Restoration Institute:
Advances in Ecological Restoration

May 26 - 30, 2010
University of Victoria
British Columbia

Coastal Ecosystem Restoration and Management

University of Victoria

Presented by the School of Environmental Studies
and the Division of Continuing Studies

Welcome to the 2010 Restoration Institute!

Institute Location
Most activities during the Institute will be run out of the Social Sciences and Math Building (SSM) on the University of Victoria campus. Workshops will depart from SSM room A102.

Registration
The registration desk will be located in the lobby in front of SSM A102.

Name Badges
Your name badge is required for admission to all sessions, reception, lunch and other Institute activities. Please wear it at all times.

Poster Session
Posters will be available for viewing during the Forum on Friday, May 28th from 12:00 pm - 3:00 pm in SSM A202.

Cellular Phones and Pagers
Please make sure to turn off your cellular phones and pagers during sessions as a courtesy to the speakers and participants.

Management Team
Chair of Advisory Committee: Eric Higgs
Institute Coordinator: Valentin Schaefer
Continuing Studies Coordinator: Janet Pivnick

For information throughout the Institute, please contact:

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We would like to thank all of our financial sponsors along with UVic and our academic, government, and community-based partners for their dedication and commitment in making this event possible.

Pacific Institute for Climate Solutions

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Coastal Barrier Island Network (CBIN)
Sustaining Barrier Island Ecosystems in a Changing Global Environment

SCHEDULE

WEDNESDAY, MAY 26

Time	Activity	Location
8:00 – 8:30 am	**Early Registration, Refreshments**	SSM A102 lobby
8:30 am - 4:30 pm	**Addressing Science and Stakeholder Conflicts in Environmental Restoration Decisions** Robin Gregory, UVic & Decision Research Joe Arvai, Michgan State University & Decision Research	SSM B307
10:00 am - 12:00 pm	**MoE CBIN Meeting**	SSM B247
10:00 - 10:15 am	**Nutrition Break**	SSM A102 lobby
10:15 am - 12:00 pm	**Introduction to Restoration Basics for the Community** Val Schaefer, UVic Marian McCoy, District of Saanich	DSB C112
12:00 - 1:00 pm	**Lunch Break**	SSM A102 lobby
12:00 - 1:00 pm	**Brown Bag Lunch - Programs and Careers in Ecological Restoration** Janet Pivnick and Val Schaefer, UVic	SSM B247
1:00 - 4:00 pm	**The Green Shores Program and the Ross Bay Shoreline FIELD TRIP** Brian Emmett, Green Shores Val Schaefer, UVic	Meet DSB C112
1:00 - 4:00 pm	**Conservation Strategy - Ecological and Cultural Restoration of Coastal Ecosystems at Cordova Shore, BC. FIELD TRIP** Nick Page, Raincoast Applied Ecology Ken Cossey, Lands Manager, Tsawout First Nation Tom Wood, Senior Policy Advisor, Aboriginal and Treaty Issues, Canadian Wildlife Service	Meet SSM A102 lobby
3:00 - 3:15 pm	**Nutrition Break**	SSM A102 lobby

5:00 – 7:30 pm	**Legacy/Student Reception** Eric Higgs hosting	Grad House Restaurant

THURSDAY, MAY 27

Time	Activity	Location
7:30 - 8:30 am	**Late Registration, Refreshments**	SSM A102 lobby
8:30 am - 12:00 pm	**Coastal Dune Restoration** Marisa Martinez, Inst. De Ecol. AC, Mexico	SSM B307
8:30 am - 12:00 pm	**Recovering an Urban Coastal Stream Affected by a Chemical Spill: From the Blame Game to finding Solutions in a Multi-stakeholder Environment** Triton Environmental – Tom Watson Peter Frederiksen, Erika Paradis	DSB C112
10:00 - 10:15 am	**Nutrition Break**	SSM A102 lobby
11:00 am – 12:30 pm	**SERI Science and Policy Working Group Meeting (Teleconference)**	SSM B247
12:00 1:00 pm	**Lunch**	SSM A102 lobby
1:00 - 5:00 pm	**Estuarine Restoration** Gregory Hood, Skagit River System Collective	SSM B311
1:00 - 5:00 pm	**Urban Coastal Restoration – FIELD TRIP** Sara Stallard, Gorge Waterway Initiative	SSM B247 Be prepared for wet weather. Sensible shoes would be helpful.
3:00 3:15 pm	**Nutrition Break**	SSM A102 lobby
7:00 – 9:30 pm	**Keynote Speaker and Reception:** **The Value of a Restored Earth** **Robert Costanza ,** Gordon and Lulie Gund Professor of Ecological Economics and Director, Gund Institute for Ecological Economics, Rubenstein School of Environment and Natural Resources, The University of Vermont	DSB 103 and lobby

FRIDAY, MAY 28
RESTORATION FORUM

Time	Activity	Location
8:30 – 9:00 am	**Welcome to the Restoration Institute** Val Schaefer (Restoration of Natural Systems Program), Eric Higgs (School of Environmental Studies), Jim Harris (Society for Ecological Restoration International), Rusty Feagin (Coastal Basin Island Network)	SSM A102
9:00 – 10:20 am	**Coastal Ecosystem Restoration: Setting the Issues** Heather Mackay Scientific and Technical Review Panel, Ramsar Convention on Wetlands, Gland, Switzerland Karl Nordstrom Institute of Marine and Coastal Science, Rutgers Rusty Feagin Coastal Basin Island Network and Texas A&M University	SSM A102
10:20 - 10:40 am	**Refreshments and Networking**	SSM A102 lobby
10:40 – 12:00 pm	**Coastal Ecosystem Restoration: Setting the Issues (Continued)** Tom Okey Director of Aquatic Sciences, West Coast Aquatic Management Board Nancy Jackson New Jersey Institute of Technology Ian Walker Geography Department, UVic	SSM A102
12:00 - 1:00 pm	**SER Student Information Session** Cara Nelson, University of Montana	SSM B247
12:00 - 1:00 pm	**Lunch**	SSM A102 lobby
12:00 - 3:00 pm	**Poster Session**	SSM A202

Time	Activity	Location
1:00 – 2:45 pm	**Breakout Sessions** **Estuarine and Lake Restoration** **Panelists:** • Mark Sytsma, Portland University • Greg Hood, Skagit River System Collective • Scott Parker, Parks Canada **Climate Change and Coastal Ecosystems** **Panelists:** • Marissa Martinez, Instituto de Ecologia AC, Mexico • Barbara Wojtasek, Gwaii Haanas National Park Reserve • Rusty Feagin, Texas A&M University **Urban Coastal Restoration** **Panelists:** • Karl Nordstrom, Institute of Marine and Coastal Science, Rutgers • Nancy Jackson, New Jersey Institute of Technology	 SSM B247 SSM B307 DSB C112
2:45 - 3:15 pm	**Refreshments**	SSM A102 lobby
3:15 – 4:00 pm	**Roundtable Discussion**	SSM A102
4:00 - 5:00 pm	**History, Novelty, and the future of Restoration** Jim Harris, Society for Ecological Restoration International and Chair in Environmental Technology, Cranfield University, England Richard Hobbs, University of Western Australia, Australian Laureate, Professor of Restoration Ecology	SSM A102
5:00 - 5:15 pm	**Closing Introduction of the 2011 Restoration Institute on Novel Ecosystems**	SSM A102
5:30 – 7:30 pm	**Closing Reception**	University Centre Camas Room

SATURDAY, MAY 29

Time	Activity	Location
8:30 am – 4:30 pm	**Cowichan Bay Estuarine and invasives issues FIELD TRIP** Coastal Invasive Plant Committee of BC	Meet SSM A102 lobby
12:00 – 1:00 pm	**Lunch**	SSM A102 lobby
1:00 – 4:00 pm	**Restoration Business and Design** Keith Bowers, Biohabitats Inc. Eric Higgs, UVic	DSB C113
1:00 – 4:00 pm	**Restoring Every Coastal Ecosystem That Ever Existed: Lessons from Baja to Brooklyn & Kennebunkport to Kejimkujik** Steve Murphy, University of Waterloo, in collaboration with the Nature Conservancy of Canada	DSB C112
2:45 - 3:15 pm	**Refreshments**	SSM A102 lobby
6:00 - 8:00 pm	**Steering Committee Dinner hosted by the Coastal Barrier Island Network**	University Club

SUNDAY, MAY 30

Time	Activity	Location
9:00 am - 1:00 pm	**Masterclass** Keith Bowers, Biohabitats Inc. James Harris, Cranfield University Eric Higgs, University of Victoria Richard Hobbs, University of Western Australia This innovative masterclass will give participants the opportunity to work one-on-one with international experts in the field of ecological restoration. Those attending this masterclass are asked to come prepared with a project proposal that is either in progress or in its beginning stages.	SSM B247

WEDNESDAY, MAY 26

Addressing Science and Stakeholder Conflicts in Environmental Restoration Decisions
Robin Gregory & Joe Arvai

Most environmental conflict resolution is a sham, because the underlying values and concerns of the participants are never clearly identified, let alone resolved. In this one-day workshop we will discuss ways to address conflicts among groups whose composition is similar (e.g, scientists) or diverse (e.g., involving different ministries, stakeholders, or First Nations), using methods drawn from decision analytic techniques and the behavioural sciences. A basic message for environmental managers seeking a way forward on controversial projects is that conflicts related to differences in the importance placed on objectives can (and likely will) remain; the goal is not the resolution of value differences but rather agreement on key elements of a management (and, typically, monitoring) strategy. Emphasis will be given to applications related to habitat enhancement, species conservation, and environmental restoration; the benefits of adaptive management approaches also will be considered. The morning session will provide an overview of philosophy and methods and then move to the presentation of several case studies, from western Canada and the US, that illustrate key approaches. The afternoon session will focus on problems identified by participants and provide an opportunity for break-out groups to try out different techniques in selected environmental management contexts and to evaluate their strengths and weaknesses.

