critical habitat if sufficient information is available or schedule of studies to enable such definition if insufficient information is available, for vertebrates at risk	urgent	BB CDC CWS experts GOERT PCA RBCM		50
	D.13. Initiate recovery actions, including inventory, research, threat abatement, habitat protection, habitat enhancement, captive breeding, re-introductions, and other measures as appropriate, for vertebrates at risk	urgent	BB CDC CWS experts GOERT PCA RBCM		To be determined

Strategic Approach	Specific Step	Priority	Potential Partners¹	5-year cost estimate (x \$10000), program administration	5-year cost estimate (x \$1,000), program actions
E. Research	E.1. Establish a research RAG and prepare a research RAP	necessary	BB CWS GOERT RBCM RB,MOF RNS SFU UBC UVIC	10 + 5/year = 35	
	E.2. Promote and facilitate research on priority topics	necessary	BB CWS GOERT RBCM RB,MOF RNS SFU UBC UVIC		To be determined
F. Communication, coordination, and public involvement	F.1. Establish communication, coordination, and public involvement RAG and prepare communication, coordination, and public involvement RAP	urgent	GOERT IT municipalities NGOs PCC RDs SEI	10 + 5/year = 35	

Strategic Approach	Specific Step	Priority	Potential Partners ¹	5-year cost estimate (x \$10000), program administration	5-year cost estimate (x \$1,000), program actions
	F.2. Develop and implement extension program directed towards local governments throughout the range of Garry oak and associated ecosystems	urgent	GOERT IT municipalities NGOs PCC RDs SEI		30
	F.3. Develop and implement public education program about Garry oak and associated ecosystems and the associated species at risk	urgent	environmental educators GEEK GOERT GORP MCSE NGOs PCC RBCM Real Estate Board of BC teachers Tourism Victoria Wild BC		80 + 20/year = 180
	F.4. Improve communication and information-sharing among those involved in conservation of Garry oak and related ecosystems in British Columbia and elsewhere	necessary	GOERT		50/year = 250
	F.5. Establish an organizational structure to efficiently and effectively implement the recovery program	urgent	GOERT	210/year = 1050	

¹Abbreviations used in this table are:

AAC	Agriculture and Agri-food Canada
BB	Biodiversity Branch, BC Ministry of Water, Land and Air Protection
CBGCB	Canadian Botanical Gardens Consortium for Biodiversity
CDC	BC Conservation Data Centre, BC Ministry of Sustainable Resource Management
CFS	Canadian Forest Service
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
CRD	Capital Regional District
CRD Parks	Capital Regional District Parks
CWS	Canadian Wildlife Service
DND	Department of National Defence
ENR	Esquimalt & Nanaimo Railway
FN	First Nations
FOC	Fisheries and Oceans Canada
GEEK	Garry Oak Ecosystems Education Kit Committee of the District of Saanich
GOERT	Garry Oak Ecosystems Recovery Team
GORP	Garry Oak Restoration Project of the District of Saanich
HCTF	Habitat Conservation Trust Fund
IPM	Integrated Pest Management, BC Ministry of Water, Land and Air Protection
IT	Islands Trust
ITF	Islands Trust Fund
MAFF	BC Ministry of Agriculture, Food and Fisheries
MOF	BC Ministry of Forests
MOTH	BC Ministry of Transportation
MCSE	BC Ministry of Competition, Science and Enterprise
MSRM	BC Ministry of Sustainable Resource Management
NCC	Nature Conservancy of Canada
NGOs	Non-governmental organizations, including the Garry Oak Meadow Preservation Society, conservancies, land trusts, natural history societies, stewardship groups, and others
NPSBC	Native Plant Society of British Columbia
PCA	Parks Canada Agency
PCC	Provincial Capital Commission
PPAB	Parks and Protected Areas Branch, BC Ministry of Water, Land and Air Protection
RB,MOF	Research Branch, BC Ministry of Forests
RBCM	Royal British Columbia Museum

RDs Regional Districts
RNS Restoration of Natural Systems program, University of Victoria
SEI Sensitive Ecosystems Inventory
SFU Simon Fraser University
UBC University of British Columbia
UVIC University of Victoria
WWHI Wildlife and Wildlife Habitat Inventory, BC Ministry of Sustainable Resource Management

Section V. Implementation Schedule

Strategic Approach	Specific Step	Year 1	Year 2	Year 3	Year 4	Year 5
A. Inventory, mapping and plant communities	A.1. Establish inventory, mapping, and plant communities RAG and produce inventory, mapping, and plant communities RAP	establish RAG complete RAP	ongoing RAG	ongoing RAG	ongoing RAG	ongoing RAG
	A.2. Develop standardized plant community classification	plan complete preliminary assessment	use and test existing and/or new classification units	use and test existing and/or new classification units	define standardized classification system	
	A.3. Establish GIS database	plan establish host develop architecture begin integration of existing data	complete integration of existing data ongoing maintenance	ongoing maintenance	ongoing maintenance	ongoing maintenance
	A.4. Conduct detailed ecosystem inventory and mapping	plan begin	ongoing	complete		

Strategic Approach	Specific Step	Year 1	Year 2	Year 3	Year 4	Year 5
	A.5. Analyze site and vegetation data and report results			plan begin	ongoing	complete
	A.6. Conduct wildlife habitat mapping for a set of selected indicator species and species at risk	plan begin	ongoing	complete		
	A.7. Map and analyze historical occurrences of Garry oak and associated ecosystems		plan begin complete			
	A.8. Map attributes of the adjacent landscape, including both natural and developed areas		planning begin complete			
B. Protection of ecosystems and essential ecosystem characteristics	B.1. Establish conservation planning and site protection RAG and produce conservation planning and site protection RAP	establish RAG complete RAP	ongoing RAG	ongoing RAG	ongoing RAG	ongoing RAG
	B.2. Prepare interim list of at least 10 priority sites for protection	complete first list	update	update	update	update
	B.3. Work towards the expansion of the network of protected areas and securement of at least 10 priority sites within 5 years	develop and publicize vision, site list, and strategies protect 2 sites	protect 2 sites	protect 2 sites	protect 2 sites	protect 2 sites

Strategic Approach	Specific Step	Year 1	Year 2	Year 3	Year 4	Year 5
	B.4. Develop GIS-based prioritization methodology and site list			plane begin	continue	complete
C. Restoration and management of protected areas, wildlife landscape linkages, buffers, and the general landscape	C.1. Establish restoration and management RAG and develop restoration and management RAP	establish RAG complete RAP	ongoing RAG	ongoing RAG	ongoing RAG	ongoing RAG
	C.2. Establish a research and management program to address invasive species of Garry oak and associated ecosystems	establish steering committee complete background review, develop decision-support tool, begin fact sheets and field guide plan research & adaptive management	begin research & adaptive management complete fact sheets and field guide begin general outreach & extension ongoing invertebrate extension program	ongoing research & adaptive management ongoing general outreach & extension	ongoing research & adaptive management ongoing general outreach & extension	ongoing research & adaptive management ongoing general outreach & extension

Strategic Approach	Specific Step	Year 1	Year 2	Year 3	Year 4	Year 5
	C.3. Establish research and management program to address fire and stand dynamics in Garry oak and associated ecosystems	<p>establish steering committee</p> <p>complete literature review and predictive model</p> <p>begin assessment of encroachment</p> <p>produce extension materials</p> <p>plan extension program</p>	<p>complete assessment of encroachment</p> <p>construct stand model</p> <p>plan adaptive management</p> <p>begin research & extension</p>	ongoing adaptive management, research & extension	ongoing adaptive management, research & extension	ongoing adaptive management, research & extension
	C.4. Support First Nations Traditional Ecological Knowledge research and management programs	<p>establish links</p> <p>distribute information to First Nations & others</p> <p>plan research & management program</p>	begin	ongoing	ongoing	ongoing

Strategic Approach	Specific Step	Year 1	Year 2	Year 3	Year 4	Year 5
	C.5. Establish a network of landscape linkages to connect protected areas of Garry oak and associated ecosystems with each other and with other ecosystems	designate targets establish links initiate consultations begin publications	complete publications begin extension program develop management plans plan adaptive management	ongoing extension & adaptive management	ongoing extension & adaptive management	ongoing extension & adaptive management
	C.6. Establish buffers for protected areas of Garry oak and associated ecosystems	designate targets begin publications plan contacts	complete publications begin extension program plan adaptive management	ongoing extension & adaptive management	ongoing extension & adaptive management	ongoing extension & adaptive management

Strategic Approach	Specific Step	Year 1	Year 2	Year 3	Year 4	Year 5
	C.7. Encourage restoration and ecosystem management of institutional grounds	designate targets begin publications plan contacts	complete publications begin extension program develop management plans plan adaptive management	ongoing extension & adaptive management	ongoing extension & adaptive management	ongoing extension & adaptive management
	C.8. Encourage general restoration of urban, suburban, agricultural, and other rural properties throughout the region	plan contacts	begin extension program	ongoing extension program	ongoing extension program	ongoing extension program
	C.9. Establish a stewardship program for managers of public and private natural areas	establish links begin guides and templates begin field manual plan extension program	complete guides and templates complete field manual begin extension program plan adaptive management	ongoing extension & adaptive management program	ongoing extension & adaptive management program	ongoing extension & adaptive management program

Strategic Approach	Specific Step	Year 1	Year 2	Year 3	Year 4	Year 5
	C.10. Promote the use of integrated silviculture approaches on woodlots to benefit Garry oak and associated ecosystems where appropriate		assess potential develop guidelines	begin extension program	ongoing extension program	ongoing extension program
	C.11. Promote the development of an adequate supply of native plants for restoration and management activities	establish steering committee compile information plan research & development & strategy for grower support develop ethical guidelines	produce public education materials begin research & development, grower support program, & public education	ongoing research & development, grower support program, & public education	ongoing research & development, grower support program, & public education	ongoing research & development, grower support program, & public education
D. Protection and recovery of species at risk	D.1. Establish a plants at risk RAG and develop a plants at risk RAP	establish RAG complete RAP	ongoing RAG	ongoing RAG	ongoing RAG	ongoing RAG
	D.2. Complete, or encourage or assist COSEWIC to complete as appropriate, status reports for all plants at risk that are not yet the subject of status reports, and ensure that appropriate status reports are submitted to COSEWIC for evaluation	complete 22	complete 12			

Strategic Approach	Specific Step	Year 1	Year 2	Year 3	Year 4	Year 5
	D.3. Complete recovery plans, including definition of critical habitat if sufficient information is available or schedule of studies to enable such definition if insufficient information is available, for plants at risk	begin	complete 18	complete 18	complete 13	
	D.4. Initiate recovery actions, including inventory, research, threat abatement, habitat protection, habitat enhancement, propagation, re-introductions, and other measures as appropriate, for plants at risk		begin	ongoing	ongoing	ongoing
	D.5. Establish seed bank program for plant species at risk	plan and begin	complete 18	complete 18	complete 13	
	D.6. Establish an invertebrates at risk RAG and prepare an invertebrates at risk RAP	establish RAG complete RAP	ongoing RAG	ongoing RAG	ongoing RAG	ongoing RAG

Strategic Approach	Specific Step	Year 1	Year 2	Year 3	Year 4	Year 5
	D.7. Complete, or encourage or assist COSEWIC to complete as appropriate, status reports for all invertebrates at risk that are not yet the subject of status reports and ensure that appropriate status reports are submitted to COSEWIC for evaluation	complete 6	complete 6			
	D.8. Complete recovery plans, including definition of critical habitat if sufficient information is available or schedule of studies to enable such definition if insufficient information is available, for invertebrates at risk	begin	complete 9	complete 4	complete 2	
	D.9. Initiate recovery actions, including inventory, research, threat abatement, habitat protection, habitat enhancement, captive breeding, re-introductions, and other measures as appropriate, for invertebrates at risk		begin	ongoing	ongoing	ongoing
	D.10. Establish a vertebrates at risk RAG and prepare an invertebrates at risk RAP	establish RAG complete RAP	ongoing RAG	ongoing RAG	ongoing RAG	ongoing RAG

Strategic Approach	Specific Step	Year 1	Year 2	Year 3	Year 4	Year 5
	D.11. Encourage or assist COSEWIC to complete status reports for all vertebrates at risk that are not yet the subject of status reports and ensure that status reports are submitted to COSEWIC for evaluation	complete 2	complete 2			
	D.12. Complete recovery plans, including definition of critical habitat if sufficient information is available or schedule of studies to enable such definition if insufficient information is available, for vertebrates at risk	begin	complete 2	complete 3		
	D.13. Initiate recovery actions, including inventory, research, threat abatement, habitat protection, habitat enhancement, captive breeding, re-introductions, and other measures as appropriate, for vertebrates at risk		begin	ongoing	ongoing	ongoing
E. Research	E.1. Establish a research RAG and prepare a research RAP	establish RAG complete RAP	ongoing RAG	ongoing RAG	ongoing RAG	ongoing RAG

Strategic Approach	Specific Step	Year 1	Year 2	Year 3	Year 4	Year 5
	E.2. Promote and facilitate research on priority topics	establish links distribute topics identify funding sources and gaps organize review procedures re-establish and expand library	ongoing promotion, review of proposals, library review research results	ongoing promotion, review of proposals, library review research results	ongoing promotion, review of proposals, library review research results	ongoing promotion, review of proposals, library review research results
F. Communication, coordination, and public involvement	F.1. Establish communication, coordination, and public involvement RAG and prepare communication, coordination, and public involvement RAP	establish RAG complete RAP	ongoing RAG	ongoing RAG	ongoing RAG	ongoing RAG

Strategic Approach	Specific Step	Year 1	Year 2	Year 3	Year 4	Year 5
	F.2. Develop and implement extension program directed towards local governments throughout the range of Garry oak and associated ecosystems	consult with local governments begin publications compile information plan & begin extension program	complete publications ongoing extension program	ongoing extension program	ongoing extension program	ongoing extension program

Strategic Approach	Specific Step	Year 1	Year 2	Year 3	Year 4	Year 5
	F.3. Develop and implement public education program about Garry oak and associated ecosystems and the associated species at risk	develop and conduct initial survey develop logo, theme, mascot establish celebrity panel develop media strategy begin production of educational materials develop communications network begin public education program	complete production of educational materials ongoing public education program	ongoing public education program	ongoing public education program	ongoing public education program conduct follow-up survey

Strategic Approach	Specific Step	Year 1	Year 2	Year 3	Year 4	Year 5
	F.4. Improve communication and information-sharing among those involved in conservation of Garry oak and related ecosystems in British Columbia and elsewhere	begin speaker and workshop series establish list-serve establish newsletter	ongoing speaker and workshop series, list-serve, & newsletter hold symposium	ongoing speaker and workshop series, list-serve, & newsletter	ongoing speaker and workshop series, list-serve, & newsletter hold symposium	ongoing speaker and workshop series, list-serve, & newsletter

Strategic Approach	Specific Step	Year 1	Year 2	Year 3	Year 4	Year 5
	<p>F.5. Establish an organizational structure to efficiently and effectively implement the recovery program</p>	<p>contact local governments & First Nations</p> <p>establish policies, protocols, performance indicators, web-based information exchange, & formal links with partner agencies</p> <p>develop prospectus & strategic financial plan</p> <p>hire program coordinator & extension specialist</p> <p>produce annual report</p>	<p>ongoing program coordinator & extension specialist</p> <p>produce annual report</p>	<p>ongoing program coordinator & extension specialist</p> <p>produce annual report</p>	<p>ongoing program coordinator & extension specialist</p> <p>produce annual report</p>	<p>ongoing program coordinator & extension specialist</p> <p>produce annual report</p>

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Lead Organizations Responsible for Recovery:

Environment Canada

Contact :

Michael Dunn
Acting Head, Species at Risk Section
Canadian Wildlife Service, Pacific and Yukon Region, Environment Canada
Pacific Wildlife Research Centre
RR1, 2421 Robertson Road
Delta, BC V4K 3N2
phone: (604) 940-4658
fax: (604) 946-7022
email: Michael.Dunn@ec.gc.ca

BC Ministry of Water, Land and Air Protection

Contact:

David F. Fraser
Endangered Species Specialist
Biodiversity Branch, BC Ministry of Water, Land and Air Protection
Box 9374, Stn. Prov. Govt.
Victoria, B.C.V8W 9M4
phone: (250) 387-9756
fax: (250) 356-9145
email: Dave.Fraser@gems8.gov.bc.ca

Prepared by:

Marilyn A. Fuchs
Chair & Program Coordinator, Garry Oak Ecosystems Recovery Team
202-22 Bastion Square
Victoria, BC V8W 1H9
phone: (250) 383-3224
fax: (250) 479-0546
email: marilyn.fuchs@goert.ca

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Appendix 1

Species at Risk in Garry Oak and Associated Ecosystems

Species in this table from Fuchs (2001), updated based upon new ecological information and changes in ranks and listings subsequent to publication of that report. See Appendix 2 for explanations of ranks and listings.

