

BC PROTECTED AREAS RESEARCH FORUM

2016

ABSTRACTS



BCPARF 2016

Is dedicated to the memory of

Dr. Wolfgang Haider
(1953-2015)

Dr. Wolfgang Haider, Director of the SFU Resource and Environmental Management (REM) program, passed away on August 24, 2015 from injuries suffered in a cycling accident in Austria. This is a huge loss for SFU's REM program, and for Wolfgang's family and friends. He was well-respected internationally as a researcher, well-loved as a professor and mentor, and immensely devoted as a leader in the field. Wolfgang was one of the founders of the BC Protected Areas Research Forum and was involved in the advisory committee for BCPARF for every BCPARF conference. He was also a very good friend.

Wolfgang's research, and that of his graduate students, has made a lasting impact in our field. He conducted innovative research in outdoor recreation and in the human dimensions of wildlife and was an expert in tradeoff-based decision modeling approaches to examine natural resource management and nature-based tourism, fisheries and wildlife management. With his wife, Dr. Ulrike Pröbstl-Haider, he established and was editor-in-chief of a new journal, the *Journal of Outdoor Recreation and Tourism*.

As a long-term legacy and to commemorate Wolfgang's dedication to his students and his lasting contributions to the field of natural resource management, Wolfgang's family and SFU are establishing the Wolfgang Haider Fellowship Trust, which will provide scholarship support to graduate students in REM. Information on donating to the trust can be found on the department website (<http://www.rem.sfu.ca>).

To remember and honour our colleague BCPARF will award one student attending the 2016 conference with a complementary registration.



December 6th 9:15 – 10:00am

PLENARY

Protecting Cultural Landscapes in Protected Areas: the Importance of Keeping People in the Picture

Nancy Turner, University of Victoria. Trudeau Fellow and Emeritus Professor

Humans are often excluded from parks and other protected areas that are designed to retain and conserve biodiversity (except for brief periods of time, when they are asked to “take nothing but pictures; leave nothing but footprints”). However, in many parts of the world, humans and human-initiated processes have been a part of these so-called “natural areas” for centuries, in some cases millennia. In northwestern North America, for example, humans have used and maintained particular culturally important habitats in many different ecosystems: from intertidal areas, river estuaries, to coniferous forests, prairies and subalpine parkland. If we are to retain historical fidelity, including the structure, function and composition of these cultural landscapes, as well as respecting the rights and title of Indigenous peoples to their traditional territories, we need to recognize their use and occupancy of these habitats and to retain the processes that they have used for generations to sustain their productivity. In this talk I will discuss some of the ways in which First Nations have managed their territories and plant resources, and suggest how traditional use of protected areas might be maintained or reinstated without impacting their overall value.

December 6th 10:30 – 12:00

A1. MAP AND MEASURE

State of Environment Reporting in a Digital World

Stephanie Hazlitt and Andy Teucher, BC Ministry of Environment

Since the early 1970s 'State of Environment' reporting has been a globally recognized brand and approach for summarizing large amounts of environmental information for a defined region. State of Environment reports, typically comprised of a set of indicators, are designed to support informed decision making for governments, policy makers, and individuals. However, the reporting landscape has dramatically changed over the past half century. The amount, type and availability of data has proliferated, user needs for data and information have increased, and the way that people look for, digest, and share information has gone digital. In late 2012, the Province launched Environmental Reporting BC (gov.bc.ca/environmentalreportingbc), a web-based approach to reporting on air, water, climate, species and land -- including status and trends in protected areas in B.C. I will present updated indicators relating to parks and protected areas and talk about the tools and approaches being explored through Environmental Reporting BC for modernizing environmental reporting and ensuring reporting products are accessible, transparent and engage a broad audience.

Ecosystem Mapping: Discover What's Where in the Back of the Beyond

Nyssa Temmel, Knowledge Management Branch, BC Ministry of Environment

Accessing and Using the BC provincial Ecosystem Inventory and Mapping data. Find out how the Knowledge Management Branch of the BC Ministry of Environment collects and curates ecosystem mapping data for the province and makes this information available for use for ecological conservation and land management planning. THE KMB manages spatial and reported data in BC that inventories ecological features including climate, geology, soil and vegetation. We make this information available and advise clients on how to apply it to address their project needs. Discover how working with the KMB and the data we curate can help address sensitive ecosystem mapping, land use management plans, wildlife habitat modelling, climate change models and more.

Mapping Wilderness Character in the Muskwa-Kechika Management Area

Lindi Anderson, NRES Graduate Student, University of Northern BC

Wilderness is a complex western concept with both an ecological and a social dimension. The wilderness idea differs geographically, culturally and jurisdictionally thus planning and managing a specific wilderness area necessitates definition, and then ultimately assessment and monitoring, of the associated wilderness characteristics. My work focused on the Muskwa-Kechika Management Area (M-KMA) where maintaining wilderness is a central goal. Within the province at large and the north east part of the province specifically, developments such as oil and gas exploration, forestry, wind power, and mining outside of the M-KMA have had a significant impact on intact forests and wildlife habitats. Previous mapping initiatives (see Parker and Suzuki this conference) have focused on wildlife and resource values whereas this project aimed to develop an approach to map and monitor wilderness values for the Muskwa-Kechika Management Area and examine the resultant wilderness condition relative to other resource values. When the values Wilderness in the M-KMA are separated into four categories of wilderness quality (Lower, Moderate, High and Very High), the highest wilderness category represents 44.39% of the M-KMA. This Very High category has 11.85% overlap with the highest forestry value and 17.23% overlap with area with the highest mineral potential. Wind and oil reserves have less high valued area and only 9.36% of areas with the highest oil reserve potential and only 4.17% of potential wind energy locations overlap with Very High Wilderness quality.

Blue Carbon on the Pacific Coast of Canada: Measuring Coastal Carbon Stocks in Pacific Rim National Park Reserve

Marlow Pellatt, Parks Canada

Climate change mitigation involves reductions in anthropogenic emissions of greenhouse gases. Mitigation may also be achieved by increasing the capacity of carbon sinks, e.g., through reforestation, conservation and restoration. Blue carbon is a term that recognizes the role of coastal wetlands and seagrass systems in the global carbon cycle. Tidal marshes, tidal forested wetlands, and seagrasses sequester carbon dioxide from the atmosphere continuously, in some cases over thousands of years, building stocks of carbon in organic-rich soils. It has been estimated that blue carbon systems – cover less than 2% of the area of the world's oceans but sequester at least 50% of the carbon stored in ocean sediments. In Canada, seagrass and saltmarsh ecosystems are well represented in Canada's coastal National Parks and National Marine Conservation Areas (NMCAs). These coastal ecosystems provide numerous ecosystem services in addition to blue carbon such as fish nursery habitats and erosion protection. Many of these systems are in need of protection and restoration, and will be impacted by rising sea levels, extreme weather events,

and terrestrial activities such as erosion and pollution. In addition to important ecosystem services, the restoration of seagrass and saltmarsh communities is a cost-effective part of a broader climate change mitigation strategy. Parks Canada, the Commission for Environmental Cooperation, and Simon Fraser University are studying blue carbon (seagrass and saltmarsh) stocks in Canada including Pacific Rim National Park Reserve, the Clayoquot Sound Biosphere Reserve, and Boundary Bay. This presentation will discuss some preliminary results of this research and how it may serve as climate change co-benefit of managing for ecological integrity.

A2. ENGAGING THE PUBLIC

People with Disabilities' Participation in BC Parks Experiences

Craig Paulson, BC Parks and Lorraine Copas, Social Planning and Research Council of BC

BC Parks is working to make vehicle accessible front country campgrounds and day use areas more accessible to people of all abilities, but very little information is available about the participation of people with disabilities in BC Parks. This presentation will outline the universal design imperative for developed Park facilities, review the findings of survey research among self-reported park visitors with disabilities conducted by BC Parks in 2015 and 2016, and describe a research project in development by BC Parks and the Social Planning and Research Council of BC (SPARC BC).

Volunteers for Parks: Improving Retention by Understanding Motivations for Volunteering

Rick Rollins and Angela Hunter, University of Victoria

The work of parks and other conservation agencies often requires the use of volunteers, who work where paid staffs are limited or not available. However, high volunteer turnover can increase recruiting and training costs and disrupt programs. In order to help improve retention rates and the effectiveness of volunteers, this study aimed to better understand motivations to volunteer, and what factors contribute to satisfaction. A random sample of 148 past and present conservation volunteers selected from ten conservation organizations located in Victoria, British Columbia were surveyed to explore their motives for volunteering with a conservation organization (response rate was 90%). Analysis of responses to 35 motivation statements generated nine meaningful motivational factors, labelled as: career; environmental values, personal growth, protective, social norms, social interests, intrinsic satisfaction, efficacy, and independence. These factors were used in a cluster analysis to generate a typology of six volunteer groupings, who differed substantially in their volunteer motivations. These groups were labelled as follows: practical environmentalists; concerned environmentalists; career environmentalists; budding idealists; social environmentalists; and, other helpers. Understanding this variability in volunteer motivations allows park agencies to better understand what type of volunteer will best fit the needs of the agency, thereby improving volunteer satisfaction, and retention of volunteer workers.

