



Book of Abstracts

2008 Presentation, Poster, Research Snapper and Discussion Abstracts

Dec. 1-3rd, 2008

University of Northern British Columbia

Oral Presentations

Lynn Atwood - *The Effect of Seeding on Native and Invasive Plant Establishment following Wildfire in South Okanagan Conservation Lands*. In August 2003 the Vaseux Lake wildfire impacted shrub steppe and parkland forest habitat essential for many South Okanagan species at risk. An experimental restoration project was initiated to examine the effect of restoration techniques on ecosystem recovery following wildfire. Two aspects studied were: differences in establishment rate between five seed mixes that ranged from all native species to all long-lived agronomic species and; the effect of seeding on the re-establishment of native and non-native species. Percent cover of seeded species, native species and non-native species and the three plant species that were providing the most cover in each category were documented between 2004 and 2008. An analysis of the five year data will be presented and the effect of seeding natural habitats after a wildfire will be discussed.

Annie Booth - *Munching and Burning in the Municipality: The Use of Domestic Goats and Vinegar as Municipal Weed Control Alternatives*. Investigators tested the efficacy of acetic acid (vinegar) and two domestic herbivores (donkeys and goats) as invasive weed control alternatives to the use of commercial herbicides in a north central British Columbian municipal setting. Results were positive for using 8% acetic acid as a control for Canada thistle (*Cirsium arvense* (L.) scop.), although these results were significant only in the second year of applications. A similar result was found for controlling Taraxacum officinale or the common dandelion. Domestic goats demonstrated significant interest in thistle, as well as hawkweed, (*Hieracium* spp.), two species of horsetail (*Equisetum arvense* and *Equisetum pratense*), Oxeye Daisies (*Leucanthemum vulgare*) and the common Dandelion (*Taraxacum officinale*). Cost estimates suggest that over a five year period, both methods are as cost effective as single application herbicides while posing fewer concerns over impacts on human and ecosystem health. Both are simple solutions easily implemented, with some planning, even by small municipalities and communities, and

may have application in park settings where the use of herbicides is inappropriate or undesirable.

Phil Bradshaw - *Valuing Old-Growth Forest and its Related Qualities in Southwestern Mainland British Columbia using Contingent Choice*. The Northern Spotted Owl is an endangered species that relies on old-growth forests in southwest mainland British Columbia for its survival. Policies to save the owl focus on habitat preservation and include trade-offs between removing old-growth forests from the timber harvesting allocations, and preservation of an animal that has no direct market value. The majority of forests are public land and determining the proper trade-offs between utilization and preservation requires knowledge of the general public's preferences. When such a non-market valuation study is designed, it is also important to distinguish between the amount of old-growth forest protected and the number of owls preserved for at least two reasons: old-growth in itself also has existence value in BC, and old-growth may exist without spotted owls, but not vice versa. Furthermore, once old-growth is protected, it is also possible that other species-at-risk may also benefit from this habitat.

This study uses a stated preference, multi-attribute, trade-off approach to measure these values separately, but in the context of each other. The concept of risk (success of conservation) is also included into the valuation. The study was conducted in a web-based survey for which respondents were drawn from the general public of Metro Vancouver.

Philip Burton - *The Importance of Protected Areas to Forest Science and Forest Management Research*. Much forest research cannot reliably or practically be conducted on multiple-use public forest lands in western Canada. Issues include the complete allocation of timber harvesting rights (and reluctance of forest licensees and the Crown to forego harvesting indefinitely), low management priority placed on non-timber values, and aversion to the use of management tools such as fire. Consequently, certain kinds of long-term research, non-manipulative monitoring, and ecological restoration are best accommodated on lands having a greater priority placed on conservation. Examples of research providing both basic and applied information on forest dynamics after disturbance are provided, including the recovery of damage caused by

off-road vehicles, the carbon balance implications of the mountain pine beetle outbreak, and determinants of post-fire vegetation recovery, based on ongoing projects in provincial and national parks in British Columbia and Alberta. Unfortunately, these study areas may not be representative of the larger forest land base.

Laura Cameron and Amy Paran - *Stories from the field: Data collection on visitor experience*. Field researchers Laura Cameron and Amy Paran give an account of their experience conducting visitor interviews and surveys in seven national parks.

Philip Clement, Jamie Hahn & Carl Jensen - *Khutzeymateen Grizzly Bear Management - Utilising Partnerships, Research, Traditional Knowledge, and Monitoring to Set Management Direction*. BC Parks and the Coast Tsimshian (Gitsi'is) have been under increasing pressure to undertake measures that continue to protect grizzly bears and the ecosystem within the Khutzeymateen. This pressure has been the result of increased bear viewing demands (commercial and recreational), expanded protected area responsibility (Khutzeymateen Inlet Conservancy), and the need to update the Khutzeymateen Sanctuary Interim Protection Plan. A new management plan for the Khutzeymateen is being created which will guide human activities and resource management in the area for the next 20 years. Management is being directed by research on bear viewing impacts, literature reviews, independent scientific reviews, and a detailed monitoring program. This paper will provide an overview of the relationship between research, science and the management planning process for the Khutzeymateen area.