Latin Name	Common Name	COSEWIC Status	Provincial Rank and Listing	Global Rank	Species-level planning included in this strategy?
Mosses					
<i>Bartramia stricta</i>	Rigid apple moss	Endangered	S1-Red	G?	Yes
<i>Tortula laevipila</i> var. <i>meridionalis</i>	Twisted moss sp.		S1-Red	G?T?	Yes
Vascular Plants					
<i>Agrostis pallens</i>	Dune bentgrass		S2-S3-Blue	G4G5	No
<i>Alopecurus carolinianus</i>	Carolina meadow foxtail		S2-Red	G5	Yes
<i>Balsamorhiza deltoidea</i>	Deltoid balsamroot	Endangered	S2-Red	G5	Yes
<i>Callitriche marginata</i>	Winged water-starwort		S2S3-Blue	G4	Yes
<i>Carex feta</i>	Greensheathed sedge		S2S3-Blue	G5	No
<i>Carex tumulicola</i>	Foothill sedge		S1-Red	G4	Yes
<i>Castilleja ambigua</i>	Paintbrush owl-clover		S2-Red	G4	Yes
<i>Castilleja levisecta</i>	Golden paintbrush (= golden Indian paintbrush)	Endangered	S1-Red	G1	Yes
<i>Centaurium muehlenbergii</i>	Muhlenberg's centaury		S1-Red	G5?	Yes
<i>Cheilanthes gracillima</i>	Lace fern		S2S3-Blue	G4G5	No

Latin Name	Common Name	COSEWIC Status	Provincial Rank and Listing	Global Rank	Species-level planning included in this strategy?
<i>Clarkia purpurea</i> ssp. <i>quadrivulnera</i>	Purple godetia		S1-Red	G5T3	Yes
<i>Crassula connata</i> var. <i>connata</i>	Erect pigmyweed		S2-Red	G5T?	Yes
<i>Dryopteris arguta</i>	Coastal wood fern	Special Concern	S2S3-Blue	G5	Yes
<i>Epilobium densiflorum</i>	Dense spike-primrose		S2-Red	G5	Yes
<i>Epilobium torreyi</i>	Brook spike-primrose		S1-Red	G5	Yes
<i>Gilia capitata</i> var. <i>capitata</i>	Globe gilia		SH-Red	G5T5	Yes
<i>Helenium autumnale</i> var. <i>grandiflorum</i>	Mountain sneezeweed		S2S3-Blue	G5T?	No
<i>Idahoia scapigera</i>	Scalegod		S2-Red	G5	Yes
<i>Juncus kelloggii</i>	Kellogg's rush		S1-Red	G3?	Yes
<i>Limnanthes macounii</i>	Macoun's meadowfoam	Special Concern	S3-Blue	G3	Yes
<i>Lomatium grayi</i>	Gray's desert-parsley		S1-Red	G5	Yes
<i>Lotus formosissimus</i>	Seaside birds-foot lotus (= seaside bird's-foot trefoil)	Endangered	S1-Red	G5	Yes
<i>Lotus pinnatus</i>	Bog bird's-foot trefoil		S1-Red	G5	Yes

Latin Name	Common Name	COSEWIC Status	Provincial Rank and Listing	Global Rank	Species-level planning included in this strategy?
<i>Lotus unifoliolatus</i> var. <i>unifoliolatus</i>	Spanish-clover		S2S3-Blue	G5T5	Yes
<i>Lupinus densiflorus</i> var. <i>densiflorus</i>	Dense-flowered lupine		S1-Red	G5T4	Yes
<i>Lupinus lepidus</i> var. <i>lepidus</i>	Prairie lupine	Endangered	S1-Red	G5	Yes
<i>Lupinus oregonus</i> var. <i>kincaidii</i>	Sulphur lupine		SX-Red	G5T2	Yes
<i>Marah oregonus</i>	Manroot		S2S3-Blue	G5	Yes
<i>Meconella oregana</i>	White meconella		S2-Red	G2	Yes
<i>Microseris bigelovii</i>	Coast microseris		S1-Red	G4	Yes
<i>Microseris lindleyi</i>	Lindley's microseris		S1-Red	G5	Yes
<i>Minuartia pusilla</i>	Dwarf sandwort		S1-Red	G5	Yes
<i>Myosurus apetalus</i> var. <i>borealis</i>	Mousetail		S2-Red	G5T?	No
<i>Navarretia intertexta</i>	Needle-leaved navarretia		S2-Red	G5?	No
<i>Orobanche pinorum</i>	Pine broomrape		S1-Red	G4	No
<i>Orthocarpus bracteosus</i>	Rosy owl-clover		S1-Red	G3?	Yes
<i>Piperia candida</i>	White lip rein orchid		S2-Red	G3G4	No
<i>Plagiobothrys figuratus</i>	Fragrant popcorn-flower		S1-Red	G4	Yes

Latin Name	Common Name	COSEWIC Status	Provincial Rank and Listing	Global Rank	Species-level planning included in this strategy?
<i>Plagiobothrys tenellus</i>	Slender popcorn-flower		S2-Red	G4G5	Yes
<i>Psilocarphus elatior</i>	Tall woolly-heads	Endangered (Pacific population)	S1-Red	G4Q	Yes (Pacific population only)
<i>Psilocarphus tenellus</i> var. <i>tenellus</i>	Slender woolly-heads	Not at risk	S2-Red	G4T4	Yes
<i>Ranunculus alismifolius</i> var. <i>alismifolius</i>	Water-plantain buttercup	Endangered	S1-Red	G5T5	Yes
<i>Ranunculus californicus</i>	California buttercup		S2-Red	G5	Yes
<i>Ranunculus lobbii</i>	Lobb's water-buttercup		SX-Red	G4	Yes
<i>Rupertia physodes</i>	California-tea		S2S3-Blue	G4	No
<i>Sanicula arctopoides</i>	Bear's-foot sanicle	Endangered	S1-Red	G5	Yes
<i>Sanicula bipinnatifida</i>	Purple sanicle	Threatened	S2-Red	G5	Yes
<i>Seriocarpus rigidus</i> = <i>Aster curtus</i>	White-top aster	Threatened	S2-Red	G3	Yes
<i>Silene scouleri</i> ssp. <i>grandis</i>	Scouler's campion		S1-Red	G5T?Q	Yes
<i>Tonella tenella</i>	Small-flowered tonella		S1S3-Blue	G5	Yes
<i>Toxicodendron diversilobum</i>	Poison oak		S2S3-Blue	G5	Yes
<i>Trifolium cyathiferum</i>	Cup clover		S1-Red	G4	No
<i>Trifolium dichotomum</i>	Macrae's clover		S2S3-Blue	G3G4	Yes

Latin Name	Common Name	COSEWIC Status	Provincial Rank and Listing	Global Rank	Species-level planning included in this strategy?
<i>Triphysaria versicolor</i> ssp. <i>versicolor</i>	Bearded owl-clover	Endangered	S2-Red	G5T5	Yes
<i>Triteleia howellii</i>	Howell's triteleia		S2-Red	G4?	Yes
<i>Viola howellii</i>	Howell's violet		S2S3-Blue	G4	No
<i>Viola praemorsa</i> spp. <i>praemorsa</i>	Yellow montane violet	Threatened	S2-Red	G5T3T5	Yes
<i>Yabea microcarpa</i>	California hedge-parsley		S1-Red	G5?	Yes
Earthworms					
<i>Arctiostrotus perrieri</i>	(earthworm)		S3?-Blue	G?	No
Insects Excluding Butterflies					
<i>Scolopostethus tropicus</i>	(seed bug)		S1-Red	G5	Yes
<i>Clivenema fusca</i>	(leaf bug)		S1-Red	G1?	Yes
<i>Ceratocapsus downesi</i>	(leaf bug)		S1-Red	G1?	Yes
<i>Harmostes dorsalis</i>	(scentless plant bug)		S1-Red	G5	Yes
<i>Camirus porosus</i>	(shield-backed bug)		S1-Red	G5	Yes
<i>Nicocles rufus</i>	(robber fly)		S1-Red	G?	Yes
<i>Scleropogon bradleyi</i>	(robber fly)		S2-Red	G?	Yes
Butterflies					
<i>Erynnis propertius</i>	Propertius dusky wing		S3-Blue	G5	Yes

Latin Name	Common Name	COSEWIC Status	Provincial Rank and Listing	Global Rank	Species-level planning included in this strategy?
<i>Euphyes vestris</i>	Dun skipper	Threatened (western population)	S2-Red	G5	No
<i>Euchloe ausonides</i>	Island marble, undescribed subspecies	Extirpated	SX-Red	G5T1	Yes
<i>Incisalia mossii mossii</i>	Moss' elfin, <i>mossii</i> subspecies		S3-Blue	G3G4T4	Yes
<i>Plebejus saepiolus insulanus</i> (= <i>Plebeius saepiolus insulanus</i>)	Island blue (= greenish blue, <i>insulanus</i> subspecies)	Endangered	SH-Red	G5TH	Yes
<i>Icaricia icariodes blackmorei</i>	Boisduval's blue, <i>blackmorei</i> subspecies		S3-Blue	G5T2T3	Yes
<i>Speyeria zerene bremnerii</i>	Bremner's fritillary, <i>bremnerii</i> subspecies		S3-Blue	G5T3T4	Yes
<i>Euphydryas editha taylori</i>	Taylor's checkerspot (= Edith's Checkerspot, <i>taylori</i> subspecies)	Endangered	S1-Red	G5T1	Yes
<i>Coenonympha californiana insulana</i>	Common ringlet, <i>insulana</i> subspecies		S2S3-Blue	G5T3T4	Yes
Reptiles					
<i>Contia tenuis</i>	Sharp-tailed snake	Endangered	S1-Red	G5	No. Sharp-tailed Snake Recovery Team currently drafting a recovery strategy.
<i>Pituophis catenifer catenifer</i>	Gopher snake, <i>catenifer</i> subspecies		SX-Red	G5T5	No

Latin Name	Common Name	COSEWIC Status	Provincial Rank and Listing	Global Rank	Species-level planning included in this strategy?
Birds					
<i>Columba fasciata</i>	Band-tailed pigeon		S3S4B, SZN-Blue	G5	No
<i>Coccyzus americanus</i>	Yellow-billed cuckoo		SXB, SAN-Red	G5	No
<i>Tyto alba</i>	Barn owl	Special concern (western population)	S3-Blue	G5	No
<i>Melanerpes lewis</i>	Lewis' woodpecker	Special concern	SXB, SZN-Red (Georgia Depression population)	G5T?Q (Georgia Depression population)	Yes (Georgia Depression Population only)
<i>Eremophila alpestris strigata</i>	Streaked horned lark		SH-Red	G5T2	Yes
<i>Progne subis</i>	Purple martin		S2B-Red	G5	No
<i>Sialia mexicana</i> , population 1	Western bluebird, Georgia Depression population		SHB, SZN-Red	G5T?Q	Yes
<i>Poocetes gramineus affinis</i>	Vesper sparrow, <i>affinis</i> subspecies		S1B-Red	G5T3	Yes
<i>Sturnella neglecta</i> , population 1	Western meadowlark, Georgia Depression population		SXB, SZN-Red	G5T?Q	Yes
Mammals					
<i>Corynorhinus townsendii</i>	Townsend's big-eared bat		S2S3-Blue	G4	No
<i>Mustela erminea anguinae</i>	Ermine, <i>anguinae</i> subspecies		S3-Blue	G5T3	No
<i>Cervus elaphus roosevelti</i>	Roosevelt elk		S2S3-Blue	G5T4	No

Appendix 2

Explanations of Ranks and Listings of Species at Risk

Explanations include those referred to in the strategy and other categories.

Committee on the Status of Endangered Wildlife in Canada (COSEWIC) status:

Extinct: no longer exists

Extirpated: no longer exists in the wild in Canada, but exists elsewhere in the wild.

Endangered: facing imminent extirpation or extinction.

Threatened: likely to become an endangered species if nothing is done to reverse the factors leading to its extirpation or extinction.

Special concern (vulnerable): particularly sensitive to human activities or natural events, but not including extirpated, endangered, or threatened species.

Not at risk: evaluated and found to be not at risk.

Data deficient (indeterminant): insufficient scientific information to support status designation.

BC Conservation Data Centre (CDC) ranks:

Global ranks reflect the conservation status of species from a global (ie rangewide) perspective, characterizing the relative rarity or imperilment of the species.

Basic global ranks:

GX = Presumed Extinct: believed to be extinct throughout its range. Not located despite intensive searches and virtually no likelihood that it will be rediscovered.

GH = Possibly Extinct: known only from historical occurrences. Still some hope of rediscovery.

G1 = Critically Imperilled: critically imperilled globally because of extreme rarity or because of some factor(s) making it especially vulnerable to extinction. Typically 5 or fewer occurrences or very few remaining individuals (<1,000).

G2 = Imperilled: imperilled globally because of extreme rarity or because of some factor(s) making it especially vulnerable to extinction. Typically 6 to 20 occurrences or few remaining individuals (1,000 to 3,000).

G3 = Vulnerable: vulnerable globally either because very rare and local throughout its range, found only in a restricted range (even if abundant at some locations) , or because of other factors making it vulnerable to extinction. Typically 21 to 100 occurrences or between 3,000 and 10,000 individuals

G4 = Apparently Secure: uncommon but not rare, and usually widespread. Possibly cause for long-term concern. Typically more than 100 occurrences globally or more than 10,000 individuals.

G5 = Secure: Common, typically widespread and abundant.

Variant global ranks:

G#G# = Range rank: a numeric range rank (e.g., G2G3) is used to indicate uncertainty about the exact status of a taxon

GU = Unrankable: currently unrankable due to lack of available information about status or trends

G? = Unranked: global rank not yet assessed.