Introduction to Restoration Basics for the Community
Val Schaefer, University of Victoria and Marian McCoy, District of Saanich

There are a number of principles in ecological restoration that are fundamental in dealing with degraded sites. At the outset it is important to know the site, both from a social and an environmental perspective. What does the community think about the site, will they support your project and are people already involved with the site that you need to work with? Restoration projects are often timed to maximize the likelihood of community involvement such as Earth Week in April, Environment Week in June, BC Rivers Day in September and Arbour Day, usually in November.

A restoration project begins with a clear understanding of the restoration target. What are you trying to accomplish? It follows with gathering recent information about the natural features of the site by doing a biophysical inventory. This will tell you what is there and give an indication of what is possible. The restoration design works with nature and the landscape, choosing species adapted to the specific environmental conditions of the site. The restoration target is one that would not require maintenance. In restoring the site find out about Best Management Practices such as those of the Garry Oak Ecosystem Recovery Team and refer to reference materials such as the Naturescape guides that will help inform the specifics of your project. Whenever possible, plantings should occur during the wetter months to allow plants to become established without irrigation.

From an environmental perspective there are also legal considerations. Do the Federal Fisheries Act, BC Wildlife Act or other legislation apply? Are there any municipal bylaws or guidelines that relate to the project? Is permission required from a municipality to do a project in one of their parks?

Examples of community-based restoration projects conducted in partnership with the City of Saanich include the Garry Oak Restoration Project to restore Garry oak meadows, the removal of invasive species that involves the University of Victoria's Institute for Coastal and Oceans Research and many other community connections.

Programs and Careers in Ecological Restoration

Janet Pivnick and Val Schaefer, University of Victoria

Ecological restoration is a field that applies to many occupations. We find that with the Restoration of Natural Systems Program at the University of Victoria our graduates mainly find employment with government, private companies and nonprofit organizations. The government positions are at all levels – Federal, Provincial, Municipal and Regional. They are typically in parks, planning and environment departments. Private companies are largely consulting firms but we also see our graduates placed with companies in the resource sector. The nongovernmental organizations are usually environmental groups and land trusts where our graduates work as project coordinators.

Programs that are specific to ecological restoration are few although some of the same content is covered in programs dealing with conservation biology. At the University of Victoria we have the Restoration of Natural Systems Program that offers a Diploma and a Certificate. We also have the Native Species and Natural Processes Professional Specialization Certificate. Our BA and BSc in Environmental Studies also allow for specialization in ecological restoration, as do our Master's degrees. BCIT offers an Applied Degree in Ecological Restoration. Simon Fraser University offers a Master's in Resource Management. Other programs in BC are in the technology area and are not as focused on ecological restoration. These include Camosun's Environmental Technology Program and Kwantlen's Environmental Protection Technology Program. In the rest of Canada, the University of Waterloo in Ontario has a strong Environmental Studies program that includes ecological restoration.

Your level of education contributes to your employability. Planning and conducting restoration projects usually requires a degree or combination of experience and a Diploma. Having a Certificate or Diploma enables you to work in ecological restoration under the supervision of someone more qualified or to manage projects in the nonprofit sector. Working for government usually requires a degree. Doing research in ecological restoration usually requires a graduate degree. The most employable people have both a degree and a diploma or certificate.

Good websites that post job opportunities in the environment that would include ecological restoration are: Environmental Careers Organization www.eco.ca; BC Environmental Network www.ecobc.org; BC Environment Industry Association www.bceia.com , and; Government of BC - Job Opportunities www.gov.bc.ca.

The Green Shores Program and the Ross Bay Shoreline

Brian Emmett, Archipelago Marine Research Ltd. Green Shores Technical Team Coordinator

Green Shores (www.greenshores.ca) is a program of the Stewardship Centre for BC focused on sustainable shore development. The Green Shores program provides resources and tools for coastal land-owners and managers to minimize development impacts and restore coastal ecosystem function to previously developed sites. Green Shores is based on four Guiding Principles:

1. Preserve the integrity or connectivity of coastal processes.
2. Maintain or enhance habitat diversity and function (on a local or regional scale).
3. Minimize or reduce pollutants to the marine environment.
4. Reduce cumulative impacts to the coastal environment.

Key features of the program include:

- The Coastal Development Rating System – inspired by the LEEDtm Green Building rating system.
- A design example gallery – greener alternatives for shore protection
- Support for local government coastal planning
- Outreach to the professional design and development community

This session will begin with a presentation on the Green Shores program, with emphasis on the recently completed coastal development rating system. The group will then move to Ross Bay on the Dallas Road waterfront to visit a shore protection project completed in 1996 in which a gravel beach was constructed as an alternative to a conventional seawall. The group will examine the shore design in the context of the prerequisites of the Green Shores rating system, with the objective of identifying additional design features which could contribute to meeting Green Shores certification. If time permits the group will also visit the Point Ellice Park shoreline, which was re-constructed as part of the Dockside Green project.

Conservation Strategy - Ecological and Cultural Restoration of Coastal Ecosystems at Cordova Shore, BC
Nick Page, Raincoast Applied Ecology; Ken Cossey, Lands Manager, Tsawout First Nation; and Tom Wood, Senior Policy Advisor, Aboriginal and Treaty Issues, Canadian Wildlife Service

This presentation and field visit will describe a First Nation-led interagency project for cultural and ecological restoration of coastal ecosystems on the east side of the Saanich Penninsula. Cordova Shore is a lowland area and adjacent bluffs, including Cordova Spit, Island View Beach, Saanichichton Bay, and Cowichan Head.

An inter-agency Conservation Strategy is being implemented to improve the management of ecosystems, plant and wildlife species, and human activities in the Cordova Shore through collaborative conservation actions. This includes restoring ecological processes, recovering species at risk, reducing recreation impacts, improving access to cultural resources, and celebrating the shore's unique character.

This strategy was developed through the Cordova Shore Conservation Partnership, an informal, collaborative initiative between CRD Parks, Tsawout First Nation, and Canadian Wildlife Service. It is supported by the BC Ministry of Environment (Conservation Data Centre) and the District of Central Saanich.

Land ownership of Cordova Shore comprises four primary land types: (1) parklands; (2) Tsawout First Nation; (3) private Lands; and (4) Province of BC (intertidal and sub-tidal).

Five main ecosystems make up the Cordova Shore: (1) marine ecosystems: beach, intertidal and shallow sub-tidal areas; (2) coastal wetland ecosystems: salt, brackish, and freshwater wetlands; (3) coastal sand ecosystems: sparsely-vegetated sand spit and stable and semi-stable dunes; (4) rock outcrop ecosystems: sparsely-vegetated rock and forested or shrub-dominated; and (5) bluff ecosystems: unstable and forested sand bluffs.

Five primary conservation issues have been identified: (1) disruption to hydrologic processes in the Cordova Wetland complex; (2) impacts to vegetation and wildlife from recreation; (3) invasive plant establishment and spread; (4) disruption to coastal sediment transport processes; and (5) loss of ecosystems from development activities.

The overall conservation goal is "to protect, restore, and celebrate the unique ecological and cultural values of Cordova Shore". Ten strategies encompassing 62 actions have been proposed by the partnership, and will be explored during the field visit. A major challenge to success of the partnership will be finding ways to secure conservation values on Tsawout Certificate of Possession lands.

THURSDAY, MAY 27

Coastal dune restoration
Marisa Martinez, Instituto de Ecología, A.C.