David Connell - *Assessing Benefits of Non-timber Uses: A Case Study of the Inland Rainforest of the Upper Fraser River Valley*. The upper Fraser River valley is home to a unique inland rainforest. However, its remote location, limited access, and low timber value leave the rainforest not only under-appreciated, but also relatively unknown. As a result of improved knowledge of the biological significance of the rainforest and of improved public access for recreational uses, the levels of public and political interest have grown exponentially over the

past few years. Heightened interests for protecting the inland rainforest now compete with economic interests for timber products. The potential for conflict stands in sharp contrast with the limited knowledge of the rainforest's non-timber economic potential and conservation values. This presentation focusses on how a study of the socio-economic benefits of non-timber uses fills an important gap in knowledge required to manage the inland rainforest. This knowledge helps advance long-term planning and assist communities to respond positively to change and growth related to competing interests.

Neil Davis, Cheri Ayers, Natalie Ban, Julie Beaumont, Karin Bodtker, Tanya Bryan, Andrew Day, Lynn Lee, Dave Nicolson, Craig Outhet, Glen Rasmussen, Royle Krista, Charlie Short & Charlie Twaddle - *Identifying priority areas for marine conservation in BC: the advantages and challenges of a collaborative approach*. British Columbia's marine environment hosts diverse ecological values and a growing number and variety of users. Transparent, integrated, and collaborative approaches are increasingly promoted to develop acceptable strategies for addressing the associated management challenges. The British Columbia Marine Conservation Analysis project (www.bcmtca.ca) is assembling spatial data representing the distribution of ecological features and human uses in Canada's Pacific Ocean to inform integrated marine planning and management. These data form the foundation for the project's two products: an atlas of ecological and human use maps; and Marxan analyses to identify areas of high conservation value which minimize overlap with areas important to human use. The project is a collaboration between federal and provincial governments, academia, non-governmental organisations, and First Nations organisations. This collaborative project approach has led to opportunities and challenges for implementing project goals. This presentation summarises these opportunities and challenges and describes how the project team has responded.

BC Protected Areas Research Forum – 2008 Presentation Abstracts

Natalie Dechaine - *Researching Research Permits in BC Parks*. Applying for a research permit can be daunting, especially if it's your first time! This presentation will give the background on how BC Parks processes and adjudicates requests to conduct research in Parks and Protected Areas. Learn tips to increase your chances of success and how to expedite the process so you can get out in the field by the appropriate season. BC Parks values the role researchers play in helping BC Parks manage its resources effectively. This presentation will appeal to students, researchers and land managers who process research requests

Filatow Deepa and Carmen Cadrin - *Ecosystems from the Ground Up: the Importance of Geomorphology in Ecosystem Research*. The biological and ecological diversity of BC is directly linked to the geomorphological diversity in the province and the interaction with climatic processes. Because of its tectonic, geologic and glacial history, no other province in Canada approaches the complexity of landforms, bedrock, materials, processes and topography present in BC's mountain ranges, plateaus, lowlands and valleys. This topography modifies the prevailing climatic patterns across the province from west to east with both coastal and inland rainforests alternating with subalpine and alpine zones and dryer plateaus. The result of this physiographic diversity and B.C.'s position on the Pacific coast of North America is a level of climatic, ecological and biological diversity unparalleled in Canada. This presentation will focus on the relationships between terrain, soils, ecosystems and species habitat and diversity in BC and the need to incorporate this component into research projects.

Brian Dyck and Stuart Walsh - *Validating Check-All and Forced-Choice Question Formats in a Campground Survey*. This research attempts to address a methodological issue and a policy issue at the same time. The methodological issue focuses on the discrepancy between frequently used question formats in recreation and park surveys: the check-all-that-apply (or multiple response) and forced-choice (e.g. yes/no question). Recent experimental studies have consistently shown a higher mean number of affirmative answers in the forced-choice question format. The policy issue is that BC Parks is presently considering the expansion of electrical hook-ups of some provincial

park campsites at a considerable cost per campsite. One important statistic for considering this expansion comes from a check-all question on the use of camping shelters in the BC Parks satisfaction survey that has been conducted for nearly 25 years. The primary concern is how accurate are the statistics from the historical check-all question on the use of camping shelters? None of the previous 4 published experimental studies on this methodological issue, however, have included external validation measures. To address both the methodological and policy issues, three experiments and an external validation measure were conducted in three provincial park campgrounds in 2006. This presentation will present the key findings from this research along with the management and future research implications.