HYB = Hybrid

Rank qualifiers

? = Inexact numeric rank: denotes inexact numeric rank.

Q = Questionable taxonomy: taxonomic status is questionable; numeric rank may change with taxonomy.

C = Captive or cultivated only: taxon at present is extant only in captivity or cultivation, or as a reintroduced population not yet established.

Provincial ranks reflect the conservation status of species from a local perspective, characterizing the relative rarity or imperilment of the species within the province of British Columbia.

Basic provincial ranks:

SX = Presumed Extirpated: believed to be extirpated. Not located despite intensive searches and virtually no likelihood that it will be rediscovered.

SH = Possibly Extirpated: known only from historical occurrences. Still some hope of rediscovery.

S1 = Critically Imperilled: critically imperilled provincially because of extreme rarity or because of some factor(s) making it especially vulnerable to extinction. Typically 5 or fewer occurrences or very few remaining individuals (<1,000).

S2 = Imperilled: imperilled provincially because of extreme rarity or because of some factor(s) making it especially vulnerable to extinction. Typically 6 to 20 occurrences or few remaining individuals (1,000 to 3,000).

S3 = Vulnerable: vulnerable provincially either because very rare and local throughout its range, found only in a restricted range (even if abundant at some locations), or because of other factors making it vulnerable to extinction. Typically 21 to 100 occurrences or between 3,000 and 10,000 individuals

S4 = Apparently Secure: uncommon but not rare, and usually widespread. Possibly cause for long-term concern. Typically more than 100 occurrences provincially or more than 10,000 individuals.

S5 = Secure: common, typically widespread and abundant.

Variant provincial ranks:

S#S# = Range Rank: a numeric range rank (e.g., S2S3) is used to indicate uncertainty about the exact status of a taxon.

SU = Unrankable: currently unrankable due to lack of available information about status or trends.

S? = Unranked: provincial rank not yet assessed.

HYB = Hybrid

Rank qualifiers:

? = Inexact numeric rank: denotes inexact numeric rank.

Q = Questionable taxonomy: taxonomic status is questionable; numeric rank may change with taxonomy.

C = Captive or cultivated only: taxon at present is extant only in captivity or cultivation, or as a reintroduced population not yet established.

B = Breeding: the associated rank refers to breeding occurrences of mobile animals.

N = Non-breeding: the associated rank refers to non-breeding occurrences of mobile animals.

Z = Moving: occurs in the province, but as a diffuse, usually moving population; difficult or impossible to map static occurrences.

Infraspecific taxon ranks:

T = Infraspecific Taxon (trinomial): The status of infraspecific taxa (subspecies or varieties) are indicated by a "T-rank" following the species' provincial rank. Rules for assigning T ranks follow the same principles outlined above. For example, the provincial rank of a critically imperilled subspecies of an otherwise widespread and common species would be G5T1.

Z = Moving: occurs in the province, but as a diffuse, usually moving population; difficult or impossible to map static occurrences.

BC Listings:

Red List = indigenous species or subspecies (taxa) considered to be extirpated, endangered, or threatened in British Columbia. Extirpated taxa no longer exist in the wild in British Columbia, but do occur elsewhere. Endangered taxa are facing imminent extirpation or extinction.

Threatened taxa are likely to become endangered if limiting factors are not reversed. Red-listed taxa include those that have been, or are being, evaluated for these designations.

Blue List = indigenous species or subspecies (taxa) considered to be vulnerable in British Columbia. Vulnerable taxa are of special concern because of characteristics that make them particularly sensitive to human activities or natural events. Blue-listed taxa are at risk, but are not extirpated, endangered or threatened.

Appendix 3

Summary Species Information from COSEWIC Assessments

Plants

Scientific Name: *Seriocarpus rigidus* = *Aster curtus*

Common Name: White-top aster

Current COSEWIC Status and Year of Designation: Designated Threatened in April 1996; status re-examined and confirmed Threatened in May 2000.

Range in Canada: British Columbia

Rationale for Status: Perennial herb occupying very small patches of habitat at few sites on southeastern Vancouver Island within the Garry Oak Ecosystem, which is also at risk, and where threats continue from development pressures and exotic species.

Scientific Name: *Balsamorhiza deltoidea*

Common Name: Deltoid balsamroot

Current COSEWIC Status and Year of Designation: Designated Endangered in April 1996; status re-examined and confirmed Endangered in May 2000.

Range in Canada: British Columbia

Rationale for Status: Few highly reduced populations mainly in threatened Garry oak habitats. At risk from development and competition from exotics.

Scientific Name : *Bartramia stricta*

Common Name: Rigid apple moss

Current COSEWIC Status and Year of Designation: Designated Threatened in April 1997; status re-examined and uplisted to Endangered in May 2000.

Range in Canada: British Columbia

Rationale for Status: Highly restricted with disjunct populations with low numbers and small size occurring within a recognized habitat at risk.

Scientific Name: *Castilleja levisecta*

Common Name: Golden paintbrush

Current COSEWIC Status and Year of Designation: Designated Threatened in April 1995; status re-examined and uplisted to Endangered in May 2000.

Range in Canada: British Columbia

Rationale for Status: Highly restricted range with loss of nearly half of the historic populations and continued threats from spread of exotic plants.

Scientific Name: *Dryopteris arguta*

Common Name: Coastal wood fern

Current COSEWIC Status and Year of Designation: Designated Special Concern in April 1998; status re-examined and confirmed in November 2001

Range in Canada: British Columbia

Rationale for Status: A Pacific North American species reaching its northern limit on the Gulf Islands of British Columbia where it occurs as a series of small populations within rugged coastal forest habitat.

Scientific Name: *Limnanthes macounii*

Common Name: Macoun's meadowfoam

Current COSEWIC Status and Year of Designation: Designated Special Concern in April 1988.

Range in Canada: British Columbia

Rationale for Status: A Canadian endemic with a restricted range and numerous populations readily persisting in or near urban areas.

Scientific Name: *Lotus formosissimus*

Common Name: Seaside birds-foot lotus

Current COSEWIC Status and Year of Designation: Designated Endangered in April 1996; status re-examined and confirmed in May 2000.

Range in Canada: British Columbia

Rationale for Status: Number of populations and area of occupancy are in decline and individuals are threatened by exotic shrubs, grasses and rabbits.

Scientific Name: *Lupinus lepidus* var. *lepidus*

Common Name: Prairie lupine

Current COSEWIC Status and Year of Designation: Designated Endangered in April 1996; status re-examined and confirmed in May 2000.

Range in Canada: British Columbia

Rationale for Status: Endangered due to small distribution and declining populations. May be extirpated.

Scientific Name : *Psilocarphus elatior*

Common Name: Tall woolly-heads (Pacific population)

Current COSEWIC Status and Year of Designation: Designated Endangered in May 2001

Range in Canada: British Columbia.

Rationale for Status: Small annual species present in major urban area within Garry oak habitats with few small scattered populations subject to fluctuating numbers and at risk from habitat degradation and loss.

Scientific Name: *Psilocarphus tenellus* var. *tenellus*

Common Name: Slender woolly-heads

Current COSEWIC Status and Year of Designation: Designated Not at Risk in April 1996.

Range in Canada: British Columbia

Rationale for Status: Naturally rare and geographically restricted pioneer species colonizing disturbed sites.

Scientific Name: *Ranunculus alismaefolius* var. *alismaefolius*

Common Name: Water-plantain buttercup

Current COSEWIC Status and Year of Designation: Designated Endangered in April 1996; status re-examined and confirmed in May 2000.

Range in Canada: British Columbia

Rationale for Status: Only two remaining populations of approximately 70 individuals threatened by recreational activities and competitions from exotic plants.

Scientific Name: *Sanicula arctopoides*

Common Name: Bear's-foot sanicle

Current COSEWIC Status and Year of Designation: Designated Endangered in May 2001

Range in Canada: British Columbia.

Rationale for Status: Highly restricted geographically with only five populations present within a major urban centre and on adjacent small islands where habitat losses continue and major risks are posed by exotic plants.

Scientific Name: *Sanicula bipinnatifida*

Common Name: Purple sanicle

Current COSEWIC Status and Year of Designation: Designated Threatened in May 2001.

Range in Canada: British Columbia

Rationale for Status: Geographically restricted species with small area of occupancy in Garry oak communities within a major urbanized region at risk from habitat loss and degradation and impact of exotic plants.

Scientific Name: *Triphysaria versicolor* ssp. *versicolor*

Common Name: Bearded owl-clover

Current COSEWIC Status and Year of Designation: Designated Endangered in April 1998; status re-examined and confirmed in May 2000.

Range in Canada: British Columbia

Rationale for Status: Disjunct with highly specific habitat requirements, few populations in restricted range, subject to development, recreational activities and competition with exotic plants.

Scientific Name: *Viola praemorsa* ssp. *praemorsa*

Common Name: Yellow montane violet

Current COSEWIC Status and Year of Designation: Designated Threatened in April 1995; status re-examined and confirmed in May 2000.

Range in Canada: British Columbia

Rationale for Status: Highly localized species with few sites and restricted to habitats under threat from development, recreational use and from spread of exotic plants.

Invertebrates

Scientific Name: *Euchloe ausonides*

Common Name: Island marble

Current COSEWIC Status and Year of Designation: Extirpated by 1910. Designated Extirpated in April 1999; status confirmed in May 2000.

Range in Canada: British Columbia

Rationale for Status: This butterfly was formerly found on two islands off the west coast but disappeared from both sites by 1910 because of loss of the larval host plant. It has not been seen since.

Scientific Name: *Euphydryas editha taylori*

Common Name: Taylor's checkerspot

Current COSEWIC Status and Year of Designation: Designated Endangered in November 2000.

Range in Canada: British Columbia

Rationale for Status: Has undergone significant range-wide population reductions. In Canada, it persists in Garry Oak meadows at only one site. Much of its habitat has been destroyed and introduced invasive plants have eliminated its host plant in most remaining habitat.

Scientific Name: *Euphyes vestris*

Common Name: Dun skipper (western population)

Current COSEWIC Status and Year of Designation: Designated Threatened in November 2000.

Range in Canada: British Columbia

Rationale for Status: The western population occurs in a restricted area. It has all but disappeared from Vancouver Island and will probably become extirpated in the near future. The mainland population is limited by the availability of suitable habitat, with some locations relatively secure.

Scientific Name: *Plebejus saepiolus insulanus*

Common Name: Island blue

Current COSEWIC Status and Year of Designation: Designated Endangered in November 2000.

Range in Canada: British Columbia

Rationale for Status: An extremely restricted endemic of southern Vancouver Island. It was last recorded in 1979 but there remains a possibility that it still persists.

Vertebrates

Scientific Name: *Contia tenuis*

Common Name: Sharp-tailed snake

Current COSEWIC Status and Year of Designation: Designated Endangered in April 1999; status re-examined and confirmed in October 1999.

Range in Canada: British Columbia

Rationale for Status: Probably declining; low numbers; area of occupancy less than 500 km²; no chance of rescue; low fecundity and low potential for increase.

Scientific Name: *Melanerpes lewis*

Common Name: Lewis's woodpecker

Current COSEWIC Status and Year of Designation: Designated Special Concern in April 1999; status re-examined and confirmed November 2001.

Range in Canada: British Columbia

Rationale for Status: Population is relatively small and part of the Canadian range has been lost. Required breeding habitat – large trees in open habitats – is under pressure from urban and agricultural developments.

Scientific Name: *Tyto alba*

Common Name: Barn owl (western population)

Current COSEWIC Status and Year of Designation: Canadian range was considered as a whole when the barn owl was designated as Special Concern in April 1984. In April 1999, the western and eastern populations of this species were assessed separately. The western population was designated Special Concern. Status re-examined and confirmed November 2001.

Range in Canada: British Columbia

Rationale for Status: Population is small, and preferred habitat of agricultural fields and pastures is being lost to agricultural intensification and urban developments.

Appendix 4

Summary of Major Contact and Consultation Activities

Garry oak and associated ecosystems occur on private, federal, provincial, and First Nations lands. Comprehensive tenure data have not yet been compiled. Contact and consultation activities have targeted these groups as well as other potentially interested community groups and stakeholders.

- Invitations to the initial organizing meeting held in June 1999, from which the Garry Oak Ecosystems Recovery Team was founded, were emailed to all delegates who had registered for the First International Garry Oak Meadow Symposium, Victoria, BC, May 1999. A number of other community members also received invitations. Thirty individuals attended the meeting.
- An email newsletter containing updates on the progress of the Garry Oak Ecosystems Recovery Team was founded. The mailing list was compiled primarily in the process of compiling data about projects and products relevant to conservation and recovery of Garry oak and associated ecosystems. Current distribution list is comprised of about 200 individuals and a number of email newsletters which reach a wider circulation. Recipients include federal, provincial, and local government agency personnel, members of community associations and environmental non-governmental organizations, academics, and others. Newsletters were sent in October and November 1999, March and July 2000, and March, July, October, November, and December 2001.
- Letters announcing the establishment of the Garry Oak Ecosystems Recovery Team and inviting input and participation were mailed to the Chiefs and Councils of 29 First Nations with traditional territories within the range of Garry oak ecosystems in November 1999. Follow-up phone calls were made over the subsequent months and information about the ecological values of Garry oak ecosystems was sent to those that requested it.
- Letters describing the ecological values of Garry oak ecosystems and announcing the establishment of the Garry Oak Ecosystems Recovery Team were sent to all local governments within the range of Garry oak ecosystems in January 2000. Similar letters were sent to federal and provincial politicians representing ridings in the region. A total of 53 letters were sent. Five local governments subsequently formally endorsed the initiative to develop a recovery strategy for Garry oak ecosystems.
- Public review of the draft recovery strategy was held in March 2001. Input was invited in the following ways:
 - Copies of the draft strategy and the background literature review were posted on 2 websites. Information at the websites included an invitation to review and comment, contact information, and an announcement about a public meeting to be held on 31 March 2001.
 - The executive summary, invitation to review and comment, website and contact information, and announcement of the public meeting were included in information packages given to all delegates of the Annual General Meeting of the Association of Vancouver Island and Coastal Communities, 9-11 March 2001.

- The executive summary, invitation to review and comment, website and contact information, and announcement of the public meeting were emailed to the newsletter mailing list.
- The executive summary, invitation to review and comment, website and contact information, and announcement of the public meeting were mailed to 398 individuals and agencies. Target audiences included arbourists, landscape architects, botanical gardens, garden clubs, academic institutions, federal and provincial agencies, natural history societies, conservancies, conservation advocacy groups, community, neighbourhood, and ratepayers associations, regional district boards, planners, and parks managers, municipal mayors, councils, planners, and parks managers, tourism associations, chambers of commerce, real estate organizations, nurseries, and garden centres throughout the range of Garry oak ecosystems in Canada.
- The draft strategy, invitation to review and comment, contact information, and announcement of the public meeting were mailed to Chiefs and Councils of 29 First Nations with traditional territories within the range of Garry oak ecosystems.
- Announcements of the public meeting and contact information were placed in the local daily and community newspapers. One local newspaper published an article about the recovery team and the recovery strategy.
- A public meeting was held on 31 March 2001. Approximately 60 members of the public attended. Members of the recovery team gave presentations about species at risk, the proposed Species at Risk Act, ecological values and conservation issues of Garry oak ecosystems, and the recovery strategy. Public response was overwhelmingly positive.
- Review comments were received by one member of the public and incorporated into the subsequent draft.
- The draft Recovery Strategy has been presented to a number of local governments and governmental and non-governmental agencies. Formal endorsements of the Recovery Strategy have been received to date from 2 municipal councils, 1 regional district board, 1 regional agency, 1 provincial agency, and 13 non-governmental organizations.