Coastal dunes are unique terrestrial ecosystems located in the transition zone between the ocean and the continent. They are found on any sandy coast of the world, from the tropics to the northernmost and southernmost latitudes. These ecosystems are naturally dynamic and thus, fragile and vulnerable to the impact of human activities.

Similar to other coastal ecosystems, coastal dunes and sandy beaches have been used by humans for centuries, because of the abundant natural resources found here and also because of the strategic interest of having urban settlements on the coast. More recently, worldwide tourism has expanded, and sandy coasts have become preferred sites to perform these activities. In consequence, the human footprint on the coast has had an increasingly important and negative impact that modifies and even destroys these ecosystems. When coastal dunes and beaches are destroyed, several very important ecosystem services may be lost, such as protection against the impact of storms and hurricanes, scenic beauty and recreation, among others. Thus, restoring coastal dunes is becoming increasingly relevant and cost-effective.

The goal of this workshop is to show the different methods and approaches that have been used to restore coastal dunes in different parts of the world. Several restoration strategies will be analyzed, ranging from "natural" (or soft) to man-made, (or hard). Specifically, these topics will be addressed: a) the ecological, social and ecological importance of the coasts; b) basic knowledge of coastal dunes (geomorphology); c) coastal dunes dynamics and environmental features; d) human impact on coastal dunes and vulnerability assessment; e) coastal dune restoration (methods).

Recovering an urban coastal stream affected by a chemical spill: from the "blame game" to finding solutions in a multi-stakeholder environment

Triton Environmental: Tom Watson, Peter Frederiksen, Erika Paradis

The objective of this workshop will be to challenge participants through role playing to identify and consider approaches to recovery/restoration planning in a multi-stakeholder environment, for a stream affected by a chemical spill. Participants will review a hypothetical scenario and will be asked to consider and address priorities, agency responsibilities, stakeholder and NGO input as well as other aspects they feel important. The workshop will consist of three parts:

1. Hypothetical scenario – Problem Description: A scenario will be presented where a large chemical spill has occurred in an urban, coastal stream in your area, resulting in a large fish kill. The affected stream flows through aboriginal land, spans two countries and supports multiple species of fish with associated commercial, recreational and cultural values. The river and its estuary are managed by multiple government agencies and are important to many non-government organizations, aboriginal groups and stakeholders.
2. Solution development – Recovery Planning: Initial response to the incident and clean-up has already been completed and the goal of the workshop will be to identify how to recover affected species. As a member of one of the agencies or stakeholder groups, you will be invited to join other representatives to bring forward your concerns and priorities for restoration/recovery. A discussion will follow to consider issues such as interaction between the party responsible for the spill, government and non-government organizations, First Nations, and trans-boundary issues. Break-out groups and role playing are intended to define approaches, strategies and responsibilities for recovering the affected stream.
3. Hypothetical vs. Practical – Presentation and Discussions of real-life scenarios: Attendees will compare the recovery plan developed in phase 2 of the workshop to "real life" recovery effort for a stream affected by a chemical spill in BC. Participants will be asked to bring forward other examples from their own experience for discussion and comparison.

This workshop will engage and challenge participants to think and interact from numerous perspectives. It is expected some participants will focus on the technical aspects of recovery, while others will be considering a broad range of issues such as funding, politics, societal values, responsibility and so on. Reports will be provided by breakout groups and the facilitators will lead a close-out discussion on the reports and present the elements of the "real life" event.

Estuarine Restoration
Gregory Hood, Skagit River System Collective

Tidal marsh restoration requires understanding how geomorphology affects ecology in an estuarine landscape. Estuarine habitat loss is invariably the result of human alteration of hydrodynamic processes and landforms. Consequently, restoration requires addressing the altered hydrodynamic processes and landforms that determine ecological structure and processes in tidal systems. Restoration planning and design require application of scientific principles to a practical problem, i.e., quantitative planning and design tools are necessary. In the vocabulary of science, design tools are predictive models. Because predictive models in tidal marsh restoration are an area of active research and development, these predictive models are experimental. Consequently, restoration is itself an uncertain and experimental activity, which means that monitoring is necessary to test or validate the predictive models and to correct unforeseen problems or outcomes that often arise. This course will focus on controversies surrounding various dike breaching alternatives, predicting tidal channel geometry, predicting tidal marsh vegetation development, issues of scale, direct and indirect effects of dikes and dike removal, the role of monitoring, and the importance of recognizing non-stationarity in dynamic estuarine landscapes—especially in the context of global warming.

Urban Coastal Restoration – Gorge Waterway Initiative Field Trip
Sara Stallard, Fish-Kissing Weasels Environmental

Restoration or rehabilitation of landscapes can take a range of forms and an even greater range of resources. This tour of restoration projects in the Gorge Waterway of Victoria explores a variety of sites with varying
inputs of community time, in-kind donations of services, municipal funding and full-scale excavation and site restructuring. The sites selected will demonstrate a full range of costs, from the small-scale Murray Road improvement of native plantings by community volunteers to the $1.2 million restructuring and daylighting of Gorge-Esquimalt Creek. Additional sites include Point Ellice House Woodland Shoreline invasive species removal, 508 Selkirk Avenue seawall removal and shoreline restoration, and Gorge Road Hospital shoreline stabilization and bio-engineering.

KEYNOTE ADDRESS: The Value of a Restored Earth
Robert Costanza, University of Vermont

The value of ecosystem services in providing benefits to humans far exceeds the benefits of marketed goods and services. When these values are taken into account, restoring ecosystems is often an extremely good investment for society. Examples include: the value of coastal wetlands for storm protection, alternative scenarios for the management of the Great Barrier Reef to enhance ecosystem services, and the global economic benefits of a restored earth.

FRIDAY, MAY 28

COASTAL ECOSYSTEM RESTORATION: SETTING THE ISSUE PANEL

Restoring geomorphic and biologic functions on backshores and dunes of developed shores.
Karl F. Nordstrom, Institute of Marine and Coastal Sciences, Rutgers University.

This presentation addresses restoration options for developed shores, where human-uses will drive actions for managing landforms and habitats. The working assumptions are that:

1. people will continue to build structures and modify beaches and dunes
2. the major expenditures for public works affecting landforms will be to protect infrastructure and enhance recreation; and
3. beach nourishment will continue to be the primary method used for these purposes.

The value of nourishment in restoring naturally functioning dune fields where natural habitats were eliminated has been demonstrated in some locations. The goal now is to demonstrate how many of these benefits can be achieved in other locations by restoring the maximum number and extent of habitats and species to increase resilience and sustainability in the face of unknown longer term changes in climate, sea level, storm frequency and magnitude. Restoration strategies are evaluated by:

1. identifying how natural features can be incorporated into designs for shore protection projects
2. addressing constraints in size or space
3. overcoming reluctance to build dunes or allow landscapes to evolve
4. conducting post-construction evaluations and actions for nourishment and restoration projects
5. integrating endangered species programs
6. addressing regulatory issues
7. and obtaining public support and coordination.

Examples are provided of locations in New Jersey, which has had a long history of beach use and infrastructure development.

Coastal Restoration Crossroads

Rusty Feagin, Texas A&M University

We are now at a coastal restoration crossroads. Over the last few centuries, much human and industrial progress has been made at the cost of significantly degrading and modifying coastal ecosystems. Today, we are beginning to account for this cost in economic terms, and value coastal ecosystems for the services that they provide. For example, we can now count the monetary value of salmon produced by one hectare of a native wetland or stream habitat. In this context, rebuilding functional coastal ecosystems becomes economically viable. Coastal restoration can lead to economic gain. If we can build capital by rebuilding ecosystems, then how far should we go? Should we build them in places where they never existed, or should we build them in places where they are likely to migrate to, given climate change? What is the difference between building ecosystems and rebuilding ecoystems?

The West Coast Vancouver Island Coastal and Ocean Plan as an Opportunity for Ecological Restoration and Sustainability

Tom Okey, University of Victoria

The biological communities within ecosystems are shaped by multiple dimensions of resources and disturbance or stress, in addition to biological partitioning of niche axes. Humans are prominent components of modern ecosystems, and many human stressors are exotic in magnitude and character, thereby affecting habitable niche space and ecosystem functions and services.

A coastal and ocean plan is being developed for the West Coast of Vancouver Island (WCVI) through a broadly collaborative process, with the general goal of achieving social-ecological sustainability as the region continues to develop. Humans have been interacting with WCVI ecosystems for many millennia, but ecosystem degradation accelerated most rapidly during the last century. A variety of natural resource issues and human stressors can be identified by residents and other knowledge holders, and different types of management strategies and actions will be considered to address these issues. Spatial zoning is one approach that may be implemented in Barkley and Clayoquot Sounds as a way of resolving conflicts and maximizing the value of the overall social-ecological system. Protection and restoration of important, sensitive, or representative habitats will be considered as one type of zone to achieve the goal of healthy ecosystems, but revealed trade-offs with economic and societal goals will inform compromises. An indicator-based integrated ecosystem assessment is being developed to evaluate the effectiveness of management strategies and actions, and different types of vulnerability assessments and cumulative impacts analysis can highlight management actions for maximizing ecosystem health and informing climate change adaptation planning.