Electronic Media and Children's Outdoor Recreation: A critical exploration of popular discourses

Stephanie A. Coulson and John Shultis, University of Northern BC

In the early 21st century, powerful discourses that relate to children and their potential outdoor recreation behaviour and attitudes towards conservation began to emerge; these discourses quickly consolidated to become hegemonic ways of thinking. Academics, governments and non-governmental organizations (NGOs) quickly adopted these discourses relating to perceived changes in the relationship between children, electronic media, the outdoors and protected areas, but the adoption and dissemination of these discourses have rarely been critically or empirically examined. This study attempts to 1) identify the primary, hegemonic discourses that related to children, electronic media and the natural environment and 2) illuminate the potential gaps between the most prominent discourses in the popular media, NGOs and institutional park agency reports and the related empirical evidence presented in the academic literature. A textual analysis of content from public park agency reports, popular media articles, and academic literature is used to identify the primary popular and academic discourses and the agents of those discourses, as well as connections between discourses. Four primary discourses are identified in this analysis, and it is noted that the vast majority of empirical evidence from published research does not support these four hegemonic discourses. The implications of these findings are discussed: why do these discourses retain such power when the empirical evidence does not support them?

A3. CONSERVATION ACROSS SCALES AND BOUNDARIES

Seawall Removal and Shoreline Restoration at Rathtreavor Provincial Park, Vancouver Island

Erica L. McClaren, BC Parks

In 1971, BC Parks built a 300 m long concrete seawall in Rathtreavor Provincial Park, on the southeast coast of Vancouver Island, to deflect unwanted logs from accumulating along the beach and to enhance sunbathing opportunities. Since then, we have learned that concrete seawalls along shorelines interfere with natural sediment transport processes and in fact, lead to the loss of beach material and associated coastal sand ecosystems and the ecological processes that maintain them. In recent years, the concrete seawall has been failing and public access to the beach has decreased (due to beach erosion). Therefore, in 2014 BC Parks initiated a project to: 1) increase public access to the beach; 2) increase the resilience of the Rathtreavor Park shoreline to sea-level rise from climate change; and 3) restore unique coastal sand ecosystems and ecological processes. Between 2014 and 2016, coastal engineers developed design options, archaeological and ecological assessments occurred, and public and First Nations consultation about the project was ongoing. In early September 2016, we initiated the project and between September and early November the concrete seawall was removed, a mixture of sand and gravel was used to nourish the beach and restore the natural beach slope profile, and engineered log structures were anchored along the shoreline. Prior to seawall removal, coastal sand ecosystem plants (*Leymus mollis*, *Ambrosia chamissonis*, *Grindelia stricta*) were salvaged and seed from Silver burweed (*Ambrosia chamissonis*) was collected and stored for the project duration. Plants and seed were dispersed onsite during the final stages of log placement and beach nourishment. Future stages of this project include controlled pedestrian access to the beach using split-rail fencing, ongoing restoration of coastal sand ecosystems (including invasive plant removal), and installation of interpretive signs to educate the public about shoreline restoration and associated ecological values.

Stepping Stones: The Role of Saanich Parks

Eva Riccius, Saanich Parks

Saanich has 171 parks, many of which are natural areas. This is an opportunity for species' response to changing conditions and to build strong and long lasting connections between people and nature.

Invertebrate Species at Risk Projects in BC Parks

Jennifer Heron, BC Ministry of Environment

British Columbia's parks and protected areas include some of the most biologically diverse and unique habitats in Canada. The invertebrate fauna within many of these parks is equally as diverse and unique. This talk will focus on three ongoing invertebrate conservation projects within BC Parks. The first project centres on documenting the bee fauna within the protected areas of the Western Interior Basin ecozone, a region in Canada that less than 55,000 km² but with the highest bee diversity and endemism in the country. The second project is an overview of the habitat enhancement work for Taylor's Checkerspot (*Euphydryas editha taylori*) in Garry Oak (*Quercus garryana*) maritime meadow ecosystems; the challenges with captive rearing, habitat restoration, public support and ecosystem restoration. The third project centres on the habitat characterization of the Canadian endemic Hotwater Physa Snail (*Physella wrighti*), which is also part of a longer-term assessment of arthropod diversity within some of the province's thermal springs.

First Nation's Conservation of Culturally and Ecologically Significant Landscapes: On-reserve planning for protected areas

Taylor Groenewoud, Simon Fraser University

Land use planning by First Nations for reserves and traditional territories in Canada is becoming increasingly important as Aboriginal people attain more control over their lands through treaties, federal policies, and court decisions affirming Aboriginal rights and title. Notably, the recent federal First Nations Land Management Act enables greater control of reserve land by First Nations and has led to new comprehensive land use planning initiatives. One important dimension of First Nations' planning that has not been extensively studied is the conservation of endangered and threatened species ("species at risk") on reserve lands. Planning on reserve lands is particularly challenging because of the limited land base available to meet multiple and sometimes competing community objectives. Proposals for protected areas or other restrictions on land use that are designed to conserve species at risk must compete with demands for residential housing, economic development and other needs. My research seeks to understand how protected areas have been established and managed, or co-managed, on reserve lands and adjacent areas to protect species at risk. I will use qualitative, comparative case studies to investigate factors that influence the adoption, implementation and effectiveness of tribal parks and other types of protected areas on reserves and adjacent lands. I will conduct semi-structured interviews and a review of First Nations land use planning documents to develop lessons from the experiences of these First Nations with protected areas.

December 6th 1—2:30 pm

B1. CONSERVATION AREA DESIGN TOOLS FOR THE PRIORITIZATION OF LAND PARCELS IN THE GEORGIA BASIN

Peter Arcese, University of British Columbia

The Georgia Basin supports a globally unique mix of dry forest and savannah habitats that evolved under historic climates and First Nations land management. These extraordinary areas still provide ecosystem services essential to human health and well-being and are widely recognized for their outstanding beauty, recreational and economic values. However, most of this historic habitat has been converted to human use, and what remains will be lost without further investments in conservation and restoration. The goal of our project was to develop a landscape planning tool to answer the question: can we maximize the biodiversity benefits of conservation investments by prioritizing land parcels and landscapes for acquisition and stewardship? To do so, we provide a web-based prioritization tool and tutorial designed to identify 'optimal solutions' to user-defined problems in the conservation of Coastal Douglas-fir, Garry oak and Arbutus forest, savanna and maritime meadow bird and plant communities of the Georgia Basin. The resulting North Pacific Landscape Conservation Cooperative (NPLCC) and Coastal Douglas Fir Conservation Partnership (CDFCP) planning tools represent a state-of-the-art, web-based tool designed to facilitate the ability of land managers to maximize returns on conservation investments by prioritizing land parcels and landscapes for acquisition and stewardship based on the distributions of target and non-target plant and bird communities as they exist now and are predicted to occur in 2045 (for Tutorial see <http://arcese.forestry.ubc.ca/marxan-tool/>). Our goal in these sessions is to a) introduce and offer examples of these scenario planning tools; b) show how the inclusion of critical habitat maps can be used to conserve species at risk within relatively intact old forest and savanna habitats and c) instruct interested users in how they can use these tools to develop their own scenarios of interest.

B2. ECOLOGICAL CHANGE

Rapid Ecological Change on Herschel Island-Qikiqtaruk, Yukon Territory

Cameron D. Eckert (1), M.M. Grabowski, I. H. Myers-Smith (2), D. Arey (1), R. R. Gordon (1), R. Joe (1), P. Lennie (1), E. McLeod (1), S. McLeod (1)
(1) Yukon Parks, Yukon Department of Environment, (2) School of Geosciences, University of Edinburgh

Arctic ecosystems are experiencing rapid ecological change in response to climate warming – and among the most striking observed are pronounced shifts in plant phenology. Long-term monitoring at Herschel Island-Qikiqtaruk Territorial Park, located in the Beaufort Sea off the Yukon's north coast, conducted by Park Rangers has been observing and recording the phenological stages of three tundra plant species (*Eriophorum vaginatum*, *Dryas integrifolia*, and *Salix arctica*) for the past 16 years. Transects comprised of 10-cm² plots are visited every two to three days over the growing season, from snow-off in spring to senescence in fall. Using this 16-year dataset, we compared plant phenology measurements including leaf emergence, flower emergence, and senescence through time and found that plant phenology has advanced for all three species, though the magnitude of advance varied. In other words, spring is coming earlier to Qikiqtaruk. Advancing phenology on Qikiqtaruk

has been observed by local Inuvialuit for many years, and this monitoring program quantifies the magnitude of change. Notably, this ecological monitoring program is based on collaboration between the Yukon Government, university researchers, and local Inuvialuit people. The results are both compelling to scientists and park managers, as well as informing community-based monitoring in the Inuvialuit Settlement Region.