Appendix 5

Recovery Team Members and Contact Information

Robb Bennett

Entomologist

3972 Tudor Avenue

Victoria, BC V8N 4L6

phone: (250) 370-5015

fax:

email:

Louise Blight

Environmental Protection Specialist, Capital Regional District Parks

490 Atkins Avenue

Victoria, BC V9B 2Z8

phone: (250) 478-3344

fax: (250) 478-5416

email: lblight@crd.bc.ca

Cheryl Bryce

Education Liaison, Songhees First Nation

1500D Admirals Road

Victoria, BC V9A 2R1

phone: (250) 386-1043

fax: (250) 383-1084

email: cherylbryce@hotmail.com

Brenda Costanzo

Garry Oak Botanist

BC Conservation Data Centre, BC Ministry of Sustainable Resource Management

PO Box 9344, Stn. Prov. Govt.

Victoria, BC V8W 9M1

phone: (250) 387-8889

fax: (250) 387-2733

email: Brenda.Costanzo@gems7.gov.bc.ca

Michael Dunn

Acting Head, Species at Risk Section

Canadian Wildlife Service, Pacific and Yukon Region, Environment Canada

RR1, 2421 Robertson Road

Delta, BC V4K 3N2

phone: (604) 940-4658

fax: (604) 946-7022

email: Michael.Dunn@ec.gc.ca

Tim Ennis

Project Manager, Cowichan Garry Oak Preserve, Nature Conservancy of Canada

202-26 Bastion Square

Victoria, BC V8W 1H9

phone: (250) 479-3191

fax: (250) 479-0546

email: time@telus.net

Matthew Fairbarns

Rare Species Biologist
BC Conservation Data Centre, BC Ministry of Sustainable Resource Management
PO Box 9344, Stn. Prov. Govt.
Victoria, BC V8W 9M1
phone: (250) 387-6972 fax: (250) 387-2733 email: Matthew.Fairbarns@gems1.gov.bc.ca

Richard Feldman

M.Sc. Candidate, University of British Columbia
2424 Mail Mall
Vancouver, BC V6T 1Z4
phone: (604) 822-0501 fax: (604) 822-5410 email: richaref@interchange.ubc.ca

David F. Fraser

Endangered Species Specialist, Biodiversity Branch, BC Ministry of Water, Land and Air Protection
Box 9374, Stn. Prov. Govt.
Victoria, B.C.V8W 9M4
phone: (250) 387-9756 fax: (250) 356-9145 email: Dave.Fraser@gems8.gov.bc.ca

Marilyn A. Fuchs

Chair & Program Coordinator, Garry Oak Ecosystems Recovery Team
202-22 Bastion Square
Victoria, BC V8W 1H9
phone: (250) 383-3224 fax: (250) 479-0546 email: marilyn.Fuchs@goert.ca

Harold J. Gibbard

Vice President, Garry Oak Meadow Preservation Society
1439 Wende Road
Victoria, BC V8P 3T7
phone: (250) 477-2986 fax: email: hagibbard@shaw.ca

Tom Gillespie

Treasurer, Garry Oak Meadow Preservation Society
A-954 Queens Avenue
Victoria, BC V8T 1M6
phone: (250) 361-1694 fax: email: thomasw._gillespie@telus.net

Richard Hebda

Curator of Botany and Earth History, Royal British Columbia Museum
675 Belleville Street
Victoria, BC V8W 9W2
phone: (250) 387-5493 fax: (250) 387-0534 email: rhebda@royalbcmuseum.bc.ca

Andrew MacDougall

Ph.D. Candidate

Department of Botany, University of British Columbia

Vancouver, BC V6T 1Z4

phone: (604) 822-2700

fax: (604) 822-6089

email: asmacdougall@sprint.ca

Carrina Maslovat

Plant Ecologist

2615 Asquith Street

Victoria, BC V8R 3Y4

phone: (250) 592-2733

fax:

email: cmaslovat@pacificcoast.net

Michael D. Meagher

Secretary, Garry Oak Meadow Preservation Society

666 Jones Terrace

Victoria, BC V8Z 2L7

phone: (250) 727-7675

fax: (250) 727-7609

email: mmeagher@pfc.forestry.ca

Adriane Pollard

Manager of Environmental Services, Planning Department, District of Saanich

770 Vernon Avenue

Victoria, BC V8X 2W7

phone: (250) 475-5494x3556

fax: (250) 475-5450

email: pollarda@gov.saanich.bc.ca

Brian Reader

Species at Risk Ecologist, Coastal British Columbia Field Unit, Parks Canada

2nd Floor, 711 Broughton Street

Victoria, BC V8W 1E2

phone: (250) 363-8560

fax: (250) 363-8552

email: brian.reader@pc.gc.ca

Arthur Robinson

Federal Lands Forest Officer, Canadian Forest Service

506 West Burnside Road

Victoria, BC V8Z 1M5

phone: (250) 363-0729

fax: (250) 363-0775

email: arobinson@pfc.forestry.ca

James W. Rutter

Public Involvement and Extension Specialist, Garry Oak Ecosystems Recovery Team

202-22 Bastion Square

Victoria, BC V8W 1H9

phone: (250) 383-3283

fax: (250) 479-0546

email: jim.rutter@goert.ca

George P. Sirk

Regional Director, Board of the Regional District of Comox-Strathcona

Box 83

Whaletown, BC V0P 1Z0

phone: (250) 935-6926

fax: (250) 935-6929

email: gsirk@oberon.ark.com

Kate Stewart

Treasurer, The Land Conservancy of British Columbia

5793 Old West Saanich Road

Victoria, BC V9E 2H2

phone: (250) 479-8053

fax: (250) 744-2251

email: camassia@telus.net

Appendix 6

Potential Partner Organizations and Contact Information

Potential partner organizations are suggestions only. No commitment on the part of the potential partner organizations is implied. Participation of organizations not included in this list is welcome and encouraged.

Federal Government

Agriculture and Agri-food Canada
Coastal Areas Branch
Box 2527
103-620 Royal Avenue
New Westminster, BC V3L 5A8
phone: (604) 666-9283
fax:
email:
website: www.agr.ca

Canadian Forest Service
506 West Burnside Road
Victoria, B.C. V8Z 1M5
phone: (250) 363-0600
fax: (250) 363-0775
email:
website: www.pfc.forestry.ca

COSEWIC (Committee on the Status of Endangered Wildlife in Canada) Secretariat
c/o Canadian Wildlife Service
Environment Canada
Ottawa, Ontario K1A 0H3
phone: (819) 953-3215
fax: (819) 994-3684
email: cosewic/cosepac@ec.gc.ca
website: www.cosewic.gc.ca

Department of National Defence
CFB Esquimalt
PO Box 17000, Stn. Forces
Victoria, BC V9A 7N2
phone: (250) 363-4006
fax: (250) 363-5527
email: cfbesquimalt@home.com
website: www.marpac.dnd.ca

Environment Canada, Canadian Wildlife Service
Pacific and Yukon Region
RR1, 5421 Robertson Road
Delta, BC V4K 3N2
phone: (604) 940-4700
fax: (604) 940-7022
email:
website: www.cws-scf.ec.gc.ca/cwshom_e.html

Environment Canada
3567 Island Highway West
Qualicum Beach, BC V9K 2B7
phone: (250) 752-9611
fax: (250) 752-9611
email:
website: www.cws-scf.ec.gc.ca/cwshom_e.html

Fisheries and Oceans Canada
South Coast Division
3225 Stephenson Point Road
Nanaimo, BC V9T 1K3
phone: (250) 756-7270
fax: (250) 756-7160
email:
website: www.pac.dfo-mpo.gc.ca

Parks Canada
Coastal British Columbia Field Unit
2nd Floor, 711 Broughton Street
Victoria, BC
phone:
fax:
email:
website: parkscanada.gc.ca

Provincial Government

Because the provincial government is undergoing restructuring at this time, information listed here pertaining to provincial agencies may not be current.

BC Ministry of Agriculture, Food and Fisheries
808 Douglas Street
PO Box 9120, Stn. Prov. Govt.
Victoria, BC V8W 9B4
phone: (250) 387-5121
fax:
email:
website: www.gov.bc.ca/agf

BC Ministry of Competition, Science and Enterprise
Small Business Programs
5th Floor, 1405 Douglas Street
Victoria, BC V8W 9W1
phone: (250) 387-9807
fax: (250) 387-6055
email: Barbara.Clough@gems5.gov.bc.ca
website: www.gov.bc.ca/sbtc

BC Ministry of Competition, Science and Enterprise
Tourism British Columbia
865 Hornby Street, 8th Floor
Vancouver, BC V6Z 2G3
phone: (604) 660-3758
fax: (604) 660-3383
email: Rmoffatt@tourism.bc.ca
website: www.tbc.gov.bc.ca/tourism/tourismhome.html

BC Ministry of Forests
Protection Branch
2nd Floor, 2957 Jutland Road
PO Box 9502, Stn. Prov. Govt.
Victoria, BC V8W 9C1
phone: (250) 387-5965
fax: (250) 387-5585
email:
website: www.for.gov.bc.ca

BC Ministry of Forests
Research Branch
3rd Floor, 712 Yates Street
PO Box 9502, Stn. Prov. Govt.
Victoria, BC V8W 9C2
phone: (250) 387-6721
fax: (250) 387-0046
email:
website: www.for.gov.bc.ca

BC Ministry of Sustainable Resource Management
Conservation Data Centre
2nd Floor, 1975 Jutland Road
PO Box 9344, Station Provincial Government
Victoria, BC V8W 9M1
phone: (250) 356-0928
fax: (250) 387-2733
email: elpcdcdata@victoria1.gov.bc.ca
website: www.elp.gov.bc.ca/rib/wis/cdc

BC Ministry of Sustainable Resource Management
Environment Inventory Branch
2nd Floor, 2975 Jutland Road
PO Box 9344, Stn. Prov. Govt.
Victoria, BC V8W 9M1
Nanaimo, BC V9T 6J9
phone: (250) 387-1112
fax: (250) 953-3603
email:
website: www.elp.gov.bc.ca

BC Ministry of Sustainable Resource Management
Forest Inventory and Monitoring Branch
1st Floor, 722 Johnson Street
PO Box 9516, Stn. Prov. Govt.
Victoria, BC V8W 9C2
phone: (250) 387-1314
fax: (250) 387-5999
email:
website: www.for.gov.bc.ca

BC Ministry of Transportation
South Island District
103-4475 Viewmont Avenue
Victoria, BC V8Z 5K8
phone: (250) 952-4515
fax:
email:
website: www.gov.bc.ca/th

BC Ministry of Transportation
Central Island District
6475 Metral Drive
Nanaimo, BC V9T 2L9
phone: (250) 390-6100
fax:
email:
website: www.gov.bc.ca/th

BC Ministry of Water, Land and Air Protection
Integrated Pest Management Program
PO Box 9342, Stn. Prov. Govt.
Victoria, BC V8W 9M1
phone: (250) 387-4441
fax: (250) 387-9935
email:
website: www.elp.gov.bc.ca/epd/epdpa/ipmp/index.html

BC Ministry of Water, Land and Air Protection
Vancouver Island Regional Headquarters
2080A Labieux Road
Nanaimo, BC V9T 6J9
phone: (250) 751-3100
fax: (250) 751-3103
email:
website: www.elp.gov.bc.ca

BC Ministry of Water, Land and Air Protection
Biodiversity Branch
PO Box 9374, Stn. Prov. Govt.
Victoria, BC V8W 9M1
phone: (250) 387-9717
fax: (250) 356-9145
email:
website: www.elp.gov.bc.ca

BC Ministry of Water, Land and Air Protection
Parks and Protected Areas Branch
PO Box 9398, Stn. Prov. Govt.
Victoria, BC V8W 9M9
phone: (250) 387-5002
fax: (250) 387-5757
email:
website: www.elp.gov.bc.ca/bcparks

BC Ministry of Water, Land and Air Protection
Parks and Protected Areas Branch
Vancouver Island Region
2080A Labieux Road
Nanaimo, BC V9T 6J9
phone:
fax:
email:
website: www.elp.gov.bc.ca/bcparks

BC Ministry of Water, Land and Air Protection
Parks and Protected Areas Branch
Lower Mainland Region
1610 Mt. Seymour Road
North Vancouver, BC V7G 2R9
phone:
fax:
email:
website: www.elp.gov.bc.ca/bcparks

Government House
1401 Rockland Avenue
Victoria, BC V8S 1V9
phone: (250) 387-2080
fax: (250) 387-2077
email:
website: www.ltgov.bc.ca

Habitat Conservation Trust Fund
PO Box 9354, Stn. Prov. Govt.
Victoria, BC V8W 9M1
phone: (250) 387-9853
fax: (250) 952-6684
email:
website: www.env.gov.bc.ca/hctf

Naturescape British Columbia
PO Box 9354, Stn. Prov. Govt.
Victoria BC V8W 9M1
phone: (250) 387-9853
fax: (250) 952-6684
email:
website: www.env.gov.bc.ca/hctf/nature.htm

Provincial Capital Commission
613 Pandora Street
Victoria, BC V8W 1N8
phone: (250) 953-8800
fax: (250) 386-1301
email: info@bcpsc.com
website: www.bcpsc.com

Royal British Columbia Museum
675 Belleville Street
Victoria, BC V8W 9W2
phone: (250) 356-7226
fax: (250) 356-8197
email:
website: rbcm1.rbcm.gov.bc.ca

Wild BC
PO Box 9354, Stn. Prov. Govt.
Victoria, BC V9W 9M1
phone: (250) 356-7111
fax: (250) 952-6684
email: wild@gems5.gov.bc.ca
website: stc.mala.bc.ca/hctf/wild.htm

Local Government

Alberni-Clayoquot Regional District
3008-5th Avenue
Port Alberni, BC V9Y 2E3
phone: (250) 720-2700
fax: (250) 723-1327
email:
website:

Capital Regional District
Box 1000, 524 Yates Street
Victoria, BC V8W 2S6
phone: (250) 360-3000
fax: (250) 360-3130
email:
website: www.crd.bc.ca

Capital Regional District Parks
490 Atkins Avenue
Victoria, BC V9B 2Z8
phone: (250) 478-3344
fax: (250) 478-5416
email:
website: www.crd.bc.ca/parks

City of Colwood
3300 Wishart Road
Victoria, BC V9C 1R1
phone: (250) 478-5541
fax: (250) 478-7516
email: administration@city.colwood.bc.ca
website: www.city.colwood.bc.ca

City of Courtenay
830 Cliffe Avenue
Courtenay, BC V9N 2J7
phone: (250) 334-4441
fax: (250) 334-4241
email:
website:

City of Duncan
PO Box 820
Duncan, BC V9L 3Y2
phone: (250) 334-4441
fax: (250) 334-4241
email:
website:

City of Nanaimo
455 Wallace Street
Nanaimo, BC V9R 5J6
phone: (250) 754-4401
fax: (250) 755-4436
email:
website: www.city.nanaimo.bc.ca

City of Parksville
PO Box 1390
100 Jensen Avenue East
Parksville, BC V9P 2H3
phone: (250) 248-6144
fax: (250) 248-6650
email:
website: city.parksville.bc.ca

City of Port Alberni
4850 Argyle Street
Port Alberni, BC V9Y 1V8
phone: (250) 723-2146
fax: (250) 723-1003
email: citypa@city.port-alberni.bc.ca
website: www.city.port-alberni.bc.ca

City of Victoria
1 Centennial Square
Victoria, BC V8W 1P6
phone: (250) 385-5711
fax: (250) 361-0348
email:
website: www.city.victoria.bc.ca

Regional District of Comox-Strathcona
4795 Headquarters Road
PO Box 3370
Courtenay, BC V9N 5N5
phone: (250) 334-6000
fax: (250) 334-4358
email:
website:

Cowichan Valley Regional District
137 Evans Street
Duncan, BC V9L 1P5
phone: (250) 746-2500
fax: (250) 746-5612
email: cvrdds@island.net
website: www.cvrdd.bc.ca

District of Central Saanich
1903 Mt. Newton Cross Road
Saanichton, BC V8M 2A9
phone: (250) 652-4444
fax: (250) 652-0135
email:
website: district.central-saanich.bc.ca

District of Highlands
1980 Millstream Road
Victoria, BC V9B 6H1
phone: (250) 474-1773
fax: (250) 474-3677
email: municipal_office@highlands.bc.ca
website: www.highlands.bc.ca

District of Langford
2805 Carlow Road
Victoria, BC V9B 5V9
phone: (250) 478-7882
fax: (250) 391-3433
email:
website: www.district.langford.bc.ca

District of Metchosin
RR4, 4450 Happy Valley Road
Victoria, BC V9B 5T8
phone: (250) 474-3167
fax: (250) 474-6298
email:
website: www.district.metchosin.bc.ca

District of North Cowichan
Box 278
7030 Trans Canada Highway
Duncan, BC V9L 3X4
phone: (250) 746-3100
fax: (250) 746-3133
email:
website: www.northcowichan.bc.ca

District of North Saanich
1620 Mills Road
North Saanich, BC V8L 5S9
phone: (250) 656-0781
fax: (250) 656-3155
email: admin@district.nsaanich.bc.ca
website: www.crd.bc.ca/nsaanich

District of Oak Bay
2167 Oak Bay Avenue
Victoria, BC V8R 1G2
phone: (250) 598-3311
fax: (250) 598-9108
email:
website: www.district.oak-bay.bc.ca

District of Saanich
770 Vernon Avenue
Victoria, BC V8X 2W7
phone: (250) 475-1775
fax: (250) 475-5440
email:
website: www.gov.saanich.bc.ca/fpweb/index.htm

District of Sooke
2205 Otter Point Road
Sooke, BC V0S 1N0
phone: (250) 642-1634
fax: (250) 642-0541
email: info@district.sooke.bc.ca
website: www.district.sooke.bc.ca

Fraser Valley Regional District
8430 Cessna Drive
Chilliwack, BC V2P 7K4
phone: (604) 702-5000
fax: (604) 792-9684
email:
website:

Islands Trust
Suite 200-1627 Fort Street
Victoria, BC V8R 1H8
phone: (250) 405-5151
fax: (250) 405-5155
email: information@islandstrust.bc.ca
website: www.islandstrust.bc.ca

Islands Trust Fund
Suite 200-1627 Fort Street
Victoria, BC V8R 1H8
phone: (250) 405-5174
fax: (250) 405-5155
email: tfbmail@islandstrust.bc.ca
website: www.islandstrustfund.bc.ca

Powell River Regional District (Lasqueti Island)
5776 Marine Avenue
Powell River, BC V8A 2M4
phone: (250) 483-3231
fax: (250) 483-2229
email:
website:

Regional District of Nanaimo
6300 Hammond Bay Road
Nanaimo, BC V9T 6N2
phone: (250) 390-4111
fax: (250) 390-4163
email: Corpsrv@rdn.bc.ca
website: www.rdn.bc.ca

Town of Comox
1809 Beaufort Avenue
Comox, BC V9M 1R9
phone: (250) 339-2202
fax: (250) 339-7110
email:
website: www.town.comox.bc.ca

Town of Ladysmith
PO Box 220
410 Esplanade
Ladysmith, BC V0R 2E0
phone: (250) 245-6400
fax: (250) 245-6411
email: infor@town.ladysmith.bc.ca
website: www.town.ladysmith.bc.ca

Town of Qualicum Beach
PO Box 130
#201-660 Primrose Street
Qualicum Beach, BC V9K 1S7
phone: (250) 752-6921
fax: (250) 752-1243
email: mail@qualicumbeach.com
website: www.qualicumbeach.com

Town of Sidney
2440 Sidney Avenue
Sidney, BC V8L 1Y7
phone: (250) 656-1184
fax: (250) 655-4508
email:
website: www.town.sidney.bc.ca

Town of View Royal
45 View Royal Avenue
Victoria, BC V9B 1A6
phone: (250) 479-6800
fax: (250) 727-9551
email: info@town.viewroyal.bc.ca
website: www.town.viewroyal.bc.ca

Township of Esquimalt
1229 Esquimalt Road
Victoria, BC V9A 3P1
phone: (250) 414-7100
fax: (250) 414-7111
email: info@mun.esquimalt.bc.ca
website: www.mun.esquimalt.bc.ca

Village of Cumberland
Box 340
Cumberland, BC V0R 1S0
phone: (250) 336-2291
fax: (250) 336-2321
email:
website:

First Nations

Beecher Bay First Nation
RR6, 3843 Sooke Road
Sooke, BC V0S 1N0
phone: (250) 478-3535
fax: (250) 478-3585

Chawathil First Nation
Box 1659
Hope, BC V0X 1L0
phone: (604) 869-9994
fax: (604) 869-7614

Cheam First Nation
52130 Old Yale Road
Rosedale, BC V0X 1X0
phone: (604) 794-7924
fax: (604) 794-7456

Chemainus First Nation
RR1, Silverstrand Road
Ladysmith, BC V0R 2E0
phone: (250) 245-7155
fax: (250) 245-3012

Comox First Nation
3320 Comox Road
Courtenay, BC V9N 3P8
phone: (250) 339-7122
fax: (250) 339-7053

Cowichan First Nation
5760 Allenby Road
Duncan, BC V9L 5J1
phone: (250) 748-3196
fax: (250) 748-1233

Esquimalt First Nation
1000 Thomas Road
Victoria, BC V9A 7K7
phone: (250) 381-7861
fax: (250) 384-9309

Halalt First Nation
RR1
Chemainus, BC V0R 1K0
phone: (250) 246-4736
fax: (250) 246-2330

Hupaçasath First Nation
PO Box 211
Port Alberni, BC V9Y 7M7
phone: (250) 724-4041
fax: (250) 724-1232

Lake Cowichan First Nation
c/o 470 Ker Avenue
Victoria, BC V9A 2B7
phone: (250) 749-3301
fax: (250) 749-3368

Lyackson First Nation
RR1, 9137 Chemainus Road
Chemainus, BC V0R 1K0
phone: (250) 246-5019
fax: (250) 246-5049

Malahat First Nation
PO Box 111
Mill Bay, BC V0R 2P0
phone: (250) 743-3231
fax: (250) 743-3251

Nanoose First Nation
209 Mallard Way
Lantzville, BC V0R 2H0
phone: (250) 390-3661
fax: (250) 390-3365

Pauquachin First Nation
8960 West Saanich Road
Sidney, BC V8L 5W4
phone: (250) 656-0191
fax: (250) 656-6134

Penelakut First Nation
PO Box 360
Chemainus, BC V0K 1K0
phone: (250) 246-2321
fax: (250)246-2725

Qualicum First Nation
5850 River Road
Qualicum Beach, BC V9K 1Z5
phone: (250) 757-9337
fax: (250) 757-9898

Shxw'ow'hamel First Nation
RR2, Site 22, Comp 4
Hope, BC V0X 1L0
phone: (604) 869-2627
fax: (604) 869-9903

Siska First Nation
PO Box 519
Lytton, BC V0K 1Z0
phone: (250) 455-2219
fax: (250) 455-2539

Snuneymuxw First Nation
668 Centre Street
Nanaimo, BC V9R 4Z4
phone: (250) 753-3481
fax: (250) 753-3492

Songhees First Nation
1500A Admirals Road
Victoria, BC V9A 2R1
phone: (250) 386-1043
fax: (250) 386-4161

Spuzzum First Nation

Site 3, C-11, RR1

Yale, BC V0K 2S0

phone: (604) 863-2395

fax: (604) 863-2218

Sumas First Nation

RR4, 3092 Sumas Mountain Road

Abbotsford, BC V3G 2J2

phone: (604) 852-4040

fax: (604) 852-3834

Tsartlip First Nation

PO Box 70, Stelly's X-Road

Brentwood Bay, BC V8M 1R3

phone: (250) 652-3988

fax: (250) 652-3788

Tsawout First Nation

PO Box 121

Saanichton, BC V8M 2C3

phone: (250) 652-9101

fax: (250) 652-9114

Tsawwassen First Nation

131 N. Tsawwassen Drive B

Delta, BC V4M 4G2

phone: (604) 943-2112

fax: (604) 943-9226

Tseshah First Nation

PO Box 1218

Port Alberni, BC V9Y 7M1

phone: (250) 724-1225

fax: (250) 724-4385

Tseycum First Nation

1210 Totem Lane

Sidney, BC V8L 5S4

phone: (250) 656-0858

fax: (250) 656-0868

Union Bar First Nation

Box 788

Hope, BC V0X 1L0

phone: (604) 869-9466

fax: (604) 869-9466

Yale First Nation
PO Box 1869
Hope, BC V0X 1L0
phone: (604) 863-2443
fax: (604) 863-2467

Academic

Camosun College
Environmental Technology Program
3100 Foul Bay Road
Victoria, BC V8P 5J2
phone: (250) 370-3432
fax:
email: humphrey@camosun.bc.ca
website: www.camosun.bc.ca/schools/artsci/envirotech/index.html

Camosun College
Horticulture Program
4461 Interurban Road, RR #3
Victoria, BC V9E 2C1
phone: (250) 370-3841
fax:
email: camosunhort@vuv.com
website: www.camosun.bc.ca/schools/tradesntech/horticulture

Douglas College
Institute of Urban Ecology
PO Box 2503
New Westminster, BC V3L 5B2
phone: (604) 527-5522
fax: (604) 527-5095
email: iue@douglas.bc.ca
website: www.douglas.bc.ca/iue/title1.html

Malaspina University-College
Department of Biology, Department of Geography, Horticultural Technician Program
900 Fifth Street
Nanaimo, BC V9R 5S5
phone: (250) 753-3245
fax:
email:
website: www.mala.bc.ca

North Island College
Environmental Studies Program
2300 Ryan Road
Courtenay, BC V9N 8N6
phone: (800) 715-0914
fax:
email:
website: www.nic.bc.ca

Lester B. Pearson College of the Pacific
650 Pearson College Drive
Victoria, BC V9C 4H7
phone: (250) 391-2411
fax: (250) 391-2412
email:
website: www.pearson-college.uwc.ca/pearson

Royal Roads University
Environmental Programs
2005 Sooke Road
Victoria, BC V9B 5Y2
phone: (800) 788-8028
fax: (250) 391-2522
email:
website: www.royalroads.ca/ste/default.htm

Simon Fraser University
Department of Biological Sciences
Burnaby, BC V5A 1S6
phone: (604) 291-4475
fax: (604) 291-3496
email:
website: www.sfu.ca/biology/homepage.html

Simon Fraser University
School of Resource and Environmental Management
Burnaby, BC V5A 1S6
phone: (604) 291-4659
fax: (604) 291-4968
email: reminfo@sfu.ca
website: www.rem.sfu.ca

University of British Columbia
Centre for Applied Conservation Biology
3rd Floor, Forest Sciences Centre
3004-2424 Main Mall
Vancouver, BC V6T 1Z4
phone: (604) 822-5724
fax: (604) 822-5410
email:
website: www.forestry.ubc.ca/conservation/index.htm

University of British Columbia
Centre for Biodiversity Research
#1505 – 6270 University Boulevard
Vancouver, BC V6T 1Z4
phone: (604) 822-3820
fax: (604) 822-5558
email:
website: www.bcu.ubc.ca/~otto/Biodiversity.html

University of British Columbia
Botanical Garden
6501 N.W. Marine Drive
Vancouver, BC V6T 1W5
phone: (604) 822-9666
fax:
email:
website: www.hedgerows.com/UBCBotGdn

University of British Columbia
Sustainable Development Research Institute
B5-2202 Main Mall
Vancouver, BC V6T 1Z4
phone: (604) 822-8198
fax: (604) 822-9191
email: sdri@sdri.ubc.ca
website: www.sdri.ubc.ca

University of Victoria
Department of Biology
PO Box 3020, Stn. CSC
Victoria, BC V8W 3N5
phone: (250) 721-7094
fax:
email:
website: web.uvic.ca/biology

University of Victoria
Department of Geography
PO Box 3050, Stn. CSC
Victoria, BC V8W 3N5
phone: (250) 721-7327
fax: (250) 721-6216
email: infor@office.geog.uvic.ca
website: www.geog.uvic.ca

University of Victoria
Eco-Research Chair of Environmental Law and Policy
Faculty of Law
PO Box 2400
Victoria, BC V8W 3H7
phone: (250) 721-6388
fax: (250) 721-8146
email: ecochair@uvic.ca
website: www.law.uvic.ca/~elp

University of Victoria
Environmental Law Centre
Room 153, The Murray and Anne Fraser Building
PO Box 2400, Stn. CSC
Victoria, BC V8W 3H7
phone: (250) 721-8188
fax: (250) 472-4528
email: elc@uvic.ca
website: www.elc.uvic.ca

University of Victoria
Restoration of Natural Systems Program
School of Environmental Studies
Box 1700, Station CSC
Victoria, BC V8W 2Y2
phone: (250) 472-4568
fax: (250) 721-8985
email: rns@uvic.ca
website: www.uvcs.uvic.ca/restore

University of Victoria
Herbarium
Box 3020, Station CSC
Victoria, BC V8W 3N5
phone: (250) 721-7110
fax: (250) 721-7120
email:
website:

Non-governmental Organizations

Association for the Protection of Rural Metchosin
#1-4401 William Head Road
Victoria, BC V9C 3Y6
phone: (250) 478-9572
fax: (250) 478-737
email:
website:

BC Endangered Species Coalition
PO Box 383
Smithers, BC V0J 2N0
phone: (250) 847-2400
fax:
email: kate@extinctionsucks.org
website: www.extinctionsucks.org/main.html

British Columbia Conservation Foundation
#3-1200 Princess Royal Avenue
Nanaimo, BC V9S 3Z7
phone: (250) 716-8776
fax: (250) 716-2167
email: nanaimo@bccf.com
website: bccf.com.hsf/hsf.htm