Beach restoration in estuaries - current practice and future direction.
Nancy Jackson, New Jersey Institute of Technology

This presentation reports on lessons learned from research conducted on beach restoration projects in Delaware Bay to assess habitat suitability for horseshoe crab reproduction. Emphasis on process over repair – Beach restoration restores the sediment budget to a shoreline. Most beach restoration is conducted to protect private property and public infrastructure from flooding and erosion. Design criteria for beach restoration are based on what we have learned in ocean environments. There is a need for designs that are specifically targeted for low-wave energy systems and that recognize the ecological value of the beach environment in estuaries. Move from opportunism to intention – Many beach restoration practices in estuaries often represent a subsidiary benefit of a primary activity.

The primary activity is generally the need to dredge and the resulting beach may achieve shore protection goals but not necessarily enhance ecological value. Beach restoration as an intentional act creates opportunity to enhance both shore protection and ecological goals. Consider geography - Where a beach is built is as important as how it is built. Estuarine shorelines are highly irregular in their configuration and their exposure to wave energy will influence their geomorphic behavior and suitability as habitat from season to season.

Site selection for restoration should fill gaps in the spectrum of sandy beach environments available. Improve research designs – The ability to assess whether designs are "working" requires research collaborations between geomorphologists and biologists. There is a need for better integration of field research designs used by geomorphologists and biologists to assess beach restoration projects.

Coastal Foredune Restoration at Wickaninnish Dunes, Pacific Rim National Park Reserve.
Ian Walker, University of Victoria

Research by: Ian J. Walker, Associate Professor, Department of Geography, University of Victoria Hawley E. Beaugrand, MSc student, Department of Geography, University of Victoria; Ian Darke, PhD student, Department of Geography, University of Victoria.

Since the 1990s, dune restoration efforts have shifted focus from stabilization to activation of aeolian activity and dune mobility under the assumption that a dynamic system is more geomorphically resilient and holds greater ecological value than a stabilized system. A recent survey of research literature shows that most dynamic restoration efforts involve stimulating aeolian activity via the removal of stabilizing vegetation.

This paper reviews methods of restoring dynamic dune systems, identifies limitations, and discusses the rationale, implementation, and ongoing research initiatives of a coastal foredune restoration project at Wickaninnish Dunes, Pacific Rim National Park Reserve in collaboration with Parks Canada. The project involves mechanical removal of invasive beach (marram) grasses (Ammophila spp.) to stimulate aeolian activity and dune mobility to provide favourable habitat to support viable populations of Pink sand-verbena (Abronia umbellata), a species that is red-listed under the Federal Species at Risk Act (SARA). The invasive grass has impacted the beach-dune sediment budget considerably by reducing aeolian activity on the foredune, which, in turn, has reduced biodiversity and favourable ecological conditions for Pink sand-verbena.

The research presented here focuses mainly on geomorphological responses since the initial phase of restoration in September 2009. A high-resolution, light detection and ranging (LIDAR) digital elevation model (DEM) of the 5 km-wide study site was flown and subsequent monthly DEMs have been measured from ground-based topographic surveys. This allows for frequent characterization of morphological and sand volume changes. The former reveal landscape responses telling of dune mobility, aeolian activity, and general geomorphic diversity. With the use of control sites (i.e., no vegetation removal), the latter can be compared to regional estimates and onsite measurements of sand transport to identify changes in sand transport pathways and flux amounts. Combined, these results provide information of both pragmatic and scientific value.

Pragmatically, the results serve Parks Canada's interests by providing: i) methods that can serve to develop a monitoring protocol for assessing the geomorphic responses to restoration and, ii) qualitative and quantitative information that can be used to refine subsequent stages of restoration at the same or new sites. Scientifically, this project is among the first of its kind in Canada and provides: i) new information on geomorphic impacts and effectiveness of mechanical restoration for improving dune dynamics and aeolian activity, and ii) insight into longer-term implications for sediment transfers between the beach, dune, and back-dune environments (i.e., impacts on the backshore sediment mass balance). Thus, it is anticipated that this research will provide novel results that are both useful for refining and maintaining foredune restoration at the study site, as well as relevant for other dynamic dune restoration efforts.

Breakout Sessions

Climate Change Panel Abstracts:

Rusty Feagin, Texas A&M University

Human-nature conflicts will increase along coastal shorelines, as our climate changes. Both sea level rise and extreme storm events generally force coastal plant communities to migrate landward and upslope. These natural processes have been on-going since at least the last ice age, and are expected to accelerate due to a warming world. However, humans act as if the shoreline is stable and will never change, developing communities, building houses, bordering the backs of beaches with seawalls or rip-rap, barricading salt marshes with bulkheads at their landward extent, etc. Inevitably, human-nature conflicts ensue as climate changes occur, forcing the sea to intercede upon our static structures. Ecosystems are often squeezed between our structures and the rising sea. These conflicts are played out in physical, ecological, economic, legal, and philosophical realms. We should certainly plan for climate changes, to minimize these conflicts, especially when restoring ecosystems. However, should we also take a pro-active role, and assist at-risk coastal ecosystems to colonize new areas to ensure their survival? Can we take advantage of climate change by planning for it, and increase valuable native habitats?

Marisa Martinez, Instituto de Ecología, A.C.

Some of the most worrisome predictions associated with climate change will directly affect coastal ecosystems: a) changes in sea level, which have been projected to rise from 0.09 to 0.88m in the next decades. Under this scenario, it is expected that shoreline erosion will be exacerbated and thus, coastal ecosystems such as coastal dunes and beaches, may be forced to migrate inland; b) Increased number of hurricanes categories 4 and 5 and increased storm surges; c) the impact of saline intrusion into the water table of coastal dunes will intensify. This new setting will modify the soils and will likely affect coastal vegetation. It is very likely that those species that are tolerant to salinity will increase the frequency and abundance, given the increased maritime influence. Interesting evidence will be presented.

Barbara Wojtasek, Parks Canada
Coastal Geoindicators Monitoring Program for Climate Change and Coastal Erosion in Gwaii Haanas National Park Reserve & Haida Heritage Site

B.F. Wojtaszeka and I.J. Walkerb
Parks Canada – Gwaii Haanas National Park Reserve & Haida Heritage Site
University of Victoria – Department of Geography

Climate change, and associated potential rise in water levels, storm frequency and severity, is of ecological and cultural concern on the Haida Gwaii Archipelago. Gwaii Haanas National Park Reserve & Haida Heritage Site is home to a number

of unique sandy beach-dune ecosystems, as well as cultural and archaeological resources such as ancient village sites and middens, that are vulnerable to the effects of climate variability, especially erosion. In response to the uncertainty of effects of climate variability on these resources, 5 sensitive beach dune systems and 5 vulnerable cultural sites were selected and measured for key "geoindicators", including shoreline topographic profiles, relative sea level, extreme events (storm, seismic), and timing of key processes such as El Niño-Southern Oscillation. Weather-permitting, these sites have been visited annually since 2006. From 2006-2009, the shorelines of most of the sites have generally been retreating, some sites at a rate of greater than 1m/year. This is not indicative of a longer-term trend, however, but does suggest that coastal erosion is evident. Similar procedures are being used at Pacific Rim and Gulf Islands National Park Reserves. As erosion is often part of a natural cycle in beach-dune systems, longer observation is required to identify trends and assess possible erosion-rebuilding regimes.

Estuarine and Lake Restoration Panel Abstracts:

Gregory Hood, Skagit River System Collective
Adaptive Management: the Problem of Integrating Restoration Practice and Science

Adaptive management and restoration monitoring are frequently advocated and acknowledged as important, even necessary, to habitat restoration. The reality, unfortunately, is that most habitat restoration is "faith-based" with little rigorous monitoring being funded. Practitioners and funding agencies simply have faith that restoration actions will produce the desired results. "Shovel-ready" projects recieve funding because agencies need to show their directors and politicians that they have restored X acres of habitat. Progress to recovery goals is measured in acres "restored". Agencies receive no credit for monitoring X acres of restoration. Moreover, monitoring could show that restoration was only partial or did not occur at all. Agencies are typically allergic to such bad news and currently have no incentive to implement programs that risk uncovering program failures. How do we address this problem?