400 Years of Fire and Western Spruce Budworm Outbreaks in the Churn Creek Protected Area, British Columbia

Jill E. Harvey, University of Victoria

The Churn Creek Protected Area (CCPA) includes the largest protected area of native grasslands in BC. Grasslands dominate lower elevations in the CCPA transitioning to a mosaic of Douglas-fir forests and grasslands at the grassland-forest ecotone around 800 m asl. At the grassland-forest ecotone land management practices in the 20th century, including fire suppression, have led to increased conifer and woody plant encroachment into grasslands and the excessive in-growth of trees in previously open forests. Climate change projections for the Cariboo Forest Region indicate a greater frequency of drought conditions, highlighting the need for historical baseline data of forest disturbances in this environment. This study describes the prehistorical character of fire and western spruce outbreaks over the period of AD 1600-2000 in the CCPA. Fire history reconstructions were based on samples from 92 fire-scarred trees and stand demography from 27 plots collected over an area of about 7 km². We utilized landscape-level variability in fire-climate relationships and patterns in forest structure to document a mixed severity fire history in the CCPA. We reconstructed multiple western spruce budworm outbreaks since the early 1600s, and characterized outbreak severity using three levels of infestation intensity. Although no synergistic relationship was found between fire and insect outbreaks, independently fire and western spruce budworm events had a significant impact on forest structure between AD 1600-2000. These findings provide important insights for land managers promoting resilience in this important ecosystem.

Repeat Photography: A History of Biodiversity in the Willmore Wilderness Park

Julie Fortin, University of Victoria

Land-cover change is a momentous environmental challenge. Landscapes can be altered by anthropogenic or natural causes, modifying the habitat available for organisms. Thus, when planning for biodiversity conservation, one common approach is to focus on preserving landscapes as a whole. Unfortunately, designating areas as “protected” does not make them immune to all vectors of change. As such, understanding the changing needs of biodiversity in protected areas is important for making effective management decisions. This project studies a unique protected area, the Willmore Wilderness Park in Alberta, Canada, and its biodiversity over the last century. To fully comprehend how the biotic structure of the Willmore has changed, first a baseline must be established. Then, comparisons can be made between aspects of historic and current biodiversity. Due to a lack of historical biodiversity data, the baseline will be established using other forms of data which allow inference of biodiversity. Specifically, we will infer past species distribution by feeding species-habitat models with historical landscape information. We will then repeat the process with current landscape information. This will allow us to assess changes in the biodiversity of the park over time. Typically, landscape data used in species-habitat models is assimilated from overhead satellite images. This project proposes a new approach with the models: using oblique imagery. Despite the associated challenges, photographic datasets reach farther back in time and thus allow us to make the most educated-guess possible on historic conditions of biodiversity in the Willmore.

Mapping Glacier Retreat in BC Parks, 2005-2015

Roger Wheate, University of Northern British Columbia

Glaciers are an important aesthetic and functional component in mountain landscapes. They attract hikers, climbers and photographers, while also contributing to summer hydrology through meltwater, cooling streamflow to the benefit of salmon and other fish species. We reported the extent of glacier retreat in BC parks from 1985-2005 at the 2006 / 2008 forums, covering all parks in the provinces of Alberta and British Columbia. Since then, changes can be better monitored with the launch of further medium resolution satellite sensors, such as Landsat 8 (2013) and Sentinel-2 (2015). I will present a mid-decade update (2015) to summarize the changes over the last 10 years, and evaluate the relative glacier melt rate, compared with the previous 20 years for select provincial and national BC parks, including Yoho, Glacier and Mt. Revelstoke, Mt. Robson, Garibaldi and Strathcona. While BC glaciers are relatively in 'much better shape' than those in other protected areas with warmer climates, it is highly likely that an increasing number of glaciers will disappear in the next decades.

B3. WET and WILD**Exploring Rockfish Conservation with Underwater Video and SCUBA Surveys**

Lily Burke, University of Victoria

Marine protected areas are used by coastal states in an attempt to conserve and restore depleted marine biota. Often, recreational fishers demonstrate a low level of regulatory compliance with marine reserve regulations and may impact the ability of conservation areas to meet their conservation objectives. In British Columbia, Canada Rockfish Conservation Areas (RCA) were established in response to conservation concerns associated with a decline in Inshore Rockfish catches. Previous research evaluating RCA efficacy in meeting conservation objectives has yielded inconclusive results, which may be a result of two sources of variance, the degree of recreational fisher compliance with RCA regulations and/or the precision of organism detection during survey methods. Through the use of multiple underwater survey methods I examined how recreational fisher non-compliance impacts RCA efficacy and determined complementarity and biases inherent in underwater survey techniques used.

Conservation Approaches for Wild Salmon: Assessing the Relative Risk of Habitat Degradation in the Skeena River Watershed

Leah Honka, Pacific Salmon Foundation

Over time, cumulative pressures from human activities in combination with changing climate conditions can alter the quality of freshwater habitats used by wild Pacific salmon (*Oncorhynchus* spp). The Skeena River is the second largest salmon-producing river in British Columbia and provides extensive spawning and rearing habitat for coho, chum, Chinook, sockeye, and pink salmon. These fish are of great cultural, ecological, and economic importance to the peoples and ecosystems of this river basin. In light of increasing anthropogenic and natural pressures in the Skeena, conservation planning requires a shared understanding of risks to salmon habitat that is based on a strong foundation of baseline information. The Pacific Salmon Foundation recently assessed the status of freshwater salmon habitats for all geographically and genetically unique wild salmon populations, known as Conservation Units under Canada's Wild Salmon Policy, in the Skeena watershed. Our main objectives were to: (1) summarize the relative extent of 13 different habitat pressures on freshwater habitats used by salmon; (2) evaluate the cumulative risk of habitat degradation from these pressures based on defined benchmarks; and (3) integrate the results of the assessment into the Pacific Salmon Explorer, an online data visualization platform. This project was a collaboration with local First Nations, the BC Ministry of Environment, Fisheries and Oceans Canada, and independent regional experts. The results of this project will help resource managers identify habitats at the greatest risk of degradation, and where conservation efforts are required to protect or restore Pacific salmon populations, their habitats, and the greater ecosystem.

Marine Spatial Planning to Support Shellfish Aquaculture and Nature-based Tourism in Coastal BC

Aerin Jacob, University of Victoria

On Canada's North Pacific Coast, the Province of British Columbia and 18 Coastal First Nations recently co-developed marine spatial plans to support sustainable economic development and a healthy marine environment. But effective implementation requires evaluating how key marine uses interact, including linkages on land and under global environmental change. We worked with Central Coast First Nations to identify priority income-generating activities in the Great Bear Sea and adjacent Great Bear Rainforest, and used an ecosystem services approach to evaluate potential environmental and economic synergies and trade-offs. Shellfish aquaculture (geoduck, scallops and oysters) and nature-based tourism (bear-viewing) were the highest priorities. We evaluated suitability for shellfish aquaculture under present and plausible future environmental conditions (e.g., depth, substrate, temperature, salinity, currents) and compared current aquaculture zoning to areas and variables important for nature-based tourism (e.g., visual quality, beach access, locations to see bears). We are using our results to allocate different marine uses within zones to minimize conflicts and maximize compatibilities in linked marine, coastal, and terrestrial environments. Combined with community engagement, this iterative process can adaptively manage multiple uses and activities to support human well-being, governance, and ecological integrity.

C1. INTEGRATED OBSERVATIONS FROM LAND TO SEA—Hakai Institute Science within Protected Areas on the BC Central Coast**Nearshore Marine Ecology**

Margot Hessing-Lewis and Zachary Monteith, Hakai Institute and Angeleen Olson, University of Victoria

Nearshore vegetated habitats play critical roles in coastal ecosystems. From carbon storage to nursery function, they provide valuable services for linked social ecological systems. Yet, monitoring efforts to track change in these critical habitats are often poorly resolved in geographic scope and methodological standardization. This hinders the use of monitoring data to inform management and conservation decisions. Monitoring networks with spatial reach offer coordinated and integrated efforts to address broad questions of both global and local import including: 1) How are habitats changing spatially and temporally, 2) What factors drive productivity of nearshore habitats, and 3) How does habitat-associated biodiversity affect metrics of its resilience. Hakai's Nearshore Marine Ecology, in concert with MarineGEO (a new Smithsonian Institution program that brings together an international consortium of research sites) conducts monitoring of nearshore habitats with a focus on common overarching research questions, standardized methodologies, and comparative-experimental approaches. Monitoring efforts at Hakai's Calvert Island Research Station focuses on vegetated habitats including seagrass beds, kelp forests, rocky intertidal benches, and soft sediment systems. Monitoring efforts are strongly tied with other research projects led by Hakai scientists and university affiliates. The Hakai Institute is also building networks with other groups working on nearshore habitat research and monitoring throughout the province. Ultimately, our aim is to galvanize nearshore ecology research in BC; supporting future habitat monitoring, data management, and associated research projects to understand and respond to change in coastal marine ecosystems.