British Columbia Environmental Network
610-207 West Hastings Street
Vancouver, BC V6B 1H7
phone: (604) 879-2279
fax: (604) 879-2272
email: info@bcen.bc.ca
website: www.bcen.bc.ca

British Columbia Field Ornithologists
PO Box 8059
Victoria, BC V8W 3R7
phone: (250) 979-0363
fax:
email: rhvander@home.com
website: birding.bc.ca/bcfo

British Columbia Wildlife Federation
#303-19292 60th Avenue
Surrey, BC V3S 8E5
phone: (800) 533-2293
fax: (604) 533-1592
email:
website: www.bcwf.bc.ca

Canadian Botanical Gardens Consortium for Biodiversity
c/o Dr. Iain Taylor
University of British Columbia Botanical Garden
6804 S.W. Marine Drive
Vancouver, BC V6T 1Z4
phone: (604) 822-2340
fax: (604) 822-6089
email: iepiep@interchange.ubc.ca
website: www.rbg.ca/cbcn/en/biodiversity/cbgcb

Canadian Parks and Wilderness Society
BC Chapter
502-475 Howe Street
Vancouver, BC V2C 2B3
phone: (604) 685-7445
fax: (604) 685-6449
email: info@cpawsbc.org
website: www.cpawsbc.org

Canadian Wildlife Federation
350 Michael Cowpland Drive
Kanata, ON K2M 2W1
phone: (800) 563-9453
fax: (613) 599-4428
email: info@cwf-fcf.org
website: www.cwf-fcf.org

Canadian Nature Federation
1 Nicholas Street, Suite 606
Ottawa, ON K1N 7B7
phone: (800) 267-4088
fax:
email: cnf@cnf.ca
website: www.cnf.ca

Common Ground Community Mapping Project
521 Superior Street
Victoria, BC V8V 1T7
phone: (250) 360-0799
fax: (250) 386-3449
email: cground@telus.net
website: www3.telus.net/cground/index.html

Comox Valley Community Land Society
279 Second Street
Courtenay, BC V9N 1B6
phone: (250) 334-0874
fax:
email:
website:

Comox Valley Naturalists Society
PO Box 3222
Courtenay, BC V9N 5N4
phone: (250) 338-9962
fax:
email: hovenden@mars.ark.com
website: www.comoxvalleynaturalist.bc.ca

Comox Valley Land Trust
PO Box 3462
Courtenay, BC V9N 5N5
phone: (250) 338-1368
fax: (250) 339-5855
email: cvlt@uniserve.com
website: www.communitythings.com/cvlt

Cowichan Community Land Trust
#6-55 Station Street
Duncan, BC V9L 1M2
phone: (250) 746-0227
fax: (250) 746-9608
email: cclt@island.net
website: www.island.net/~cclt

Cowichan Valley Naturalists Society
PO Box 361
Duncan, BC V9L 3X5
phone:
fax:
email:
website:

Denman Conservancy Association
PO Box 60
Denman Island, BC V0R 1T0
phone: (250) 335-0517
fax: (250) 335-2731
email: pcdsres@island.net
website: denmanis.bc.ca/conservate/table.html

Ecotrust Canada
Suite 202-1226 Hamilton Street
Vancouver, BC V6B 2S8
phone: (604) 682-4141
fax: (604) 682-1944
email: info@ecotrustcan.org
website: www.ecotrustcan.org

Evergreen Foundation West
#410-744 West Hastings Street
Vancouver, BC V6C 1A5
phone: (604) 689-0766
fax: (604) 669-6222
email: infobc@evergreen.ca
website: www.evergreen.ca/home.html

Federation of BC Naturalists
1367 West Broadway
Vancouver, BC V6H 4A9
phone: (604) 737-3057
fax: (604) 738-7175
email: fbcn@intergate.bc.ca
website: members.nbc.com/fbcn

Friends of Beacon Hill Park
#1-366 St. Charles Street
Victoria, BC V8S 3N3
phone:
fax:
email:
website:

Friends of Bowker Creek
2850 Queenston Street
Victoria, B.C. V8R 4P3
phone: (250) 592-1423
fax:
email: chrisdare@home.com
website: <http://www.members.home.net/chrisdare/bowker.htm>

Friends of Government House Gardens Society
1401 Rockland Avenue
Victoria, BC V8S 1V9
phone: (250) 356-5139
fax:
email:
website: www.ltgov.bc.ca/gardens/default.htm#g11

Friends of Ecological Reserves
PO Box 8477, Stn. Central
Victoria, BC V8W 3S1
phone:
fax:
email: ecoreserves@hotmail.com
website:

Friends of John Dean Park
8727 Lochside Drive
Sidney, BC V8L 1M8
phone:
fax:
email:
website:

Friends of Knockan Hill Park Society
81 High Street
Victoria, BC V8Z 5C8
phone:
fax:
email:
website:

Friends of Matson Lands
944 Dunsmuir Road
Esquimalt, BC V9A 5C3
phone: (250) 381-8648
fax:
email: garryoakmeadow@yahoo.com
website: www.angelfire.com/bc2/garryoakmeadow/index.html

Friends of Mount Douglas Park
4285 Cedar Hill Road
Victoria, BC V8N 3C7
phone:
fax:
email:
website:

Friends of Summit Park
1310 Summit Avenue
Victoria, BC V8T 2R1
phone: (250) 995-0001
fax:
email:
website:

Friends of Tod Creek Watershed
237 Meadowbrook Road, RR#7
Victoria, BC V9E 1J5
phone:
fax: (250) 479-8801
email: bbowker@pacificcoast.net
website:

Galiano Conservancy Association
RR#1, Sturdies Bay Road
Galiano Island, BC V0N 1P0
phone: (250) 539-2424
fax: (250) 539-2424
email: galiano_conservancy@gulfislands.com
website:

Garry Oak Meadow Preservation Society
A-954 Queens Avenue
Victoria, BC V8T 1M6
phone: (250) 361-1694
fax:
email: info@garryoak.bc.ca
website: www.garryoak.bc.ca

Garry Oak Restoration Project
c/o District of Saanich Environmental Services
770 Vernon Avenue
Victoria, BC V8X 2W7
phone: (250) 475-5494
fax: (250) 475-5450
email: macdonald@gov.saanich.bc.ca
website:

Gowlland Foundation
Box 7164, Depot 4
Victoria, BC V9B 4Z3
phone: (250) 474-4124
fax:
email:
website:

Green Spaces Project of the Victoria Natural History Society
2643 Victor Street
Victoria, BC V8R 4E3
phone: (250) 595-6812
fax:
email: tonyembleton@home.com

Grasslands Conservation Council of BC
954 A Laval Crescent
Kamloops, BC V2C 5P5
phone: (250) 374-5787
fax: (250) 374-6287
email: gcc@telus.net
website:

Habitat Acquisition Trust
PO Box 8552
Victoria, BC V8W 3S2
phone: (250) 995-2428
fax: (250) 995-2428
email: hatmail@home.com
website: www.hat.bc.ca

Harmony Foundation
1183 Fort Street
Victoria, BC V8V 3L1
phone: (250) 380-3001
fax: (250) 380-0887
email: harmony@islandnet.com
website: www.islandnet.com/~harmony

Heartlands Conservancy Society
PO Box 187
Gabriola, BC V0R 1X0
phone:
fax:
email: hcs@island.net
website: www.island.net/~hcs

Heritage Tree Society
2452 Camelot Road
Victoria, BC V8N 1J4
phone: (250) 477-5026
fax:
email:
website:

Hornby Island Conservancy
PO Box 55
Hornby Island, BC V0R 1Z0
phone: (250) 335-2887
fax:
email:
website:

Horticulture Centre of the Pacific
505 Quayle Road
Victoria, BC V8X 3X1
phone: (250) 479-6162
fax: (250) 479-6047
email: hcp.info@hcp.bc.ca
website: www.hcp.bc.ca

The Land Centre
#202-1089 West Broadway
Vancouver, BC V6H 1E5
phone: (604) 688-1150
fax: (604) 688-1170
email: info@landcentre.ca
website: www.landcentre.ca

The Land Conservancy of British Columbia
5793 Old West Saanich Road
Victoria, BC V9E 2H2
phone: (250) 479-8053
fax: (250) 744-2251
email: admin@conservancy.bc.ca
website: www.conservancy.bc.ca

Land Trust Alliance of British Columbia
#204-338 Lower Ganges Road
Salt Spring Island, BC V8K 2V3
phone: (250) 538-0112
fax:
email: sheila@landtrustalliance.bc.ca
website: landtrustalliance.bc.ca

Langford Lake Area Protection Society
2900 Leigh Road
Victoria, BC V9B 4G3
phone:
fax:
email: mail@LLaps
website: www.ultranet.ca/LLAPS

Mount Arrowsmith Biosphere Foundation
PO Box 217
Parksville, BC V9P 2G4
phone:
fax:
email: info@mountarrowsmithbioshpere.ca
website: www.mountarrowsmithbiosphere.ca

Mount Tolmie Conservancy Association
3503 Camcrest Place
Victoria, BC V8P 4V6
phone: (250) 592-9089
fax:
email: upgareau@islandnet.com
website: <http://www.geocities.com/RainForest/1234/>

Nanaimo Area Land Trust
151 Skinner Street
Nanaimo, BC V9R 5E8
phone: (250) 714-1990
fax:
email: admin@nalt.bc.ca
website: www.nalt.bc.ca

Nanaimo Field Naturalists
PO Box 125
Nanaimo, BC V8R 5K4
phone: (250) 758-0338
fax:
email: president@nanaimofieldnaturalists.ca
website: www.nanaimofieldnaturalists.ca

Native Plant Society of British Columbia
14275-96th Avenue
Surrey, BC V3V 7Z2
phone:
fax:
email:
website:

Native Plant Study Group
Victoria Horticultural Society
PO Box 5081, Station B
Victoria, BC V8R 6N3
phone: (250) 592-8618
fax:
email: decoratingden@home.com
website: victoria.tc.ca/Recreation/VHS

Nature Conservancy of Canada
Suite 202, 26 Bastion Square
Victoria, BC V8W 1H9
phone: (250) 479-3191
fax: (250) 479-0546
email: bcoffice@natureconservancy.ca
website: www.bc.natureconservancy.ca

The Nature Trust of British Columbia
260-1000 Roosevelt Crescent
North Vancouver, BC V7P 1M3
phone: (604) 924-9771
fax: (604) 924-9772
email:
website: www.mybc.com/groups-naturetrust

North American Native Plant Society
PO Box 84, Station D
Etobicoke, ON M9A 4X1
phone: (416) 680-6280
fax:
email: nanps@nanps.org
website: www.nanps.org

Northwest Wildlife Preservation Society
707-1112 West Pender Street
Vancouver, BC V6E 2S1
phone: (604) 713-6686
fax: (604) 713-6698
email: nwps@direct.ca
website: persweb.direct.ca/nwps/index.html

Oaklands Greenways Project
c/o 1325 Kings Road
Victoria, BC V8R 2N6
phone: (250) 595-5600
fax:
email: patj@tnet.net
website:

Partners in Flight, BC and Yukon
5421 Robertson Road, RR#1
Delta, BC V4K 3N2
phone: (604) 940-4683
fax: (604) 946-7022
email: Krista.Degroot@ec.gc.ca
website: www.cws-scf.ec.gc.ca/canbird/pif/p_title.htm

Pender Islands Conservancy Association
PO Box 52
Pender Island, BC V0N 2M0
phone: (250) 629-6416
fax: (250) 629-6432
email: pica@gulfislands.com
website:

Pender Island Field Naturalists
3825 Cutlass, RR2
Pender Island, BC V8K 1Z6
phone: (250) 629-3381
fax:
email:
website:

Portage Inlet Sanctuary Colquitz Estuary Society
1121 Skeena Place
Victoria, BC V8Z 1L8
phone: (250) 479-1877
fax:
email:
website:

Rithet's Bog Conservation Society
4006 Grange Road
Victoria, BC V8Z 5K5
phone:
fax:
email:
website:

Rosewall to Bonnell Land Trust
563 West Crescent
Qualicum Beach, BC V9K 1J2
phone:
fax:
email:
website:

Saanich Greenbelt Association
4190 Glendenning Road
Victoria, BC V8X 2B5
phone: (250) 477-1775
fax:
email:
website:

Salt Spring Island Conservancy
PO Box 722, Ganges Post Office
Salt Spring Island, BC V8K 2V3
phone: (250) 538-0318
fax: (250) 538-0319
email: ssiconservancy@saltspring.com
website: www.salt-spring.bc.ca/conservancy

Salt Spring Island Water Preservation Society
PO Box 555, Ganges Post Office
Salt Spring Island, BC V8K 2W3
phone: (250) 537-9281
fax: (250) 537-4192
email: insight@saltspring.com
website:

Savary Island Land Trust
PO Box 141
Lund, BC V0N 2G0
phone:
fax:
email:
website: www.discoversavary.bc.ca/silt.html

SmartGrowthBC
c/o 201-402 West Pender Street
Vancouver, BC V6B 1T6
phone: (604) 915-5234
fax: (604) 915-5236
email: info@smartgrowth.bc.ca
website: www.smartgrowth.bc.ca

Sierra Legal Defence Fund
214-131 Water Street
Vancouver, BC V6B 4M3
phone: (604) 685-5618
fax: (604) 685-7813
email: sldf@sierralegal.org
website: www.sierralegal.org

Sierra Club of British Columbia
576 Johnson Street
Victoria, BC V8W 1M3
phone: (250) 386-5255
fax: (250) 386-4453
email: info@sierraclubbc.org
website: bc.sierraclub.ca

Society for Conservation Biology, Victoria Local Chapter
University of Victoria
phone:
fax:
email:
website: office.geog.uvic.ca/dept/news/localchp.html

Society for Ecological Restoration, British Columbia Chapter
c/o Symbios Research & Restoration
PO Box 3398, 3868 13th Avenue
Smithers, BC V0J 2N0
phone: (250) 847-0278
fax: (250) 847-0279
email: symbios@mail.bulkley.net
website: www.ser.org/chapters.html

Somenos Marsh Wildlife Society
PO Box 711
Duncan, BC V9L 3Y1
phone:
fax:
email:
website: www.vial.com/somenos

David Suzuki Foundation
Suite 219, 2211 West 4th Avenue
Vancouver, BC V6K 4S2
phone: (604) 732-4228
fax: (604) 732-0732
email: solutions@davidsuzuki.org
website: www.davidsuzuki.org

Swan Lake Christmas Hill Nature Sanctuary Society
3873 Swan Lake Road
Victoria, BC V8X 3W1
phone: (250) 479-0211
fax: (250) 479-0132
email: willmacgill@swanlake.bc.ca
website: www.swanlake.bc.ca

Thetis Island Conservancy
PO Box 5-8
Thetis Island, BC V0R 2X0
phone:
fax:
email:
website:

Thetis Park Nature Sanctuary Association
c/o 666 Jones Terrace
Victoria, BC V8Z 2L7
phone: (250) 727-7675
fax: (250) 727-7609
email: mmeagher@PFC.forestry.ca
website:

Tree Canada Foundation
220 Laurier Avenue West, Suite 1550
phone: (613) 567-5545
fax: (613) 567-5270
email: tcf@treecanada.ca
website: www.treecanada.ca

Vancouver Island Public Interest Research Group
University of Victoria
PO Box 3035, Stn. CSC
Victoria, BC V8W 3P3
phone:
fax:
email: vipirg@uvic.ca
website: www.finearts.uvic.ca/~vipirg