Scott Parker, Parks Canada
Resilience, reconciliation, and restoration: Parks Canada and coastal conservation efforts on the Great Lakes

The Laurentian Great Lakes are an extraordinary and complex social-ecological system. They are an invaluable source of freshwater, rich in biodiversity, and an economic driver for two nations. Yet significant issues, such as increased population growth (i.e., 1/3rd of Canada population), climate change (e.g., decreased lake levels), invasive species (i.e., > 181 sp.), biodiversity loss, chemical loading, and shoreline development have caused profound change and continue to stress the lakes. Conservation actions, including restoration, come in many forms, including those within national parks, marine conservation areas and heritage sites.

Parks Canada is the federal agency with a responsibility to 'protect and present' a representative system of national protected areas. In Ontario, all five of its national parks are located on the Great Lakes. As well there are two national marine conservation areas, three canals and over 200 other national historic sites. The talk will introduce some of the experiences of Parks Canada in coastal conservation. For example, efforts for restoring cattail marsh and dunes at Point Pelee and managing for resilience in Fathom Five's coastal wetlands.

Mark D. Sytsma, Department of Environmental Science and Management
Invasive spartina eradication and salt marsh restoration

Four species of non-native cordgrasses (genus Spartina) are found along the West Coast of the United States and Canada. Where established, these invaders convert estuarine mudflats and salt-marsh ecosystems into uniform spartina meadows and alter estuarine hydrology through sediment accretion. With the registration of the herbicide imazapyr as

a tool for spartina management massive infestations of spartina in Willapa Bay and San Francisco Bay have begun to be brought under control. The plant forms dense rhizome mats in estuarine sediments, however, that are recalcitrant and continue to hold sediment and maintain the elevated marsh that developed due to sediment accretion prior to control. The elevated marsh is colonized by native, high-marsh species forming a new plant community in areas that were mudflat habitat prior to spartina invasion.

The successful control of "ecosystem engineers", such as spartina, may not result in restoration of the pre-invasion habitat, which is typically the goal of invasive species management. Through the West Coast Governors' Agreement on Ocean Health, the Governors of Washington, California, and Oregon committed to work cooperatively to eradicate non-native spartina on the U.S. West Coast by 2018. An Action Coordination Team (ACT) was formed to develop a strategy to meet the 2018 goal. One of the elements of the strategy is explicit recognition of the importance of habitat restoration. The spartina eradication plan identifies specific tasks to begin to incorporate restoration of hydrology as the goal of spartina control efforts.

Urban Coastal Restoration Panel Abstracts:

Karl F. Nordstrom, Institute of Marine and Coastal Sciences, Rutgers University
Addressing problems restoring landforms and habitats on developed shores

Urban coastal restoration provides many opportunities but also many drawbacks. This component of the breakout session is designed to provide a forum for addressing thorny issues related to restoring landforms and habitats on beaches and dunes on ocean shores of developed coasts. Potential questions to be addressed include the following:

- How can beach nourishment projects designed for shore protection or recreation be transformed into projects for restoring landforms and ecosystems.
- How can design criteria for artificially-created protective dunes be modified to make them more closely resemble natural landforms and habitats?
- How do we incorporate key elements of natural dynamism on landforms designed primarily for stability?
- How can critical time-dependent or spatially-dependent niches be maintained on a naturally evolving landscape?
- How must the concepts of "natural" or "natural trajectory" be redefined in human-altered systems?
- How should human-management techniques, such as raking, planting vegetation and deploying fences, be used to overcome temporal and spatial restrictions?
- What are the criteria (size limits, boundary conditions, control of exotics and predators) for managing undeveloped enclaves in developed areas?
- What are the best examples of naturally-functioning dune habitats within urban coastal systems and how can these projects inform future efforts?
- What are realistic options for restoring environments on privately owned shorefront properties?
- How can stakeholder preferences be changed to favor restoration initiatives and have greater appreciation of dynamic landforms, with greater topographic and species diversity?

Nancy Jackson, New Jersey Institute of Technology

Restoration of sandy beaches in estuaries – merging shore protection with habitat needs on developed shorelines. Sandy beaches in estuaries are recognized for their importance as habitat but many shoreline reaches offer less than optimal conditions for species that utilize them. Presence of shore protection structures (bulkheads and seawalls) and background erosion rates can truncate or eliminate habitat. Managers view beach nourishment as a potential strategy for merging the need to reduce erosion and flood hazards to human development and to enhance habitat for species who utilize the shoreline, but few studies exist to guide project design. This presentation will review the opportunities and constraints of using beach nourishment as a restoration strategy to achieve shore protection and habitat goals in estuaries. The spatial and temporal scales of beach dynamics, habitat use, and restoration activities will be explored via examination of nourishment efforts in Delaware Bay, USA. Delaware Bay is a drowned river valley estuary in the mid-Atlantic region. The estuary consists of numerous sandy barriers fronting extensive marsh. Some of the beach nourishment projects undertaken on the developed sandy barriers in the estuary included consideration of spawning habitat for the American horseshoe crab in addition to shore protection. Results of field studies to assess the effectiveness of both traditional armoring (bulkheads) and nourishment strategies on horseshoe crab spawning and egg development will be reported. Suggestions for future design considerations to enhance habitat potential of nourishment activities will be presented.

SATURDAY, MAY 29

History, Novelty, and the future of Restoration

Beyond Restoration: Thoughtful Intervention in Ecosystems in Times of Rapid Change

Richard Hobbs, University of Western Australia

The world is changing more rapidly and more comprehensively than ever before in human history. Abiotic conditions are changing with changing climates, land use and human inputs and extractions from ecosystems, and biotic compositions are changing through range shifts, invasions and local extinctions. These changes are leading to a reconsideration of what the goals for management, conservation and restoration can and should be. In addition, there is increased recognition that active intervention in ecosystem dynamics will be required to ensure the continuation of ecosystem service provision and biodiversity conservation. Such intervention will increasingly have to take multiple factors into account in a more meaningful way. On-ground management and restoration programs are currently wrestling with these issues and can provide useful test-beds for new ideas and approaches.

There is a strong need for the development of a more effective ecology that facilitates the analysis and management of ecosystems in a rapidly changing world. I suggest that restoration ecology needs to extend its reach to become a more comprehensive "intervention ecology" which couples conceptual and empirical studies with on ground application. When, how and where should intervention be implemented, and what types of intervention are likely to be most effective? I provide examples of this type of approach from Western Australia, where we are working with groups conducting broad-scale restoration aimed at restoring ecological function and maintaining biodiversity within highly degraded agricultural, urban, coastal and mining landscapes.

Restoring Every Coastal Ecosystem That Ever Existed: Lessons from Baja to Brooklyn & Kennebunkport to Kejimkujik

Stephen D. Murphy, University of Waterloo

This year I will present lessons in success and failure; tales of drama and heartbreak and triumph. The hubris and humility of restoration ecology will be laid bare to participants. All this hyperbole is my way of summarizing that in keeping

with the Coastal Restoration theme, I intend to run an interactive session on best (and worst) practices for coastlines across North America – oceans and Great Lakes. How interactive the session is depends on how many case examples participants would like to raise from their experiences as a workshop exercise; I personally have enough material and will stop only if someone drops a copy of Jim Harris' or Richard Hobbs' cvs on me (those things are heavy). I will focus on the social, biophysical and transdisciplinary approaches to coastal restoration. This means exploring how community participants define restoration, failures to address the needs of First Nations, social issues related to economic valuation (and whether this is a good approach), the problems of finding regionally appropriate organisms for restoration, and issues related to adaptive restoration ecology in the face of short term weather variation and long term climate change (recent hee-hawing and malfeasance on the parts of would-be critics aside). Case examples will include work on the Colorado River Basin and Baja Mexico; Lakes Ontario, Erie, and Huron; the urban coasts in centres like New York City; and work in the Atlantic coasts in Nova Scotia and New Brunswick.

FACULTY

Joe Arvai, PhD
Skunkworks Lab for Risk and Decision Research

Arvai is professor of judgment and decision making at Michigan State University. He is appointed across three academic units: Environmental Science and Policy, Cognitive Sciences, and the Centre for the Advanced Study of International Development. At MSU, Arvai is also the director of the Skunkworks lab for Risk and Decision Research. His research focuses on advancing our understanding of how people process information and make decisions, both as individuals and in groups. A second objective of his research is to develop and test decision support tools that can be used by people to improve decision quality across a variety of risk and environmental contexts. Arvai's home is in Michigan but he works across Canada, the United States, and internationally as an advisor to various government agencies and non-profit groups; in this capacity, he has worked as an advisor to NASA, the EPA's Science Advisory Board, the National Academy of Sciences, and Natural Resources Canada.

Keith Bowers, RLA, PWS
Biohabitats Inc.