Monitoring the Land-Sea Interface in the British Columbia Coastal Ocean

Brian Hunt, Jennifer Jackson and Wiley Evans, Hakai Institute

Coastal margins are dynamic zones at the interface between land and ocean that support complex and highly productive ecosystems, and a range of essential ecosystem services. Coastal British Columbia (BC) is particularly strongly connected to the ocean, through high volume riverine outflows of carbon rich freshwater, and spawning migrations of salmon transporting ocean nutrients to the land. The timing, quantity, and composition of terrestrial inputs to the ocean is strongly affected by climate and land use practice, yet the role of terrestrial contributions in these coastal marine ecosystems remains poorly understood. Additionally, the physics, chemistry and productivity of coastal oceans are driven by ocean-climate systems, seasonally (e.g., upwelling / downwelling cycles; spring transition timing), inter-annually (ENSO, PDO), and in the long-term (e.g., warming; increasing CO₂). Understanding the dynamics of coastal ecosystems, and their response to climate and anthropogenic impacts, therefore requires an integrated approach that considers interacting effects over a range of spatial and temporal scales. The Hakai Institute's Oceanographic Program (HOP) combines high frequency field sampling with autonomous instrumentation for comprehensive monitoring of ocean conditions on the BC Central Coast and the northern Strait of Georgia. Here we outline the HOP structure, and how it interfaces with atmosphere-land-nearshore Hakai programs in a uniquely integrated ecosystem observatory framework.

Watersheds and Carbon on the BC Outer Coast: The Hakai Watersheds Observatory on Calvert Island

Ian Giesbrecht, Hakai Institute

The coastal temperate rainforest in British Columbia stores and moves large quantities of carbon and water. In this region of abundant precipitation, water flows through forests and wetlands, transporting carbon to the near-shore ocean where it can be taken up in marine food-webs and impact regional carbon balances. Protected areas allow researchers to investigate coastal carbon processes in watersheds that are unlogged and undeveloped, yet these systems are subject to long-term climate change. Since 2013, the Hakai Institute has been operating a long-term watershed observatory in the Hakai Lúxvbálís Conservancy. The study is focused on understanding the movement of terrestrial carbon through soils and streams into the near-shore ocean. Here we present an overview of the study design and highlight some key emerging results. Much of the landscape is covered with wetlands and forested wetlands, and with soils rich in organic matter. Tall forests with high levels of above-ground carbon are rare and isolated to particular locations determined by topography and other factors. In this 'bog forest landscape', exports of dissolved organic carbon from land to sea are very high compared to most of the world. Watershed topography, hydrology and land cover all influence the concentration of organic carbon exported by individual streams. Carbon export fluctuates substantially with seasons and with storms. Climate change projections suggest that water and carbon fluxes in the region are undergoing long-term change. Ongoing monitoring by the Hakai Institute will track long-term trends in carbon export and the fate of terrestrial carbon in the coastal ocean.

Geospatial technologies and Coastal Sand Ecosystems at Hakai Institute, Calvert Island.

Derek Heathfield, Hakai Institute

A key component of Hakai Institute is the cross-cutting of geospatial technology and ecological research. Hakai's geospatial capacity supports varied terrestrial and marine research programs by employing the use of several remote sensing techniques. Aerial and ground based lidar, Structure from Motion (SfM) from Unmanned Aerial Systems (UAS), vantage stereophotography, and Multibeam Echosounder (MBES) bathymetry provide us contiguous spatial data on a variety of scales to generate integrated terrain models and continue with long-term ecological monitoring. The Coastal Sand Ecosystem (CSE) program utilizes nearly all of Hakai's remote sensing capabilities in-concert to answer complex questions of Calvert Island's geological history and contemporary beach-dune geomorphology – particularly seasonal to decadal landscape change. Aerial and ground based lidar along with SfM derived topographic surfaces provide insight to seasonal landscape change, particularly beach-dune erosion during the winter and rebuilding throughout the summer. MBES data provides key data on where eroded beach sediments are later deposited in the nearshore. Combined, this data helps CSE researchers towards answering a key question: Are Calvert Island beaches independent sedimentary systems that are constrained (bounded) by headlands, or, is sediment transport around headlands possible, therefore connecting beaches and exchanging sediments? Ongoing monitoring and emerging technologies are helping us to achieve objectives within the CSE and throughout the broader Hakai Institute network.

C2. RESEARCH AND RESTORATION ON THE GULF ISLANDS

Towards Ecological Integrity in Gulf Islands National Park Reserve: Monitoring the Ecosystems

Tara Sharma, Parks Canada

Parks Canada's main mandate is to enhance and restore ecological integrity (EI) in parks while fostering public understanding, appreciation and enjoyment. Ecological monitoring provides a way to take the pulse of ecosystems and provides crucial information related to the condition of the ecosystems and their rates of change, which helps identify priorities for active management. In Gulf Islands National Park Reserve, ecosystems are monitored using 3 indicators – Coastal/Marine, Forest, and Freshwater, which are the major ecosystems found in the park. A suite of measures which track the key biodiversity and ecological processes in each indicator are used to assess the condition of that indicator ecosystem. Status and trend of a measure is determined and rolled up to determine the condition of the indicator. Determining thresholds which represent the point at which the condition changes for a measure has been found to be the most challenging task of assessing the EI in the park. This presentation will provide an overview of the monitoring programme in GINPR, present results on the condition of its ecosystems, and discuss some opportunities and challenges in assessing the condition of park's ecosystems.

Bringing Back Fire to Garry Oak Ecosystems in the Gulf Islands National Park Reserve: An Ecocultural Restoration Project

Marlow Pellatt and Jay Zakaluzny, Parks Canada and Ron Walker, CRD

Fire suppression, aboriginal land-use, climate change, and post-colonial development have lead to drastic changes in the structure and number of Garry oak ecosystems in North America. Many of these ecosystems have been impacted by a lack of disturbance leading to the succession many sites into Douglas-fir dominated systems. The use of fire by indigenous people likely played an important role in maintaining Garry oak ecosystems, albeit for agriculture/harvest (i.e., Camas and other plants), open areas for settlement and defence, and for hunting purposes. My colleagues and I have document change in Garry oak and temperate rain forest species in south west BC using paleoecological methods (pollen, charcoal, phytoliths), tree rings, and historical information. This body of research shows that these ecosystems are dynamic often responding to site specific drivers of change and establishment. They also show the importance of people, fire and disturbance, and climate in the presence of these systems. Building on retrospective studies we have designed an eco-cultural restoration study on Tumbo Island in the Gulf Islands National Park Reserve. We have spent several years monitoring plant communities, edaphic characteristics, dendroecology, impacts of deer browse, and as of September 30, 2016 prescribed fire. In this talk we will discuss the journey from research to restoration, highlighting the largest prescribed burn of Garry oak ecosystems to take place in British Columbia. We will also discuss the logistical challenges and successes associated with the application of science and the need of a strong team to accomplish this Ecocultural restoration project.

Restoration of Rare Ecosystems in Gulf Islands National Park Reserve

Pippi Lawn, Parks Canada

Gulf Islands National Park Reserve protects a number of different ecosystem types, including examples of rare Garry oak and coastal sand ecosystems. At many sites within the park reserve, ecological integrity of these rare ecosystems is degraded, due to impacts from invasive species

and other threats. Parks Canada undertakes active management to restore ecological integrity at select sites, through invasive species management, re-vegetation, population augmentation of rare species, and other techniques. This presentation shares details on two key projects in Gulf Islands National Park Reserve: (i) restoration of a Garry oak ecosystem on Eagle Islet, a project that has been underway since 2008; and (ii) restoration of coastal sand ecosystem at the tip of Sidney Spit, Sidney Island, a new project that aims to improve habitat for associated species at risk. Management approaches, successes and challenges will be discussed.