Van Dusen Botanical Gardens
5251 Oak Street
Vancouver, BC V6T 4H1
phone: (604) 878-9274
fax: (604) 266-4236
email:
website:

Veins of Life Watershed Society
Box 36057-1153 Esquimalt Road
Victoria, BC V9A 7J5
phone: (250) 383-2086
fax:
email: volws@home.com
website: www.islandnet.com/~volws

Victoria Horticultural Society
PO Box 5081, Station B
Victoria, BC V8R 6N3
phone: (250) 592-8618
fax:
email: decoratingden@home.com
website: victoria.tc.ca/Recreation/VHS

Victoria Natural History Society
PO Box 5220, Stn. B
Victoria, BC V8R 6N4
phone: (250) 479-2054
fax:
email:
website:

West Coast Environmental Law Association
Suite 1001, 207 West Hastings Street
Vancouver, BC V6B 1H7
phone: (604) 684-7378
fax: (604) 684-1312
email: admin@wcel.org
website: www.wcel.org

Western Canada Wilderness Committee
227 Abbott Street
Vancouver, BC V6B 2K7
phone: (800) 661-9453
fax: (604) 683-8229
email: info@wildernesscommittee.org
website: www.wildernesscommittee.org

WBT Wild Bird Trust of British Columbia
124-1489 Marine Drive
West Vancouver, BC V7T 1B8
phone: (604) 924-2581
fax: (604) 924-2581
email: minerva@direct.ca
website:

Wildlife Habitat Canada
7 Hinton Avenue North, Suite 200
Ottawa, ON K1Y 4P1
phone: (613) 722-2090
fax: (613) 722-3318
email:
website: www.whc.org

Wildlife Preservation Trust Canada
120 King Street, Guelph, ON N1E 4P8
phone: (800) 956-6608
fax: (519) 836-8840
email: wptc@wptc.org
website: www.wptc.org

World Wildlife Fund Canada
245 Eglinton Ave. East, Suite 410
Toronto, ON M4P 3J1
phone: (800) 267-2632
fax: (416) 489-8055
email:
website: www.wwwfcanaga.org

Community, Neighbourhood, and Ratepayers Associations

Contact information for most community, neighbourhood, and ratepayers associations changes frequently and hence is not included here. Current contact information for local associations is available from many municipalities.

Bazan Bay Community Association
Braefoot Allison Ratepayers Association
Broadmead Area Residents Association
Burnside Gorge Community Association

Cadboro Bay Residents Association
Camosun Community Association
Cedar Hill Park Preservation Committee
Central Oak Bay Residents Association
Cordova Bay Association for Community Affairs
Crofton Community Association
Dean Park Estates Community Association
Downtown Blanshard Community Advisory Committee
Downtown Neighbourhood Association
Fairfield Community Association
Falaise Crescent Community Association
Fernwood Community Association
Gonzales Hill Preservation Society
Glanford Homeowners Association
Gordon Head Residents' Association
Gorge Tillicum Community Association
Harris Green Community Association
James Bay Neighbourhood Environmental Association
Lands End Residents' Association
Mount Tolmie Community Association
North Henderson Residents Association
North Jubilee Neighbourhood Association
North Park Neighbourhood Association
North Quadra Land Use Protection Association
North Saanich Residents' Association
Oakland Community Association
Prospect Lake Community Association
Quadra/Cedar Hill Community Association
Rainbow Park Ratepayers Association
Rock Bay Ratepayers Association
Rockland Neighbourhood Association
Royal Oak Community Association
South Gordon Head Homeowners' Association
South Jubilee Neighbourhood Association
South Oak Bay Residents Association
Strawberry Vale Community Ratepayers Association
Victoria Harbour Residents Association
Victoria West Community Association
West Bay Residents Association
Wilkinson Valley Residents Association
Willis Point Community Association

Commercial and Professional

Architectural Institute of British Columbia
100-440 Cambie Street
Vancouver, BC V6B 2N5
phone: (800) 667-0753
fax: (800) 661-2955
email: aibc@aibc.bc.ca
website: www.aibc.bc.ca

BC Hydro
333 Dunsmuir Street, 16th Floor
Vancouver, BC V6B 5R3
phone: (800) 224-9376
fax:
email:
website: www.bchydro.com

British Columbia Landscape and Nursery Association
101-5830 176A Street
Surrey, BC V3S 4E3
phone: (800) 421-7963
fax: (604) 574-7773
email: kdejong@idmail.com
website: www.canadanursery.com/bclna/index.shtml

British Columbia Society of Landscape Architects
110-355 Burrard Street
Lobby of the Marine Building
Vancouver, BC V6C 2G8
phone: (604) 682-5610
fax: (604) 681-3394
email: admin@bcsla.org
website: www.bcsla.org

Chemainus Chamber of Commerce
PO Box 575
9796 Willow Street
Chemainus, BC V0R 1K0
phone: (250) 246-3944
fax: (250) 246-3251
email: ccoc@tourism.chemainus.bc.ca
website: www.chemainus.com/chamber.htm

Comox Valley Chamber of Commerce
2040 Cliffe Avenue
Courtenay, BC V9N 2L3
phone: (888) 357-4471
fax: (250) 334-4908
email: chamber@mars.ark.com
website: www.comoxvalleychamber.ca

Cowichan Tourism Association
25 Canada Avenue
Duncan, BC V9L 1T3
phone: (250) 715-0709
fax:
email: info@cowichan.bc.ca
website: www.cowichan.bc.ca

Galiano Island Chamber of Commerce
phone:
fax:
email: info@galianoisland.com
website: www.galianoisland.ca

Ladysmith Chamber of Commerce
PO Box 598
26 Gatacre Street
Ladysmith, BC V9G 1A4
phone: (250) 245-2112
fax: (250) 245-2124
email: info@ladysmithcoc.com
website: www.ladysmithcofc.com

Cumberland Chamber of Commerce
PO Box 250
2755 Dunsmuir Avenue
Cumberland, BC V0R 1S0
phone: (250) 336-8313
fax: (250) 336-2455
email: cumbchamber@comox.island.net
website: www.island.net/~cumbcham

Duncan-Cowichan Chamber of Commerce
381-A Trans Canada Highway
Duncan, BC V9L 3R5
phone: (250) 748-1111
fax: (250) 746-8222
email: duncanc@islandnet.com
website: www.duncanc.bc.ca

Greater Nanaimo Chamber of Commerce
Suite E-77 Doplan Street
Nanaimo, BC V9S 2H7
phone: (250) 753-1191
fax: (250) 754-5186
email: info@nanaimochamber.bc.ca
website: www.nanaimochamber.bc.ca

Gabriola Island Chamber of Commerce
PO Box 249
575 North Road
Gabriola Island, BC V0R 1X0
phone: (250) 247-9332
fax: (250) 247-9332
email: info@gabriolaisland.org
website: www.gabriolaisland.org

Mayne Island Chamber of Commerce
PO Box 2
Mayne Island, BC V0N 2J0
phone:
fax:
email: mayne_chamber@gulfislands.com
website: www.mayneislandchamber.ca

Planning Institute of British Columbia
10551 Shellbridge Way
Richmond, BC V6X 2W9
phone: (604) 270-2061
fax: (604) 270-9116
email: rhobbs@civicnet.gov.bc.ca
website: www.pibc.bc.ca

Tourism Association of Vancouver Island
#203-335 Wesley Street
Nanaimo, BC V9R 2T5
phone: (250) 754-3500
fax: (250) 754-3599
email:
website:

Tourism Nanaimo
2290 Bowen Road
Nanaimo, BC V9T 3K7
phone: (800) 663-7337
fax:
email: info@tourismnanaimo.com
website: www.tourism.nanaimo.bc.ca

Parksville Chamber of Commerce
PO Box 99
1275 Eat Island Highway
Parksville, BC V9P 2G3
phone: (250) 248-3613
fax:
email: info@chamber.parksville.bc.ca
website: www.chamber.parksville.bc.ca

Pender Island Chamber of Commerce
c/o Pender Island Lumber
3338 Prot Washington Road
Pender Island, BC V0N 2M0
phone: (250) 888-3737
fax:
email:
website: www.penderislandchamber.com

Qualicum Beach Chamber of Commerce
2711 West Island Highway
Qualicum Beach, BC V9K 2C4
phone: (250) 752-9532
fax: (250) 752-2923
email: info@qualicum.bc.ca
website: www.qualicum.bc.ca

Saanich Peninsula Chamber of Commerce
PO Box 2014
10382 Pat Bay Highway
Sidney, BC V8L 3S3
phone: (250) 656-3616
fax: (250) 653-7111
email: saanpcoc@spcoc.org
website: www.spcoc.org

Tourism Victoria
31 Bastion Square
Victoria, BC V8W 1J1
phone: (250) 414-6999
fax: (250) 361-9733
email:
website:

Urban Development Institute, Victoria Chapter
101-727 Fisgard Street
Victoria, BC V8W 1R5
phone: (250) 383-1072
fax: (250) 383-1072
email:
website: www.udl.bc.ca

Vancouver Island Real Estate Board

PO Box 719

6374 Metral Drive

Nanaimo, BC V9T 2L8

phone:

fax: (250) 390-5014

email: vireb@vireb.com

website: www.vireb.com

Victoria Real Estate Board

3035 Nanaimo Street

Victoria, BC V8T 4W2

phone: (250) 385-7766

fax: (250) 385-8773

email: vreb@vreb.org

website: www.vreb.org

West Shore Chamber of Commerce

2830 Aldwynd Road

Victoria, BC V9B 3S7

phone: (250) 478-1130

fax: (250) 478-1584

email: web@westshore.bc.ca

website: westshore.bc.ca

Appendix 7

Potential Funding Partners and Contact Information

Potential funding partners are suggestions only. No commitment on the part of the potential funding partners is implied. Participation of funding agencies not included in this list is welcome and encouraged. Because all provincial funding programs are currently being re-evaluated, with few exceptions provincial funding programs are not included.

Government Agency and Crown Corporation Funding Programs

British Columbia Heritage Trust
PO Box 9818, Stn. Prov. Govt.
Victoria, BC V8W 9W3
phone: (250) 356-1433
fax: (250) 356-7796
email: heritage@tbc.gov.bc.ca
website: www.heritage.gov.bc.ca/trust/htint.htm

Climate Change Action Fund
5 Murray Street, Suite 600
Ottawa, ON K1N 5M3
phone: (613) 943-2671
fax: (613) 943-2694
email: ccaf@climatechange.gc.ca
website: www.climatechange.gc.ca/english/actions/action_fund/index.shtml

Community Animation Program
Environment Canada
700-1200 West 73rd Avenue
Vancouver, British Columbia V6P 6H9
phone: (250) 595-7779
fax:
email: cap.pyr@ec.gc.ca
website: www.pyr.ec.gc.ca/cap/what_e.html

Community-University Research Alliances
Research and Dissemination Grants Programs Division
Social Sciences and Humanities Research Council
350 Albert Street, PO Box 1610
Ottawa, ON K1P 6G4
phone: (613) 943-1145
fax: (613) 992-7635
email: allen.middlebro@sshrc.ca
website: www.sshrc.ca/english/programinfo/grantsguide/cura.html

EcoAction
Environment Canada
1200 West 73rd Avenue, Suite 700
Vancouver, BC V6P 6H9
phone: (800) 6677779
fax: (604) 261-4111
email: ecoaction.pyr@ec.gc.ca
website: www.ec.gc.ca/ecoaction

Georgia Basin Ecosystem Initiative
Bruce Kay, Manager
Georgia Basin Coordination Office
Environment Canada
phone: (604) 713-9528
Sarah Hutcheson
BC Ministry of Sustainable Resource Management
phone: (250) 387-1850
website: www.pyr.ec.gc.ca/GeorgiaBasin/gbi_eIndex.htm

Habitat Conservation Trust Fund
PO Box 9354, Stn. Prov. Govt.
Victoria, BC V8W 9M1
phone: (250) 387-9853
fax: (250) 952-6684
email:
website: www.elp.gov.bc.ca/hctf

Habitat Stewardship Program
Coral deShield
Pacific Wildlife Research Centre
Environment Canada, Canadian Wildlife Service, Pacific and Yukon Region
5421 Robertson Road, RR #1
Delta, BC V4K 3N2
phone: (604) 940-4697
fax: (604) 946-7922
email: Coral.deShield@ec.gc.ca
website: www.speciesatrisk.gc.ca/species/sar/media/back2_e.htm

Human Resources Development Canada
Student Summer Job Action, Youth Internship Canada, Youth Service Canada
PO Box 1177/CP 1177
Victoria, BC V8W 2V2
phone: (800) 277-9914
fax:
email: gc-sc@hrdc.gc.ca
website: www18.hrdc-drhc.gc.ca/programs/community.asp

Indian Environmental Assistance Fund
Indian and Northern Affairs Canada
Ottawa, ON K1A 0H4
phone: (819) 997-0380
fax:
email: InfoPubs@inac.gc.ca
website: www.ainc-inac.gc.ca/ps/lts/p38/p38_e.html

Natural Sciences and Engineering Research Council of Canada
350 Albert Street
Ottawa, ON K1A 1H5
phone: (613) 995-5992
fax: (613) 992-5337
email: resgrant@nserc.ca
website: www.nserc.ca

North American Fund for Environmental Cooperation
c/o North American Commission for Environmental Cooperation
393 St. Jacques West, Suite 200
Montreal, QC H2Y 1N9
phone: (514) 350-4357
fax: (514) 350-4314
email: NAFEC@ccemtl.org
website: www.cec.org/grants/index.cfm?varlan=english

Provincial Capital Commission Greenways Program
613 Pandora Avenue
Victoria, BC V8W 1N8
phone: (250) 953-8800
fax: (250) 386-1303
email: info@bcpsc.com
website: www.bcpsc.com

Science Council of British Columbia
Suite 400-4710 Kingsway
Burnaby, BC V5H 4M2
phone: (800) 665-7222
fax: (604) 438-6564
email: infor@scbc.org
website: www.scbc.org

Young Canada Works in Science and Technology
c/o Canadian Museums Association
400-280 Metcalfe Street
Ottawa, ON K2P 1R7
phone: (613) 567-0099
fax: (613) 233-5438
email: mpaguet@ museums.ca
website: www.phc.gc.ca/YCW-JCT/english/overview.htm

Foundations and Non-profit Organizations

Acorn Foundation
c/o Common Counsel Foundation
1221 Preservation Park Way
Oakland, CA 94612-1206
phone: (510) 834-2995
fax: (510) 834-2998
email: ccounsel@igc.org
website: www.commoncounsel.org/pages/foundation.html

Allstate Foundation of Canada
10 Allstate Parkway
Markham, Ontario L3R 5P8
phone: (905) 475-4551
fax: (905) 475-4488
email:
website: www.allstate.ca

James L. Baillie Memorial Fund for Bird Research and Preservation
Dr. David M. Bird, Chair, Society of Canadian Ornithologists Research and Award Committee
Avian Science and Conservation Centre
McGill University
Ste. Anne de Bellevue, QC H9X 3V9
phone:
fax:
email: bird@nrs.mcgill.ca
website: www.bsc-eoc.org/organization/jlbmf.html