For over 25 years, this internationally recognized landscape architect has planned, designed, and managed the construction of over 200 ecological restoration projects throughout the United States. He also teaches ecological restoration seminars and workshops, and participates on numerous industry panels. Bowers actively volunteers for organizations supporting ecological restoration, and is currently serving as chairman of the board for the Society for Ecological Restoration International. He is the founder and president of the consulting firm, Biohabitats Inc.

Ken Cossey, MCIP
Lands Manager, Tsawout First Nation

Ken Cossey is a community planner with over 23 years of community planning experience. Ken has a BA Advanced in Regional and Urban Development (Planning Option) (University of Saskatchewan 1987), Site Planning Certificate (UBC 1998) and a certificate from the University of Saskatchewan (2008) for completion of the Indigenous Peoples Resource Management Program. Over his planning career Ken has worked for municipal governments, First Nations governments and for over 10 years was the principal of KWC Planning Services. Ken is a full member of the Canadian Institute of Planners and the Planning Institute of BC. Currently Ken is the Lands Manager for the Tsawout First Nation and is responsible for the implementation of the Tsawout First Nation Land Code laws and land development procedure policies. Ken also represents the Shawnigan Lake community, his home town, on the Cowichan Valley Regional District Board and he is very active in the local soccer community.

Robert Costanza, PhD
University of Vermont

Costanza is Gordon and Lulie Gund Professor of Ecological Economics and director of the Gund Institute for Ecological Economics at the University of Vermont. He is also a Distinguished Research Fellow at the New Zealand Center for Ecological Economics, Massey University, Palmerston North, New Zealand, a Senior Fellow at the Stockholm Resilience Center, Stockholm, Sweden. Dr. Costanza received BA and MA degrees in Architecture and a Ph.D. in Environmental Engineering Sciences

(Systems Ecology with Economics minor) all from the University of Florida. Before Vermont, he was on the faculty at LSU and Maryland. Dr. Costanza's transdisciplinary research integrates the study of humans and the rest of nature to address research, policy and management issues at multiple time and space scales, from small watersheds to the global system. Dr. Costanza is co-founder and past-president of the International Society for Ecological Economics, and was chief editor of the society's journal, Ecological Economics from its inception in 1989 until 2002. He currently serves on the editorial board of eight other international academic journals. He is founding editor in chief of Solutions, a new hybrid academic/ popular journal.

Brian Emmett, M.Sc., R.P.Bio.
Archipelago Marine Research Ltd

Mr. Emmett is a Vice President of Archipelago Marine Research Ltd. and head of the Marine Environmental Services Division. He has over thirty years of experience in coastal marine and fisheries biology, mostly on the British Columbia coast but also in the Canadian Arctic and Atlantic coasts. Brian has worked extensively on the development of innovative survey, sampling and monitoring methods for coastal marine resources. He has a broad interest in the development of environmentally sound and sustainable approaches to marine resource and resource management. He has worked on a number of coastal resource planning initiatives, the development of stewardship guide for the British Columbia coast, an assessment of progress towards sustainability the BC seafood harvesting sector, and methods of ecological evaluation of marine habitats. Brian is a founding member of and Technical Team Coordinator for the Green Shores project (www.greenshores.ca) which promotes sustainable use of coastal ecosystems through planning and design that recognizes the ecological features and functions of coastal systems.

Rusty Feagin, PhD
Texas A&M University

Feagin is an assistant professor in the Spatial Sciences Laboratory within the Department of Ecosystem Science & Management at Texas A&M University. He is a coastal ecologist who looks at the impact of climate change on plant communities and sediments from a spatial perspective (GIS, remote sensing, GPS). After the recent major hurricanes on the US Gulf Coast he has been involved in several restoration projects. He is currently a lead PI on a major National Science Foundation Research Coordination Network. His restoration work focuses primarily on coastal ecosystems, particularly sand dunes and wetlands, and his work has spanned from altering the geomorphic/topographic substrate with machinery, and rebuilding proper land forms after major storms, to vegetation planting techniques using mycorrhizae and algae in dune/beach restoration. He has also studied ecosystem service values for restoration projects in China's Yangtze Delta, and monitored sedimentary changes after restoration projects.

Peter Frederiksen, CPESC
Triton Environmental

Peter has 25 years of experience in environmental consulting, focusing on fisheries research, environmental monitoring, fish habitat inventory and fish habitat restoration. He also is a student in the Restoration of Natural Systems program at UVIC.

Robin Gregory, PhD
University of Victoria

Gregory is a senior researcher at Decision Research, associate director of the Eco-Risk Research Unit at the University of British Columbia, and director of Value Scope Research, a small consulting firm. Gregory is also an adjunct professor at the School of Environmental Studies, University of Victoria. He leads research projects and workshops for government, private, and international groups on questions relating to risk management, the conduct of deliberative groups, and techniques for eliciting preferences and addressing difficult tradeoffs.

James Harris, PhD, Cbiol, C.Env
Cranfield University

Harris is at the forefront of restoration research and science, and his work in restoration biology and climate change is widely published. He is currently the chair of Environmental Technology and a professor at Cranfield University in Bedfordshire, UK. Originally trained as a plant physiologist/biochemist, he has investigated the effects of topsoil storage on microbial communities on opencast mining areas. This work was extended to encompass many aspects of land degradation and restoration. Harris is keenly interested in the exploration and application of "ecosystem services" as a concept, and its potential application in land-use planning and as a target for ecological restoration programs. He participates on a myriad of boards and councils, including the Society for Ecological Restoration International, Journal Restoration Ecology, NERC Peer Review College, the British Society of Soil Science, and the Environment and Land Use Committee of the Institute of Biology.

Eric Higgs, MA, PhD
University of Victoria

Higgs is a professor and the director of the School of Environmental Studies at the University of Victoria. His research focuses on ecological restoration in its many forms including historical ecology, restoration policy, cultural practices, and philosophy. He teaches courses on ecological restoration, and his research takes him to the mountains of western Canada through the Mountain Legacy Project – a consortium of researchers and managers using systematic historical survey photography to track changes in the landscape. Restoration of national parks and protected areas are a major focus of this work, and a parallel and long-standing interest is in technology and culture. His books include 'Nature By Design' (MIT Press, 2003), and 'Technology and the Good Life?' (with Andrew Light and David Strong, University of Alberta Press, 2000).

Richard Hobbs, PhD
University of Western Australia

Hobbs is an ecologist who has worked in Australia, United Kingdom, Europe, and the United States. He is currently a Professorial Fellow in the School of Plant Biology at the University of Western Australia. He is the author of over 200 refereed publications, many magazine articles and non-juried publications, and author/editor of 10 books. His particular interests are in vegetation dynamics and management, fragmentation, invasive species, ecosystem rehabilitation and restoration, conservation biology and landscape ecology. Hobbs has served on a number of editorial boards including Ecological Management and Restoration, Journal of Vegetation Science, Landscape and Urban Planning, Landscape Ecology, Conservation Biology, and and Ecosystems. He is also editor-in-chief of the journal Restoration Ecology. Previously, he served as president of the International Association for Landscape Ecology and the Ecological Society. Hobbs has been named in the "Top Scientists in Ecology and Environmental Science" and, in 2004, was elected Fellow of the Australian Academy of Science.

Gregory Hood, PhD
Skagit River System Collective

Hood is a senior research scientist for the Skagit River System Cooperative, a natural resources management agency serving the Swinomish Indian Tribal Community and the Sauk-Suiattle Indian Tribe. His research focuses on the interaction between geomorphology and ecology in tidal wetlands with application to habitat restoration and recovery of threatened Chinook salmon. He has been working for twenty years in Pacific Northwest wetlands. In addition to research, he has taught Landscape Ecology of Wetlands for five years with Si Simenstad in the Professional Certification Program at the University of Washington. He is currently serving as a panel member on the Columbia River Expert Regional Technical Group on Estuary Habitat Actions, which advises the National Marine Fisheries Service, US Army Corps of Engineers, and Bonneville Power Administration on federal estuarine habitat actions for Chinook salmon recovery in the Columbia River Estuary.

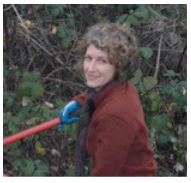
Nancy Jackson, PhD
New Jersey Institute of Technology

Nancy Jackson is a professor in the Department of Chemistry and Environmental Science at New Jersey Institute of Technology. Her research focuses on coastal processes on beaches and dunes in estuarine and ocean environments. She held the Fulbright Distinguished Chair in Environmental Science at the Polytechnic in Turin in 2005. She is an Associate Editor of Estuaries and Coasts and Journal of Coastal Research. She received her bachelor's degree from Clark University, her master's degree from Antioch New England Graduate School and her doctorate from Rutgers University.

Marisa Martinez, PhD
Instituto de Ecología, A.C.