Cultivating Clams and Culture: Collaborative Restoration of Coast Salish Clam Gardens in the Gulf Islands National Park Reserve

Kelly Forbes and Skye Augustine, Gulf Islands National Park Reserve

For the first time in a hundred years, Coast Salish people are once again gathering on the beaches of their ancestors. Elders, youth and knowledge holders, alongside Parks Canada staff, are coming together to restore intertidal ecosystems and, to re-ignite cultural connections to the land and sea. Clam gardens are an ancient form of mariculture used by indigenous peoples of the Pacific Northwest to cultivate traditional foods and resources for subsistence, trade, and ceremonial uses. Many gardens found today are 'legacy gardens' that have not been maintained for generations. In partnership with members of Hul'q'umi'num and WSÁNEĆ Nations, Parks Canada is actively restoring two clam garden sites in the Gulf Islands National Park Reserve. This 5-year project aims to examine the role of traditional shellfish management in restoring intertidal ecosystems, and; to support First Nations as they re-engage with their ancestral land and seascapes. Through meaningful collaboration with our First Nations partners, we hope to see more effective environmental protection; improved restoration techniques; better management of intertidal ecosystems, and greater eco-cultural connection to the Park Reserve. Clam gardens restoration in the GINPR has the potential to transform beaches back into the important places of learning that they once were. Places where people of all ages, from different Nations, professions, and disciplines can come together with the shared goal of caring for the marine environment.

C3. FROM A VISITOR PERSPECTIVE

Chinese Perceptions and Satisfaction in Urban Parks: The Case of Stanley Park in Vancouver

Pete Parker and Ava Wu, Vancouver Island University

Urban parks play a significant role in the wellbeing of individuals and the sustainability of cities in social, economic, and ecological ways. Research on visitor experience, satisfaction, and cross cultural leisure are becoming increasingly significant in sustainable leisure management. This thesis used Stanley Park as a case study to investigate Chinese people's experience and satisfaction in urban parks. Via a convenient sampling strategy, Chinese park visitors were asked questions regarding the importance and satisfaction of different park attributes and leisure satisfaction constructs. Elements of least satisfaction and expectations were also assessed. The data was analyzed using qualitative analysis. The results found that Chinese park visitors identified relaxation and having a sense of peacefulness as their main motivations for visiting parks, prioritized safety in parks as their primary concern and regarded appropriate crowding level and facilities as the most important park attributes.

Hot Interpretation of Controversial Topics at Protected Areas: A Case Study of Batoche National Historic Site, Saskatchewan

Glen Hvenegaard, University of Alberta

Parks and historic sites can facilitate public interaction with controversial topics through 'hot interpretation'. Hot interpretation seeks to promote affective responses and reintegrate the human and personal aspects of the events, people, places, and artifacts that shape both historical and natural sites. The goal of this presentation is to critically analyze the evolution of interpretive messaging of the armed resistance of 1885 at Batoche National Historic Site, Saskatchewan through the lens of hot interpretation. Based on a literature review, interpretation evaluations, and site visits, the authors examine how collaborative management approaches have fostered an evolution in interpretation from the one-truth style, to parallel narratives, and finally to the 'many voices' approach within the hot interpretation framework. This overview suggests how collaborative management approaches and progressive interpretation strategies can heal the hurt of the past, validate various depictions of history, provide venues for democratic discourse about contested issues, generate new thinking, and support resilient communities. The conclusion will offer suggestions for possible use of hot interpretation for other topics and sites across Canada.

Evaluating Recreational Experience in a Managed Reservoir System: A Case Study of Campbell River Reservoir System

Randolph Morris, EDI Environmental Dynamics Inc.

BC Hydro operates a number of reservoirs for hydroelectric generation throughout the province of British Columbia, with many of these reservoirs bordered by recreational areas and provincial parks. These waterbodies frequently offer extensive opportunities for recreation. BC Hydro looks to balance different objectives for these reservoirs such as maintaining flexibility for power generation while maintaining desirable water levels for recreationists. The Campbell River reservoir system is one such location, hosting numerous forest recreation sites and several provincial parks, including BC's oldest provincial park, Strathcona. Under BC Hydro's direction, A'Tlegay Fisheries Society and EDI Environmental Dynamics Inc. are studying the reservoir system to determine how fluctuating water elevations may affect visitors' recreational experience and visitation to the reservoir. Our long-term monitor uses a combination of methods to evaluate how visitor experience may be influenced by reservoir features, such as water elevations and shoreline condition. In addition to the traditional survey approach for gauging visitor preferences and satisfaction, which often are influenced by seasonal and environmental factors, our monitor utilizes a novel approach to examining preferences via a discrete choice experiment. The discrete choice experiment provides an opportunity to control for external factors (such as temperature and weather) and examine the influence of specific reservoir features that a local land manager may be able to alter to enhance the recreation experience.

Investigating the Factors that Affect Parenting Practices Towards children's Outside Play

Stephanie A. Coulson, University of Northern British Columbia, MA Student NRES

Studies suggest that children today do not spend as much time outside as they used to. This has resulted in a number of calls to identify and address the factors negatively impacting children's outside play. The significant role that parents play in terms of facilitating, encouraging, or otherwise influencing children's outside play is well-documented. Given their role, it is important to understand the factors that affect their parenting practices. Building off of research on constraints in outdoor recreation, and similar investigations of the internal and external factors that influence parenting practices towards other behaviours, my research seeks to take a qualitative approach to investigate the impact that constraints and other factors have on parenting practices towards children's outside play. Methods used to collect data will primarily include interviews and focus groups. The sample population for this study is parents of children aged 3-8 in Prince George, BC. The expected outcome from this case study is in-depth understanding of the internal and external factors affecting parenting practices towards children's outside play, from which recommendations could be provided to better support parents who seek to provide more or better-quality outside play experiences for their children.

Identifying Areas of High Conservation Value in British Columbia's Hart Ranges

Ian Curtis, University of Northern British Columbia, MSc Student NRES

Our study area is located within northeastern British Columbia, at the narrowest section of the Yellowstone to Yukon Conservation Initiative. The area serves as a vital corridor that enables biological communities to move freely between large protected areas to the north and south. Currently, protected area representation is very low within our study area and proposed resource development threatens to fragment this relatively intact corridor. Our objective is to conduct systematic spatial planning in order to prioritize areas for direct conservation action in the face of resource development.

Cultural Forests of the Southern Nuu-chah-nulth: Historical Ecology in Clearcuts on Vancouver Island's West Coast

Jacob Earnshaw, MA Graduate, University of Victoria

This graduate thesis delves into the question of Cultural Forests on Vancouver Island, British Columbia. Cedar, the "Tree of Life" to most coastal peoples of the Northwest Coast, was used in all aspects of indigenous life and is reflected in the Culturally Modified Trees (CMT) present throughout coastal forests. Fieldwork focused on dating regional samples of CMT scarring events discovered that countless protected heritage features are regularly being destroyed during the logging of old growth forests on Vancouver Island's west coast. What biases are causing archaeologists to overlook the most ancient of these features? I examined all CRM gray literature associated with recorded CMT sites in all southern Nuu-chah-nulth territories and collected dates of scarring events from stumps in the field. I compare distributions of dates found in Archaeological Impact Assessments versus those of Post Impact Assessments, the distributions of embedded bark strip scars, inadequate

archaeological protections, the practice of cedar bark tending and aboriginal title to old growth cedar forests. The work has shed light on the true representation of CMT harvesting throughout the last 1100 years. I also look into the arboricultural practices of restripping cedars to induce bark growth.

Use of Volunteer Monitoring Technicians

Andrew MacKinnon, The Land Conservancy of British Columbia, Conservation Manager

The Land Conservancy of British Columbia (TLC) has created a successful volunteer program for university students to gather and collect ecological data on over 30 covenant sites in Greater Victoria. The data forms and procedures include the Terrestrial Ecosystem Mapping template and photopoints. For the past 3 years University of Victoria students are trained and accompany TLC staff to perform monitoring of conservation covenants protecting ecological features on private land.