BirdLife International and Fauna & Flora International
BP Conservation Programme
Wellbrook Court
Girton Road
Cambridge, UK CB3 0NA
phone: +44(0) 1223 277318
fax: +44(0) 1223 277200
email: bp-conservation-programme@birdlife.org.uk
website: www.bp.com/conservation

Birks Family Foundation
Suite 534, 606 Cathcart
Montreal, QC M3B 1K9
phone:
fax:
email:
website:

S.M. Blair Family Foundation
c/o National Trust Co.
21 King street East
Toronto, ON M5C 1B3
phone:
fax:
email:
website:

Body Shop Charitable Foundation
33 Kern Road
Don Mills, ON M3B 1S9
phone: (416) 441-4189
fax: (416) 441-0712
email:
website: www.thebodyshop.ca

Brainerd Foundation
1601 Second Avenue, Suite 610
Seattle, WA 98101
phone: (206) 448-0676
fax: (206) 448-7222
email: info@brainerd.org
website: www.brainerd.org

British Columbia Conservation Foundation
#3-1200 Princess Royal Avenue
Nanaimo, BC V9S 3Z7
phone: (250) 716-8776
fax: (250) 716-2167
email: nanaimo@bccf.com
website: bccf.com.hsf/hsf.htm

Bullitt Foundation
1212 Minor Avenue
Seattle, WA 98101-2825
phone: (206) 343-0807
fax: (206) 343-0822
email: info@bullitt.org
website: www.bullitt.org

Samuel and Saidye Bronfman Family Foundation
1170 Peel Street, 8th Floor
Montreal, QC H3B 4P2
phone: (514) 878-5270
fax: (514) 878-5293
email:
website: www.web.net/urban/eintro.html

Canadian Nature Federation
Important Bird Area Outreach Coordinator
1 Nicholas Street, Suite 606
Ottawa, ON K1N 7B7
phone: (613) 562-8208 ext 245
fax: (613) 562 3371
email: iba@cnf.ca
website: www.cnf.ca/bird/birds_caf.html

Canadian Wildlife Federation
350 Michael Cowpland Drive
Kanata, ON K2M 2W1
phone: (613) 599-9594
fax: (613) 599-4428
email: info@cwf-fcf.org
website: www.cwf-fcf.org

Carthy Foundation
PO Box 2554, Station M
Calgary, AB T2P 2M7
phone:
fax:
email:
website:

Cloverleaf Foundation
304 Shakespeare Drive
Waterloo, ON N2L 2V1
phone:
fax:
email:
website:

Comox Valley Community Foundation
PO Box 3126
Courtenay, BC V9N 5N4
phone: (250) 339-9935
fax:
email: contact@cvcfoundation.org
website: www.cvcfoundation.org

Earthlife Canada Foundation
PO Box 2241, Main Post Office
Vancouver, BC V6B 3W2
phone: (250) 559-8068
fax: (250) 559-8006
email: jb@helix.net
website:

Earthwatch Institute & Center for Field Research

3 Clocktower Place, Suite 100
PO Box 75
Maynard, MA 01754
phone: (978) 461-0081
fax: (978) 461-2332
email: cfr@earthwatch.org
website: www.earthwatch.org/aboutew.cfr.html

EJLB Foundation
1350 Sherbrooke Street West, Suite 1050
Montreal, QC H3G 1J1
phone: (514) 843-5112
fax: (514) 843-4080
email:
website: www.ejlb.qc.ca

Entomological Foundation
9301 Annapolis Road, Suite 300
Lanham, MD 20706
phone: (301) 731-4535 ext. 3029
fax: (301) 731-4538
email: April@entsoc.org
website: www.entsoc.org/foundation/Fdn.html

Evergreen West
#410-744 West Hastings Street
Vancouver, BC V6C 1A5
phone: (604) 689-0766
fax: (604) 669-6222
email: infobc@evergreen.ca
website: www.evergreen.ca

Fauna & Flora International – USA
3490 California Street, Suite 201
San Francisco, CA 94118
phone: (800) 221-9524
fax: (415) 346-7612
email: falunaflora@earthlink.net
website: www.fauna-flora.org

Ford Foundation
320 East 43rd Street
New York, NY 10017
phone: (212) 573-5261
fax: (212) 351-3660
email: office-secretary@fordfound.org
website: www.fordfound.org

Friends of Ecological Reserves
PO Box 8477, Stn. Central
Victoria, BC V8W 3S1
phone:
fax:
email: ecoreserves@hotmail.com
website:

Friends of the Environment Foundation
Amanda Perry, FEF Manager, Pacific, Alberta and Central Canada Regions
700 West Georgia Street
TD Tower – 3rd Floor
Vancouver, BC V7Y 1A2
phone: (604) 654-8832
fax: (604) 654-5531
email: perry.amanda@canadatrust.com
website: www.fef.ca

William and Flora Hewlett Foundation
525 Middlefield Road, Suite 200
Menlo Park, CA 94025
phone: (650) 329-1070
fax: (650) 329-9342
email: infor@hewlett.org
website: [www.](http://www.hewlett.org)

Hudson's Bay History Foundation
401 Bay Street, Suite 2407
Toronto, ON M5H 2Y4
phone:
fax:
email:
website: www.historysociety.ca/english/hbhf/hbayfoundE.html

Hylcan Foundation
129 Irvine Avenue
Westmount, QC H3Z 2K3
phone: (514) 933-5114
fax: (514) 488-3288
email:
website:

Imperial Oil Charitable Foundation
111 St. Clair Avenue West
Toronto, ON M5W 1K3
phone: (800) 668-3776
fax:
email:
website: www.imperialoil.ca/thisis/donations

W. Alton Jones Foundation
232 East High Street
Charlottesville, VA 22902-5718
phone: (804) 295-2134
fax: (804) 295-1648
email: sustainable@wajones.org
website: www.wajones.org

Henry P. Kendall Foundation
176 Federal Street
Boston, MA 02110
phone: (617) 951-2525
fax:
email:
website: www.kendall.org

Koerner Foundation
Scotia Plaza, Suite 5010
40 King Street West
Toronto, ON M5H 3Y2
phone:
fax:
email:
website:

Kongsgaard-Goldman Foundation
1932 First Avenue, Suite 602
Seattle, WA 98101
phone: (206) 448-1874
fax: (206) 448-1973
email: kf@kongsgaard-goldman.org
website: www.kongsgaard-goldman.org

Laidlaw Foundation
365 Bloor Street East Suite 2000
Toronto, ON M4W 3L4
phone: (416) 964-3614
fax: (416) 975-1428
email:
website: www.laidlawfdn.org

Lazar Foundation
510 SW Third Avenue, Suite 416
Portland, OR 97204
phone: (503) 225-0265
fax: (503) 225-9620
email: ladfdn@aol.com
website: eelink.net/GAIN/NW.dir/entry.200.html

McLean Foundation
2 St. Clair Avenue W. Suite 1008
Toronto, ON M4V 1L5
phone: (416) 964-6802
fax: (416) 964-2804
email: mcleanfoundation@primus.ca
website: www.mcleanfoundation.on.ca

J.W. McConnell Family Foundation
Suite 1800, 1002 Sherbrooke Street West
Montreal, QC H3A 3L6
phone: (514) 288-2133
fax:
email: inquiries@mcconnellfoundation.ca
website: www.mcconnellfoundation.ca

George Cedric Metcalf Charitable Foundation
174 Avenue Road
Toronto, ON M5R 2J1
phone: (416) 926-0366
fax: (416) 926-0370
email: shouston@metcalffoundation.com
website: www.metcalffoundation.com

Charles Stewart Mott Foundation
Mott Foundation Building
503 S. Saginaw Street, Suite 1200
Flint, MI 48502-1851
phone: (810) 238-5651
fax: (810) 766-1753
email: infocenter@mott.org
website: www.mott.org

Nanaimo Community Foundation
106-619 Comox Road
Nanaimo, BC V9R 5V8
phone: (250) 714-0047
fax:
email:
website: www.nanaimocommunityfoundation.com

National Fish and Wildlife Foundation
Pacific Northwest Region
806 SW Broadway, Suite 750
Portland, OR 97205
phone: (503) 417-8700
fax: (503) 417-8787
email:
website: www.nfwf.org

National Wildlife Federation
1400 16th Street N.W., Suite 501
Washington, DC 20036
phone: (202) 797-6892
fax:
email: harrison@nwf.org
website: www.nwf.org/wildalive/SRF/srfhome.html

Neptis Foundation
50 Park Road
Toronto, ON M4W 2N5
phone: (416) 972-9199
fax: (416) 972-9198
email:
website:

David and Lucile Packard Foundation
300 Second Street, Suite 200
Los Altos, California 94022
phone: (650) 948-7658
fax:
email: inquiries@packfound.org
website: www.packfound.org

Parksville-Qualicum Community Foundation
208 West First Avenue
Qualicum Beach, BC V9K 1H1
phone: (250) 752-7202
fax: (250) 752-7246
email: pqfoundation@bcsupernet.com
website: www.bcsupernet.com/pqfoundation

Real Estate Foundation of British Columbia
Suite 570-355 Burrard Street
Vancouver, BC V6C 2G8
phone: (604) 688-6800
fax: (604) 688-3669
email: ref@istar.ca
website: www.landcentre.ca/foundation

Rockefeller Brothers Fund
437 Madison Avenue, 37th Floor
New York, NY 10022-7001
phone: (212) 812-4200
fax: (212) 812-4299
email: rock@rbf.org
website: www.lrbf.org

Royal Bank Financial Group Foundation
1055 West Georgia Street

Vancouver, BC V6E 3S5
phone:
fax:
email:
website: www.royalbank.ca/community/donations

Suncor Energy Foundation
112-4th Avenue S.W.
Calgary, AB T2P 2V5
phone: (403) 269-8775
fax: (403) 269-6240
email:
website: www.suncor.com/we_care/wecare_communityinvolve.html

Tree Canada Foundation
220 Laurier Avenue West, Suite 1550
phone: (613) 567-5545
fax: (613) 567-5270
email: tcf@treecanada.ca
website: www.treecanada.ca

Turner Foundation, Inc.
One CNN Center, Suite 1090, South Tower
Atlanta, GA 30303
phone: (404) 681-9900
fax: (404) 681-0172
email:
website: www.turnerfoundation.org

World Wildlife Fund Canada
245 Eglinton Ave. East, Suite 410
Toronto, ON M4P 3J1
phone: (800) 267-2632
fax: (416) 489-8055
email:
website: www.wwwfcanaga.org

Vancouver Foundation
Suite 1200, 555 West Hastings Street
Box 12132, Harbour Centre
Vancouver, BC V6B 4N6
phone: (604) 688-2204
fax: (604) 688-4170
email:
website: www.vancouverfoundation.bc.ca

Victoria Foundation
404-645 Fort Street
Victoria, BC V8W 1G2
phone: (250) 381-5532

fax: (250) 480-1129
email: victorlafnd@pacificcoast.net
website: www.victoriafoundation.bc.ca

Weeden Foundation
747 Third Avenue, 34th Floor
New York, NY 10017
phone: (212) 888-1672
fax: (212) 888-1354
email: weedenfdn@weedenfdn.org
website: www.weedenfdn.org

Wildlife Preservation Trust Canada
120 King Street, Guelph, ON N1E 4P8
phone: (800) 956-6608
fax: (519) 836-8840
email: wptc@wptc.org
website: www.wptc.org

W. Garfield Weston Foundation
22 St. Clair Avenue East
Toronto, ON
phone: (416) 922-2500
fax: (416) 922-4395
email:
website: www.weston.ca/en/about.htm

Weyerhaeuser Company Foundation
Weyerhaeuser Canada Ltd.
925 West Georgia Street
Cathedral Place
Vancouver, BC V6C 3L2
phone: (604) 661-8107
fax: (604) 661-8298
email:
website: www.weyerhaeuser.com/community/foundation

Wilburforce Foundation
3601 Fremont Avenue N #304
Seattle, WA 98103-8753
phone: (206) 632-2326
fax: (206) 632-2326
email: tg@wilburforce.org
website: www.wilburforce.org

Wildlife Habitat Canada
7 Hinton Avenue North, Suite 200
Ottawa, ON K1Y 4P1
phone: (613) 722-2090
fax: (613) 722-3318

email:
website: www.whc.org

Geoffrey H. Wood Foundation
304 The East Mall, Suite 750
Etobicoke, ON M9B 6E2
phone:
fax:
email:
website: www

Corporate Programs

American Express Company
Philanthropic Program
World Financial Center
New York, NY 10285-4803
phone:
fax:
email:
website: home3.americanexpress.com/corp/philanthropy

Eddie Bauer
Community Relations Department
PO Box 97000
Redmond, WA 98073-9700
phone:
fax:
email:
website: www.eddiebauer.com/about/eb_philanthropy.asp

BC Hydro
Corporate and Regional Donations
PO Box 1500
400 Madsen Road
Nanaimo, BC V9R 5M3
phone:
fax:
email:
website: eww.bchydro.bc.ca/outreach

Chevron Canada Limited
Public Affairs
1500-1050 West Pender Street
Vancouver, BC V6E 3T4
phone: (604) 668-5474
fax: (604) 668-5559
email:
website: www.chevron.ca/Community/Default.htm

Dow Chemical Canada Inc.
Shirley Hogger
PO Bag 16, Hwy 15
Fort Saskatchewan, AB T8L 2P4
phone: (780) 998-8028
fax: (780) 998-8350
email: shogger@dow.com
website: www.dow.com/facilities/namerica/canada/charit/index.htm

Dupont Canada Inc.
Donations Committee
Box 2200, Streetsville
Mississauga, ON L5M 2M3
phone:
fax: (905) 821-5653
email:
website: www.dupont.ca/english/values/valu_corp_citizenship.html

Dow Chemical Company
Midland, MI 48674

Home Depot
Director, Community Affairs
2455 Paces Ferry Road
Atlanta, GA 30339
phone:
fax:
email:
website: www.homedepot.com

Mountain Equipment Co-op
Environment Fund
149 West 4th Avenue
Vancouver, BC V5Y 4A6
phone: (604) 707-3343
fax: (604) 731-3814
email:
website: www.mec.ca/Main/content_text.jsp?FOLDER%3%3Efolder_id=2759

Noranda Inc.
181 Bay Street, Suite 4100
PO Box 755, BCE Place
Toronto, ON M5J 2T3
phone:
fax:
email: sameryj@noranda.com
website:

Petro-Canada

National Community Investment Program

PO Box 2844

Calgary, AB T2P 3E3

phone: (403) 296-8483

fax:

email:

website: www.petro-canada.ca/html/about/community/Info-enviro.html

Shell Canada

Shell Environmental Fund

400-4th Avenue S.W.

PO Box 100, Station M

Calgary, AB T2P 2H5

phone:

fax:

email: Sheila.Butler@shell.ca

website: www.shell.ca/code/values/environment/sef.html

VanCity

Corporate Social Responsibility Group

9th Floor – VanCity Head Office

PO Box 2120, Station Terminal

Vancouver, BC V6B 5RB

phone: (250) 877-7000

fax: (604) 877-8226

email:

website:

Westcoast Energy

1333 West Georgia Street

Vancouver, BC V6E 3K9

phone: (604) 488-8000

fax: (604) 488-8500

email: contactus@westcoastenergy.com

website: www.westcoastenergy.com