Dr. Martínez is the Coordinator of the Network of Functional Ecology at the Instituto de Ecología, A.C. in Xalapa, Veracruz, Mexico. She is a Plant Ecologist with research interests in plant community dynamics over space and time, and ecosystem services associated with this. She works mainly with coastal ecosystems (coastal dunes, mangroves) and cloud forests in the tropical mountains. Dr. Martínez has authored three books, 40 refereed papers and 10 book chapters. She is associate editor of two journals.

Marian McCoy, M.Sc.
Saanich Parks



As Natural Areas Technician at Saanich Parks, Marian works with staff, community volunteers, ENGOs and specialists to implement Saanich's volunteer stewardship and restoration projects. She also develops best management practices for park operations that affect natural areas, and coordinates Saanich's Integrated Pest Management program. She has a background in invasive species management, ecological restoration, paleoecology, and bio-geography. Her Master's thesis (SFU) focused on the fire history of coastal Douglas-fir and Garry oak ecosystems. She is an active member of the Capital Regional Invasive Species Partnership (CRISP), and a truant member of GOERT's Invasive Species Steering Committee and Restoration and Management group. In her spare time, Marian hikes, bikes, and dreams about being better at identifying grasses.

Stephen Murphy, PhD
University of Waterloo

Murphy is currently an associate professor and associate chair of undergraduate studies at the University of Waterloo. He is an ecologist with interests in both disciplinary and transdisciplinary research. Specifically, he focuses on restoration ecology, invasive species ecology, parks and protected areas management, and plant-plant and plant-animal interactions. He is cross-appointed to the School of Planning and the Department of Geography. In addition, he is chair of the Society for Ecological Restoration – Ontario Chapter, and chair of the Parks Research Forum of Ontario. He is also an associate editor of Restoration Ecology, Weed Science, and Allelopathy Journal, and serves on the editorial board of the Journal of Food, Agriculture and Environment.

Cara Nelson, PhD
University of Montana

Nelson is an assistant professor of restoration ecology in the Department of Ecosystem and Conservation Sciences at the University of Montana. The research in her lab focuses on two main areas: 1) the effects of large-scale disturbance, management activities, and environmental stress on forest vegetation, and 2) strategies for restoring native plant communities after disturbance. These topics are being explored at landscape, population, and organism scales, through field experiments, retrospective studies, and meta-analyses. Nelson and her students are particularly interested in projects that both contribute to basic knowledge of plant and restoration ecology, and provide managers with timely information about efficacy and non-target effects of current practices.

Karl Nordstrom, PhD
Rutgers School of Environmental and Biological Sciences

Nordstrom is a professor of beach and dune processes and landforms at Rutgers School of Environmental and Biological Sciences in New Jersey. He has his Ph.D. from Rutgers, and his research is directed toward understanding the dynamic processes affecting the size, shape and location of beaches and dunes in ocean, estuarine, and tidal inlet environments. These investigations involve assessment of winds, waves and currents and the effect of these processes on coastal sedimentation and landform evolution. Research is also directed toward analysis of natural hazards, land use, and restoration of naturally-functioning environments in developed municipalities.

Tom Okey, PhD
University of Victoria

Okey is the director of Ecological Sciences for the West Coast Aquatic Management Board and a professor at the University of Victoria School of Environmental Studies in British Columbia, Canada. His Pew Fellowship project evaluates the current and future impacts of climate change on the marine ecosystems of North American and Australian Pacific ocean regions. Okey is also developing strategies and tactics to assist national and international policy-makers in these areas.

Nick Page, M.Sc., R.P.Bio.
Raincoast Applied Ecology

Nick Page is a biologist who works on the assessment, restoration, and management of terrestrial and aquatic ecosystems in coastal BC. He has a bachelor's degree in Landscape Architecture (UBC, 1993) and completed a master's of environmental studies at the Institute for Resources, Environment, and Sustainability at UBC in 2003. His thesis focused on local- and regional-scale patterns of exotic plant species in sand beach plant communities on Vancouver Island. His recent work has focused on species at risk recovery, biological monitoring, watershed assessment, and plant community ecology. He is also involved in the recovery of species at risk and sits on recovery teams for pink sand-verbena, Streaked Horned Lark, and Vesper Sparrow, and is a technical advisor to the provincial invertebrate recovery team. He is currently involved in initiating the Coastal Sand Ecosystems Recovery Team. He started Raincoast Applied Ecology in 2003.

Erika Paradis, M.Sc.
Triton Environmental

Erika has background in biology, geography and resource management. She is experienced in marine and freshwater fish and habitat inventory. Erika also has experience in teaching and group animation from past work with the Vancouver Aquarium.

Scott Parker, PhD candidate
Ecologist, Parks Canada / University of Waterloo

Scott Parker is an ecologist at Fathom Five National Marine Park and Bruce Peninsula National Park, Ontario, Canada. He has over 20 years experience with Parks Canada – from the mountaintops of Gwaii Haanas, to the forests of Riding Mountain, to the lakebeds of Fathom Five. His current focus is sustainability and resilience within freshwater protected areas, which he is pursuing, in part, as a PhD candidate at the University of Waterloo with Dr. Stephen Murphy.

Janet Pivnick, PhD
University of Victoria

Pivnick is program coordinator of the Sustainability and Environment programs in the Division of Continuing Studies at the University of Victoria. She has a background in environmental science, environmental education and ecophilosophy. Her doctorate in Philosophy of Education from the University of Calgary focused on the transition from a western worldview to an ecological worldview. She is particularly interested in the process of social change and in creating models of ecological ways of being.

Dr. Valentin Schaefer, PhD
University of Victoria

Schaefer is a biologist and ecologist by training who has developed unique expertise in the emerging field of Urban Ecology. He is a founder and former Executive Director of the Institute of Urban Ecology at Douglas College in New Westminster, British Columbia, Canada. He is presently Faculty Coordinator of the Restoration of Natural Systems Program at the University of Victoria. Schaefer is a leading proponent of urban ecology and urban biodiversity who has written extensively and presented internationally on these topics. He is also an environmental educator who has conducted numerous community projects promoting nature in the city.

Sara Stallard
Fish-Kissing Weasels Environmental

Sara Stallard specializes in water quality and stream protection. Sara has gained experience with the BC Ministry of Environment, Lands and Parks Water Quality Section, the Capital Regional District Stormwater Program, Orca Environmental Consultants and local community associations' environment committees. Past projects have included contaminated sites clean up, developing sampling programs for stormwater investigations and baseline inventories (including Cecelia), construction monitoring and invasive species removal (Cecelia, Trial Island, Point Ellice House). She has her own firm called Fish-Kissing Weasels Environmental.

Mark Sytsma, PhD
Portland State University

Mark Sytsma is a Professor and Chair of the Environmental Science and Management, director of the Center for Lakes and Reservoirs, and co-director of the Aquatic Bioinvasion Research and Policy Institute at Portland State University. He is a founding member of the Oregon Invasive Species Council and the Western Regional Panel on Aquatic Nuisance Species and co-chair of the Spartina Action Team of the West Coast Governor's Agreement. He authored and coordinates the Oregon AIS Management Plan and works closely with the Oregon Department of Agriculture on aquatic weed management in Oregon.

Ian Walker, PhD
University of Victoria

Professor Walker is a geomorphologist with research expertise in beach-dune geomorphology, sedimentary processes, coastal erosion, and windblown (aeolian) processes. His research also explores the signals and impacts of climate variability events and sea-level rise on beach-dune ecosystems. Dr. Walker's research takes place on beaches and dunes across Canada in Prince Edward Island National Park (Greenwich Dunes), Great Sand Hills Saskatchewan, and in British Columbia in Haida Gwaii, Pacific Rim National Park in Ucluelet, and in Gulf Islands National Park. This work involves close collaboration with Parks Canada, BC Parks, Natural Resources Canada, the Geological Survey of Canada, and many international colleagues. His research is funded by NSERC, the Canada Foundation for Innovation, Natural Resources Canada, Geological Survey of Canada, Parks Canada, and MITACS.