Working Collaboratively to Assess Rare Plants and their Threats within Coastal Sand Ecosystems

Erica L. McClaren, BC Parks, Conservation Specialist and Marta T. Donovan, BC Conservation Data Centre

Three objectives associated with our surveys were: 1) to revisit occurrences of rare plants recorded by the BC Conservation Data Centre to more accurately map their locations and to assess their conservation status; 2) to gain a better overall inventory of other plants associated with these coastal sand ecosystems; and 3) to assess threats to coastal sand ecosystems from invasive plants, human recreation and other potential climate change-related factors. Between June 4 and 5, 2014 we conducted plant surveys at Whitesand Cove, Gibson Marine Provincial Park and on two beaches (Dick and Jane's, Hopkin's) within Vargas Island Provincial Park, BC. In 2015, we conducted plant surveys between June 15 and 17 at Nells Bight, Guise Bay and Experiment Bight beaches within Cape Scott Provincial Park, BC. We recorded three provincially red-listed species, one blue-listed species and seven invasive species within Gibson Marine Provincial Park. Within Vargas Island Provincial Park, we recorded one provincially red-listed species, failed to relocate one red-listed species, recorded one blue-listed species, and recorded 15 invasive species. Within the three survey locations at Cape Scott Provincial Park we located: one provincially red-listed species and four invasive species at Nells Bight; three provincially red-listed species and failed to relocate one previously recorded red-listed species, and recorded eight invasive species at Guise Bay; and did not find any provincially red- or blue-listed species but recorded seven invasive species at Experiment Bight. Overall, the greatest imminent threat to the integrity of these coastal sand ecosystems was from invasive species, such as European beachgrass which can stabilize sand movement and modify habitat conditions so that invasion by other invasive species is facilitated. Trampling from recreational activities such as camping and hiking did not appear to pose a significant threat to the rare plants at these relatively remote sites. However, outdoor recreation is a major pathway for the movement of invasive species. Climate change-related impacts from sea-level rise and increased storm intensity are being observed in many coastal sand ecosystems but the severity of future impacts from this threat is unknown.

Development of a Comprehensive Spatial Database of Non-governmental Organization Conservation Areas in British Columbia

Danielle Morrison, The Nature Trust of British Columbia & Ducks Unlimited Canada and Leanna Warman, The Nature Trust of British Columbia

A collaborative effort between conservation partners spanning a number of years, the British Columbia Non-governmental Organization Conservation Areas Database aims to provide a comprehensive, standardized spatial database of BC's private conservation lands. Designed to complement existing federal and provincial protected area inventories, this database incorporates securements from nearly 40 different NGOs. Maintenance of the database is centralized, which allows NGOs with different GIS capabilities to add and maintain information, and incorporates an update and maintenance process that requires minimal resources to administer. The database can be used to store attribute information, to provide base data for the creation of map products, for landscape modeling and analyses, and for conservation securement planning. This spatial conservation database improves joint planning efforts between partners, as it resolves inconsistencies between different spatial datasets related to boundaries, attributes, accuracy, scale, and data currency. This model for partnerships and database design is being considered as a template for other provinces throughout Canada. Technical development of the database is led by the Technical Working Group, namely Ducks Unlimited Canada, The Nature Trust of British Columbia and the Canadian Wildlife Service. Project direction and coordination is led by the General Working Group members, which in addition to the Technical Working Group includes the Nature Conservancy of Canada and The Land Trust Alliance of British Columbia. The General Working Group is currently distributing a Fee Simple (NGO owned private) lands layer for public use, which is newly available for download via the DataBC Data Catalogue.

The Ecological Footprint of Park Operators in Northern British Columbia

Rachelle Linde, UNBC - Outdoor Recreation and Tourism Management, Honours Student

Provincial parks in British Columbia serve a dual mandate to conservation and recreation, and to carry out parts of this purpose, Park Operators (POs) live and work inside parks and are responsible for enforcement and maintenance. The ecological impact of the POs in parks has previously gone unexamined. To evaluate the impact of PO activities, this study aimed to identify the size (in global hectares) of the POs' ecological footprints (EF) while during scheduled work and days-off and to explore how the EF was influenced by both the negative and pro-environmental behaviours of POs. Thirteen staff members from Sandstorm North Contracting's bundle of six provincial parks in the Peace Region of Northern BC participated. Participants tracked their consumption of goods and services, driving distances, and residential energy consumption and results were analyzed using a standardized EF spreadsheet. The average EF was 6.9 global hectares. Individual's footprints were examined to determine which parts of PO life and work contributed the most to these results. To explore these ideas further, semi-structured qualitative group interviews were conducted to identify common PO behaviours that positively and negatively impacted EFs. Understanding the factors influencing the impacts of POs as they live and work inside provincial parks will enable park managers and BC Parks policy makers to make adjustments that will help to reduce future PO ecological footprints.

Mapping Wilderness Perception in the Muskwa-Kechika Management Area (M-KMA)

Odinn Steinsson, University of Northern British Columbia, MA Student NRES

The M-KMA in northeastern BC is about 6.4 million hectares. Wilderness is one of the outstanding values and reasons for the establishment of the M-KMA, and it is known for its' largely unroaded nature, cultural, ecological and geographical diversity. The objective of this research is to examine differences between wilderness perception within the M-KMA between wilderness users using a mix of quantitative surveys and qualitative interviews. The study populations are M-KMA visitors identified based on main activity and/or mode of travel, e.g. thru-highway visitors, ATV users, fly-in hunters or remote access hikers/horseback users. User tolerances for wilderness indicators will be used to generate associated wilderness maps.

Unprotected - Campaigning, organizing and ecology on the outer fringe of protected areas.

Mark Worthing, Sierra Club BC

The Walbran Rainforest; the Flathead River Valley; the *oldest* multi-salmon bearing old growth rivers of Northern Vancouver Island; the bears of the Great Bear Rainforest and the Northern Resident Orcas of Johnstone Strait are all unprotected. The northern resident orcas that seasonally inhabit Robson Bite Ecological Reserve are the most studied population of orca's in the world; researchers have discovered and cataloged entirely new species previously unknown to science in both the Flathead and Walbran Valleys; 10,000 year old glacial fertilized salmon bearing rivers are critical to climate adaption and the Great Bear Rainforest is one of the most important tracts of temperate rainforest left in the world. Yet orcas are bombarded with underwater noise, food scarcity and boat traffic; The Flathead and the central Walbran are unprotected watersheds with heavy logging presence & road building, and it is perfectly legal to hunt grizzly bears with dogs in many parts of the Great Bear Rainforest; and old growth watersheds with seven salmonid species are subject to subsidized logging right up to park boundaries on Vancouver Island for raw-log export abroad. All of these subjects of contention and socio-political Rubix's cubes take place at the spatial interface between existing protected areas and the outer fringe beyond the lines on the map. They all also take place in the unceded territories of many first nations in a context of truth & reconciliation and decolonization. Experiential storytelling and insights into the work that triangulates ecology, politics, conservation and neocolonialism in relation to contemporary protected areas, projecting towards what's next.

**December 7th 8:30 am
PLENARY**

The Role of Protected Areas in Global Conservation Efforts

Oscar Venter, Growth and Yield and Forest Valuation Chair, University of Northern British Columbia

Protected areas (PAs) are widely recognised as the primary tool we have for conserving biodiversity. PAs have expanded rapidly over the last few decades, championed by ambitious targets such as those under the Convention on Biological Diversity. However, PAs can conflict with other societal goals, such as housing, food production and wood harvesting. This conflict can cause PAs to be preferentially established in locations that are remote or have little agricultural value, failing to protect the imperiled biodiversity found on more valuable land. In this talk I will present our work to quantify the implications these biases have on the conservation value of protected areas globally, and how this can undermine the aspirations of the major conservation conventions.

December 7^h 9:15-10:45am

D1. NEAR WILDERNESS REGIONAL PARKS AS A FOREFRONT TO CONNECT PEOPLE TO NATURE

Developing a Social Science Research Program for Regional Parks

Mike Walton and Beatrice Frank, Regional Parks, Regional Capital District of Victoria

Since 1980s, the Capital Regional District (CRD) of Victoria has engaged the public in regional parks and trails management. Surveys, consultations and public meetings have been undertaken to involve interested parties in decision-making. To strengthen the use of participatory approaches within the Regional Parks service and to implement citizen access to information and decision-making, a more systematic and rigorous social science program has been developed. This presentation will focus on: 1) the CRD Regional Parks social science program; 2) how the program is leading to a better understanding of CRD citizens' perspectives and cultures; and 3) how social science insights leads to more successful, long-term, CRD Regional Parks mandates. Data collected around the Sea to Sea Regional Park Reserve and the Sooke Hills Wilderness Regional Park Reserve will be used as an example to showcase why documenting public opinions toward a protected area is important for the planning and management of regional parks and trails.

Opening of a Near Wilderness Area Close to Victoria: the Sea to Sea Regional Park Reserve

Lynn Wilson, Regional Parks, Regional Capital District of Victoria

Regional Parks is undertaking a multi-year project to open the Sea to Sea Regional Park Reserve and the Sooke Hills Wilderness Regional Park Reserve. Phase one of the project is focused around Mount Manuel Quimper and includes: 1) a carnivore risk assessment; 2) a trails assessment,

including assigning difficulty ratings to approved mountain biking trails; 3) trail upgrades, including the installation of a pedestrian bridge and culverts; 4) development of facilities, such as a restroom, park kiosk, and park signage; and 5) development of a communications plan. This presentation will discuss the planning of phase one of the park opening, including building relationships with key stakeholders. It will highlight the challenges encountered while opening an area classified as “wilderness” where minimal human interference, services and facilities are offered while allowing visitors to experience the park’s ecosystem and species, and engage in back country recreation. This area represents a perfect example of offering a near wilderness experience available for all, one that can shape an urban population’s awareness of and value for nature.