Tom Watson, R.P.Bio
Triton Environmental

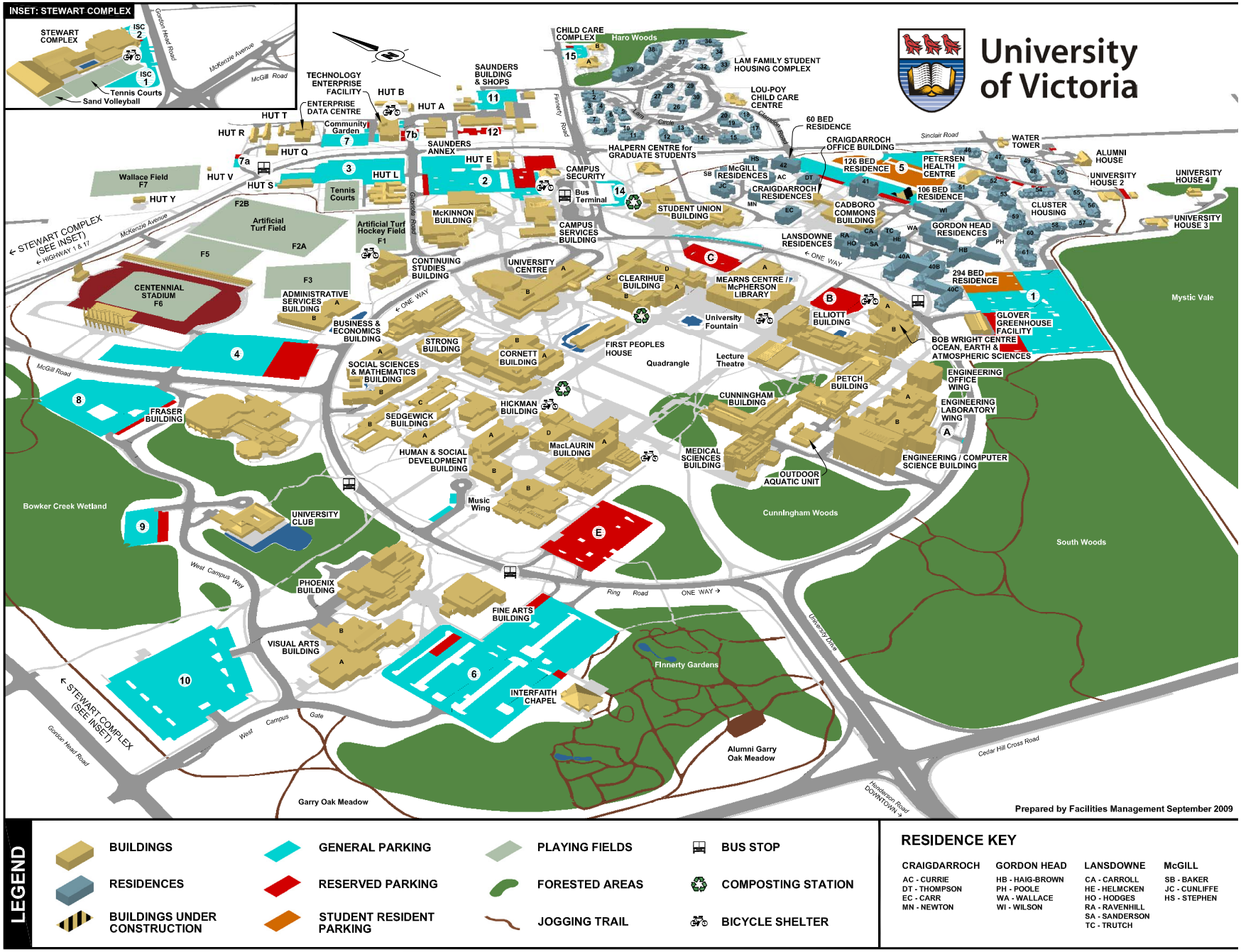
Tom obtained his Ph.D. in 1978 from the University of Guelph in fish physiology and toxicology and has more than 30 years experience in environmental consulting, research and teaching. As part of his work, Tom often provides presentations to industry and college students.

Barbara (Basia) Wojtaszek, PhD
Parks Canada

Wojtaszek is currently the monitoring ecologist at Gwaii Haanas National Park Reserve & Haida Heritage Site (Haida Gwaii / Queen Charlotte Islands, BC). She manages a broad range of studies and ecological monitoring activities ranging from alpine vegetation to stream benthic invertebrates, which feed into park management and the assessment of Gwaii Haanas' ecological integrity. She is also overseeing a stream and riparian restoration project taking place on Lyell Island, where the historic Haida anti-logging protests led to the establishment of Gwaii Haanas.

Tom Wood, MSc, CCR
Senior Policy Advisor, Aboriginal and Treaty Issues, Canadian Wildlife Service

Tom Wood is a biologist with diverse experience in wildlife research and management throughout Canada. He has served as Regional Fish and Wildlife Manager in several BC regions and was the founding Director of the Aboriginal Affairs Branch for the BC Ministry of Environment. Tom currently advises Canadian Wildlife Service on treaty negotiations and conservation-related aboriginal policy matters.


INSET: STEWART COMPLEX
STEWART COMPLEX
ISC 2
ISC 1
Tennis Courts
Sand Volleyball
Gordon Head Road
McKenzie Avenue
McGill Road
University of Victoria
CHILD CARE COMPLEX
Haro Woods
LAM FAMILY STUDENT HOUSING COMPLEX
LOU-POY CHILD CARE CENTRE
SAUNDERS BUILDING & SHOPS
TECHNOLOGY ENTERPRISE FACILITY
ENTERPRISE DATA CENTRE
HUT A
HUT B
HUT T
HUT R
HUT Q
HUT V
HUT S
HUT Y
HUT L
HUT E
Community Garden
SAUNDERS ANNEX
HALPERN CENTRE for GRADUATE STUDENTS
60 BED RESIDENCE
CRAIGDARROCH OFFICE BUILDING
WATER TOWER
ALUMNI HOUSE
126 BED RESIDENCE
PETERSEN HEALTH CENTRE
UNIVERSITY HOUSE 2
UNIVERSITY HOUSE 4
UNIVERSITY HOUSE 3
McGILL RESIDENCES
CRAIGDARROCH RESIDENCES
106 BED RESIDENCE
CLUSTER HOUSING
CADBORO COMMONS BUILDING
GORDON HEAD RESIDENCES
LANSDOWNE RESIDENCES
294 BED RESIDENCE
CAMPUS SECURITY
Bus Terminal
STUDENT UNION BUILDING
CAMPUS SERVICES BUILDING
McKINNON BUILDING
Wallace Field F7
Artificial Turf Field F2A
Artificial Turf Hockey Field F1
F2B
F5
F3
Tennis Courts
CENTENNIAL STADIUM F6
CONTINUING STUDIES BUILDING
UNIVERSITY CENTRE
CLEARIHUE BUILDING
MEARNS CENTRE / McPHERSON LIBRARY
ELLIOTT BUILDING
GLOVER GREENHOUSE FACILITY
BOB WRIGHT CENTRE OCEAN, EARTH & ATMOSPHERIC SCIENCES
Mystic Vale
ADMINISTRATIVE SERVICES BUILDING
BUSINESS & ECONOMICS BUILDING
STRONG BUILDING
CORNETT BUILDING
FIRST PEOPLES HOUSE
University Fountain
Quadrangle
Lecture Theatre
SOCIAL SCIENCES & MATHEMATICS BUILDING
PETCH BUILDING
ENGINEERING OFFICE WING
ENGINEERING LABORATORY WING
CUNNINGHAM BUILDING
FRASER BUILDING
SEDGEWICK BUILDING
HICKMAN BUILDING
MacLAURIN BUILDING
HUMAN & SOCIAL DEVELOPMENT BUILDING
MEDICAL SCIENCES BUILDING
ENGINEERING / COMPUTER SCIENCE BUILDING
OUTDOOR AQUATIC UNIT
Music Wing
Bowker Creek Wetland
UNIVERSITY CLUB
Cunningham Woods
South Woods
PHOENIX BUILDING
FINE ARTS BUILDING
VISUAL ARTS BUILDING
INTERFAITH CHAPEL
Finnerty Gardens
Alumni Garry Oak Meadow
Garry Oak Meadow
← STEWART COMPLEX (SEE INSET)
← HIGHWAY 1 & 17
West Campus Way
Ring Road
ONE WAY →
← ONE WAY
Finnerty Road
Gordon Head Road
Cedar Hill Cross Road
Henderson Road DOWNTOWN →
Prepared by Facilities Management September 2009
LEGEND
BUILDINGS
RESIDENCES
BUILDINGS UNDER CONSTRUCTION
GENERAL PARKING
RESERVED PARKING
STUDENT RESIDENT PARKING
PLAYING FIELDS
FORESTED AREAS
JOGGING TRAIL
BUS STOP
COMPOSTING STATION
BICYCLE SHELTER
RESIDENCE KEY
CRAIGDARROCH
AC - CURRIE
DT - THOMPSON
EC - CARR
MN - NEWTON
GORDON HEAD
HB - HAIG-BROWN
PH - POOLE
WA - WALLACE
WI - WILSON
LANSDOWNE
CA - CARROLL
HE - HELMCKEN
HO - HODGES
RA - RAVENHILL
SA - SANDERSON
TC - TRUTCH
McGILL
SB - BAKER
JC - CUNLIFFE
HS - STEPHEN