Connecting People to Near Wilderness Areas: Regional Parks Interpretation Program

Tracy Moss, Regional Parks, Regional Capital District of Victoria

Close enough to home and conserving biodiversity and ecosystem features of Southern Vancouver Island, regional parks and trails represent ideal laboratories to experience and connect with nature. Regional Parks offers a series of educational programs and resources designed specifically for educators, students and people living, working and playing in the Capital Regional District (CRD). For example: school programs are presented about cougars, bats and coastal marine life among others and nature outings in regional parks and trails are offered year-round for the public. In this presentation, an overview of the interpretation programs developed by Regional Parks is offered with a special focus on how to develop and target programs focused on near-wilderness areas, such as the Sea to Sea Regional Park Reserve and the Sooke Hills Wilderness Regional Park Reserve. As regional parks and trails represent the first interface between many urban citizens and their natural environments, these near wilderness programs will be key to raising awareness and connecting people to nature.

Human-Wildlife Interaction Risk Assessment for the Sea to Sea and Sooke Hills Wilderness Regional Park Reserves

Todd Golumbia, Regional Parks, Regional Capital District of Victoria

Urban dwellers experiencing near wilderness may not be aware of or prepared for encountering large mammals. Such inexperience may lead to potential negative impacts of humans on wildlife and of wildlife on humans. With the imminent opening of the Sea to Sea Regional Park Reserve and the Sooke Hills Wilderness Regional Park Reserve, a risk assessment was conducted to evaluate possible human-wildlife interactions with the following large mammals present in the area: American black bear (*Ursus americanus*), cougar (*Puma concolor*), grey wolf (*Canis lupus*), Columbian black-tailed deer (*Odocoileus hemionus columbianus*), and Roosevelt elk (*Cervus elaphus roosevelti*). The assessment focused on possible conflicts caused by visitors and staff encountering wildlife, and on the impacts caused by developing and maintaining infrastructure in a near wilderness area. This presentation will offer an overview of the results of the risk assessment, including the recommended mitigation strategies identified to assist Regional Parks with site planning and operations for the progressive opening of these near wilderness park lands.

D2. THINKING BIG

Impact of a Large Landscape Vision: 20 Year Yellowstone to Yukon Retrospective

Jodi Hilty, Y2Y

The Yellowstone to Yukon represents one of the first large landscape collaborative visions in the world. One of the conceptual challenges in large landscape conservation is that action most often occurs in more localized areas but science and vision are often at the larger landscape scale. This begs the question as to whether having a much larger vision can impact and guide cumulative localized efforts in a meaningful way. In the twenty years since the inception of the Y2Y vision, protected areas almost doubled, management designations on other lands also increased the conservation value, and the region went from few wildlife crossing structures to arguable the progressive wildlife crossing structures in the world compared to any other landscape. Progress can be assessed from local to landscape scale. However, further progress is needed to achieve the vision of connecting and protecting the region as many challenges as well as opportunities exist going forward.

The Wild Harts

Timothy Burkhart, Y2Y

Stretching roughly from Kakawa wilderness and north through the Pine Pass to the Williston Reservoir, the Wild Hart ranges of northeast BC represent a wildway connecting the central rocky mountain parks north to the wilderness of the Muskwa-Kechicka. Although the majority of the Peace Break region has extensive road networks and a widespread industrial footprint, a band of relatively intact land extends north-south along the Hart Ranges. This intact mountainous landscape includes several undeveloped creek watersheds, intact forests, alpine terrain with no roads, and critical core and seasonal habitat for species such as woodland caribou and other large mammals such as grizzly bear as well as trout, Arctic grayling, mountain whitefish, caribou, moose, and wolverine. This stretch of wild mountains is crucial to the long term conservation of biodiversity, and plays an important role in supporting the integrity of predator-prey ecosystems throughout the Rockies. Given the rapid pace of major resource development impact across the Peace River Break, the Wild Harts present one of the last opportunities for large-landscape conservation in the region. The Yellowstone to Yukon Conservation Initiative is working with our local partners, First Nations and stakeholders to ensure that these spectacular mountains stay wild, connecting and protecting habitat so people and nature can thrive.

Potential Conflicts between Development of Natural Resources and High-Value Wildlife Habitats in the Muskwa-Kechika

Kathy Parker and Nobu Suzuki, University of Northern British Columbia

Conservation of intact ecosystems to sustain wildlife populations and biodiversity has become increasingly urgent as anthropogenic disturbance expands into wild places. The Muskwa-Kechika Management Area, with 6.4 million hectares of rare contiguous wild land in northeast British Columbia, supports one of the most abundant and diverse predator-prey systems in North America. Protected areas within the Muskwa-Kechika encompass only ~30% of high-value habitats for focal ungulates and carnivores; industrial resource extraction is allowed in the other land designations. We developed Geographic Information System (GIS) layers of the resource potentials for forestry, oil and gas, mining, wind power, and all resources combined; and we quantified the overlap with high-value wildlife habitats. The proportions of high-value habitats overlapping areas with high cumulative resource potential were greater for moose, elk, and wolves than for grizzly bears, Stone's sheep, and mountain goats.

This pattern was similar for forest resources, oil and gas, and wind power. The effect of season was usually most pronounced for caribou. Proportions of their high-value habitat in areas with high cumulative, forest, or oil and gas potential were much greater in winter than in the growing season; in contrast, most overlap with areas of high mineral potential occurred during the growing season. We recommend a quantitative and visual GIS approach to scenario planning in the Muskwa-Kechika to minimize future impacts on wildlife and wilderness values. Our analyses provide a 'heads up' to those concerned with conservation of wildlife habitats and responsible resource management in the Muskwa-Kechika.

Rewilding the Rockies: Evaluating the Impact of Bison on Landscapes

Lorina Keery, Parks Canada Student Researcher

Bison are a keystone species that have been absent from Banff National Park since its establishment primarily due to over-hunting. Reintroduction initiatives have largely been responsible for bringing bison back from near extinction in North America. Reintroducing plains bison to Banff National Park is an important step to restoring full diversity of species and natural processes in the Park's ecosystem. Bison grazing and physical disturbance is predicted to create a patchwork of meadows and grasslands which provide habitat for animals and plants. The purpose of this study is to assess what the impact of the bison will be on the vegetation when they are introduced to Banff National Park. Specifically, this study will assess the impact of bison on the composition and structure of vegetation. It will also investigate how bison respond to and use burned areas and examine what vegetation bison preferentially graze upon. The results of this study will give Parks Canada an understanding of how bison will interact with and impact the landscape when they are released to free roam in the Park in 2018. The results of this study can also inform the management strategy for the bison population in Banff.

D3. THE HUMAN DIMENSION

Developing a Social Science Framework for Alberta Parks

Joyce Gould, Lars Hallstrom, Glen Hvenegaard, Elizabeth Halpenny and Brian Joubert

Alberta's Plan for Parks recognizes the need for science and research in support of decision-making. Beginning in 2012, surveys of staff, researchers and others along with a series of workshops resulted in the identification of a number of priority research needs to help inform park management. A key finding of this process was that questions with a social basis were in the majority. As a result, we developed a social science framework in an attempt to facilitate the conduction of and integration of science-based research focused on the social sciences into parks-based management. The Framework outlines a process for the intersection of science and practice and articulates methods for capacity-building and adaptive management within Alberta Parks and beyond.

Not Everybody Likes Parks: An Examination of the Flow of Costs and Benefits From Parks to Nearby Communities

Rick Rollins and Pete Parker, Vancouver Island University

Protected Areas (PAs) are thought to contribute to sustainability by addressing conservation, social values and local tourism economies. However, some studies challenge these claims, suggesting that these benefits are not always apparent at the local level, and that parks can create inequitable

flows of costs and benefits to local communities. Some have argued that the sustainability of PAs depend, at least in part, on a continual critical analysis of the holistic social, economic, and environmental context. This paper will explore these issues by outlining the findings of a seven year project examining study sites that include Pacific Rim National Park (Canada), Serengeti National Park (Tanzania), and Mole National Park (Ghana). Findings describe the perspectives of people living in local communities, and the initiatives taken to respond to these challenges.

Archaeological Work in the Hakai Luxvbalis Conservancy Area

Duncan McLaren, Hakai Institute

Over the last five years the Hakai Ancient Landscapes Archaeology Project has undertaken field research to gain a better understanding of the extent and chronology of archaeological sites in the Hakai Luxvbalis Conservancy Area. Using coring, augering and small scale excavations, our research has uncovered numerous sites with very long term records of occupation, some with evidence for repeated use over 10000 years. Site types include shell middens, water logged contexts, and non-shell deposits with lithics. Materials collected from these operations are being used to provide insights into human and ecological history since the last major glacial event.

December 7th 11:00-12:30

E1. WORKSHOP: ADVANCING CITIZEN SCIENCE IN PARKS AND PROTECTED AREAS: ADDRESSING COMMON BARRIERS

Danah Duke and Tracy Lee, Miistakis Institute

As hosts to millions of visitors per year, Canada's parks and protected areas provide excellent opportunities to engage the public in scientific pursuits. Enter Citizen Science, a widely popular approach where volunteers are engaged in scientific research. There are two key reasons protected area agencies might invest in citizen science: 1) to enable science that might not otherwise be possible because of scale or other practical issues (rare events), and 2) to engage volunteers in new knowledge production, scientific learnings, and decision making relating to the science. These are not mutually exclusive and often citizen science programs are developed with multiple outcomes in mind. Despite the immense potential of citizen science as a science and engagement tool for parks and protected areas; there are common barriers that may limit an agencies use of the concept. There are perception barriers around data quality and ability of volunteers to collect meaningful data; there are knowledge barriers such as knowing when it is appropriate to consider citizen science, and knowledge of best management considerations for program design. There are often internal policy barriers relating to engaging volunteers and there are legal barriers focused on intellectual property restrictions, reducing the potential for agencies to share data. In this workshop, an overview presentation on citizen science and common barriers will be followed by breakout groups organized to discuss barriers and solutions to strengthen our understanding of citizen science as a tool for enhancing environmental and engagement outcomes in parks and protected areas management.

E2. LOOKING FORWARD

Conservation Issues in BC Protected Areas: An Overview

James Quayle, Conservation Manager, BC Parks

BC's protected area system spans a vast and dynamic landbase. This talk will provide strategic view of some of the new and emerging issues relevant to the conservation of our protected areas, in order to identify to provide a high level view of research needs across the system.

The Future of BC's Provincial Parks System

Colin Campbell, Elders Council for Parks in BC

What is the future of BC's Provincial Parks System? This presentation begins with some results from a 1976 futures prediction from Provincial and Federal Park Experts then assesses what has evolved since then. It concludes that the system is magnificent but troubled and describes some of the challenges involved with ensuring long term system sustainability and provides possible solutions. Finally it takes one of the key solutions, greater community engagement, and describes how the Parks Collaborative - Victoria is trying to build a community driven process to provide more community support to ensure the long term sustainability of 42 provincial parks within 100 kilometres of Victoria. Included is a description of the Park Health star - a simple device to assess and discuss the state of health of a provincial park.

Protected Areas Management Effectiveness Pilot Project

Pamela Wright, University of Northern British Columbia and Joyce Gould, Alberta Parks

Parks and protected areas are designed to protect the ecological values of Canada's terrestrial, aquatic or marine diversity. There are over 7500 parks and protected areas within Canada protecting over 100 million ha or 6% of terrestrial environments and just under 1% of the marine environment. Concern about the effectiveness of protected areas in meeting objectives such as biodiversity conservation and supporting local communities is increasing. In response, there has been a significant movement to examine protected areas management effectiveness (PAME) internationally including commitments made under the Aichi targets. As a signatory and participant in these conventions and programs Canada is obligated to meet these commitments yet to date has taken little action to address the issue. This presentation reports on a pilot project to develop a PAME evaluation system for Canadian protected areas undertaken in partnership between UNBC and Alberta Parks.

E3. CAN YOU SEE THE FOREST AND THE TREES?

Tree Rings and Natural Disturbances: Sharing Stories of BC Environmental History

Estelle Arbellay, University of British Columbia

Natural disturbances are temporally discrete events that alter the composition and structure of forests. Bark beetle outbreaks and fires are major natural disturbances of BC forests, together with windstorms and insect defoliator outbreaks. Disturbances leave macroscopic and microscopic imprints in tree rings that can be dated and used to infer events retrospectively and determine their temporal and spatial dynamics in the landscape. Tree rings are thereby natural archives recording ecological information in the form of annual variations in ring- width, density, anatomy and/or chemistry. Moreover, scars on the bole of trees are embedded in tree rings and count among the top indicators of past disturbances. Here we present trees (and tree rings) as powerful tools for forest management as well as compelling storytellers of BC environmental history. We emphasize the need to tell their stories to the general public in interpretive programs as a meaningful way to teach visitors about forest conservation. Along with several other examples of tree-ring studies in BC, we communicate results of recent research conducted in Kootenay National Park, where mountain pine beetle (MPB) outbreaks and fires have affected stands over large temporal and spatial scales. We analyzed MPB scars and fire scars found on the bole of lodgepole pine trees. We anticipate that the findings of this research will serve as a foundation for novel protocols to differentiate between MPB scars and fire scars, ultimately providing forest managers with more precise tree-ring estimates of MPB outbreaks and fires.

Regional Trends in Whitebark Pine Health - Prioritizing Whitebark Pine Recovery Activities

Randy Moody, Whitebark Pine Ecosystem Foundation of Canada / Keefer Ecological

Whitebark pine (*Pinus albicaulis*) is an endangered species under the Federal Species at Risk Act (SARA), due to the combined threats of white pine blister rust, mountain pine beetle, fire suppression, and global climate change. This range of threats has resulted in a number of potential actions that may be undertaken to specifically address each threat. This presentation summarizes 2-years of health surveys from across the whitebark pine range in BC to identify priority areas for recovery activities.

Restoring Endangered Whitebark Pine Woodlands in Parks of the Southern Skeena Headwaters: Achievements and Challenges

Sybille Haeussler, Bulkley Valley Research Centre and University of Northern BC

As BC's mountain pine beetle outbreak exploded across the Central Interior in the 2000s, a remarkable set of parks and protected areas was established through the Morice Land and Resource Management Plan and government-to-government negotiations with First Nations. Located in the southernmost headwaters of the Skeena watershed in Wet'suwet'en Territory, Morice Lake Park (52,430 ha), Atna River Park (21,092 ha), Nenikëkh/Nanika-Kidprice Park (17,006 ha), Nadina Mtn Park (2,789 ha) and Burnie-Shea Park/Burnie River Protected Area (36,8881 ha) are islands of unroaded wilderness with exceptional cultural and ecological significance. An outstanding feature are rare whitebark pine (*Pinus albicaulis*)-*Cladina* lichen woodlands at their northwest limit –now endangered by pine beetle and blister rust mortality, and changing climates and fire regimes. With support from BC Parks, Office of the Wet'suwet'en, FLNRO, HCTF and others, we re-visited biogeoclimatic ecosystem classification

plots established 1978-1985. Dendroecological research showed that stands >500 yr-old experienced low severity fires that facilitated pine and lichen regeneration. Whitebark pine mortality averaged 81% of total basal area, and 75% of survivors had blister rust cankers. Our restoration program began immediately. Cones were collected from 25 rust-free trees at Kidprice Lake in 2010 and 2013; 675 seedlings were planted in the Nanika and Atna wildfires in 2014 (88% 2-yr survival); a second cohort of 4700 seedlings will be planted in 2017. While proud to report on these accomplishments, we look forward to engaging in dialogue on the technical, ethical and sustainability challenges of engaging in conservation experiments in remote wilderness parks.

Ecosystem Restoration of the Dry Forest in the White Lake Basin, South Okanagan

Leanna Warman, The Nature Trust of British Columbia

The Nature Trust of British Columbia (TNTBC) manages the White Lake Basin Biodiversity Ranch with our ranch partner. The Biodiversity Ranch encompasses 8463 ha of land under varying tenures, including private land owned by TNTBC, leased land, and Crown grazing license (some is within BC Parks). The White Lake basin is one of the largest remaining intact grassland areas in the South Okanagan. This area has a long history of ranching, First Nations use, and many SARA-listed species and rare ecosystems. The Biodiversity Ranch objective is to maintain and restore the grassland and associated ecosystems in ways that contribute to a contiguous, resilient landscape. One of the greatest risks to ecosystems in the basin is from wildfire. A fire management plan was completed in March 2016. The recommendations focus on reducing catastrophic fire potential by reducing fuel loads in the Crown land dry forest ecosystems surrounding the lower basin grassland. It was found that fuel reduction activities directly within the sensitive habitats located in the lower grassland would result in ecosystem degradation. The proposed plan encompasses a large area (3871 ha) and will need to be implemented over 10 to 20 years. A workshop was held in September 2016 with agencies (including BC Parks) and interest groups associated with land management in the White Lake Basin. There was unanimous support for moving forward with an ecosystem restoration plan that includes fuel reduction activities such as prescribed fire. TNTBC is aiming to start in 2017, depending on success of grant applications.