Brian Dyck, Tay Hanson and Wayne Stetski - *Climbing in Bugaboo Provincial Parks: Some Preliminary Finding*. Bugaboo Provincial Park is an epi-centre for rock climbing in Canada. The use of this area has grown considerably in recent years. This increase in use has led to a number of management issues for park managers: 1. identifying the social carrying capacity of the park and potential placing limits on visitor use; 2. addressing issues of safety with possibly building a Via Ferrata; 3. options for handling of human wastes; and 4. possible expansion of accommodation facilities. In an effort to better understand climber's views of these management issues and to identify possible support for several proposed management actions, a survey was undertaken during the summer of 2008. The intent of this presentation is to present some preliminary findings from this study and possible management implications.

Wendy Francis - *The Peace River Break: A Critical Link in the Yellowstone to Yukon Vision*. The Yellowstone to Yukon Conservation Initiative (Y2Y) is a bold, ambitious vision for the wild future of North America's great mountain ranges. Led by an international NGO based in Canmore, Alberta, Y2Y seeks to ensure that human activities in this iconic landscape are compatible with the future survival of the most demanding wildlife species, like grizzly bears and caribou.

Joyce Gould, Ellen Macdonald and Rene Belland - *Habitat fidelity and co-occurrence patterns of rare vascular plants in protected areas of the northern Rockies of Alberta*. The objective of this study was to examine patterns of distribution of rare vascular plants of the northern Rocky Mountains of Alberta in relation to vegetation type and other rare species. Indicator species analysis and ordination techniques were used to determine patterns of co-occurrence and fidelity of rare species to habitat. Nineteen rare species had a strong association to habitat although few were restricted to one vegetation type. Some vegetation types had a high probability of capturing one or more rare species and several species were associated with other rare taxa. In summary, conservation plans that focus on vegetation type and/or suites of species may be appropriate for some taxa but single species approaches will still be required for the rarest of the rare and those for which there is no demonstrated association with other taxa or vegetation type.

Darcy Gray, Rosaline Canessa, Rick Rollins, Phil Dearden & Peter Keller - *Recreational Boating in the Southern Strait of Georgia: Preferences, Attitudes, and Use Patterns*. Parks Canada is currently assessing the feasibility of creating a National Marine Conservation Area (NMCA) in the southern Strait of Georgia (SSoG) which, if created, will include a marine zoning plan. Research has shown that any marine protected area must consider the preferences, attitudes, and patterns of use of major stakeholders. In the SSoG, a dominant but understudied activity is recreational boating. In order to address existing research gaps, an on the water questionnaire was conducted with 543 boaters in the summer of 2007, with a focus on understanding boater setting preferences, sources of perceived conflict, and overall support for the concept of marine zoning. Results show considerable variability in preferences and attitudes amongst boaters, particularly when examined by boat type. This study contributes to an increased understanding of this user group, which is critical for NMCA planning. Highlights from the study will be presented.

Wolfgang Haider, Jennifer Reilly, Christina Ferguson and Randy P. Morris - *Estimating the number of winter users in the Sea to Sky Corridor*. The so-called “Sea-to-Sky Corridor” constitutes the main recreational playground in a spectacular mountainous setting for residents of metropolitan Vancouver and for tourists staying in Whistler. The area of predominantly public land attracts numerous recreation activities in winter and summer alike, and the recently completed LRMP has addressed user concerns; for the winter zoning into motorized and non-motorized areas has been introduced over much of the area. However, so far little no enumeration of users has been undertaken. In the winter of 2008 we undertook an intensive counting of vehicles and users in the main staging areas (24 entry points), combined with a short intercept survey about the types of activities pursued, distances travelled, specific locations and expenditures. In this presentation we will elaborate on the innovative method used for estimating site specific and regional user numbers, and their expenditures. From January to May 2008, we counted almost 39,000 visitor days (of which 20,500 were motorized users, and 16,500 were non-motorized users). Expenditures and management implications will also be discussed.

Matthew Haines - *Photo classification: A New Technique*. Matthew Haines demonstrates the photo classification tool he developed to classify over 150,000 photos recorded with Reconyx cameras installed throughout the mountain parks during the summer, 2008.

Sheila Harrington and Sara Wilson - *Protecting our Climate through the Conservation of Nature in BC*. In January 2008 the Land Trust Alliance of British Columbia released an extensive report entitled *Mitigating and Adapting to Climate Change* through the Conservation of Nature in BC. This report was commissioned by LTABC to provide economic rationale and valuation for the protection of nature, and to address conservation strategies given the likely impacts of changing environments in BC’s protected areas. The report has three parts: The Values of Nature in an Era of Climate Change, Nature under Threat from Climate Change, and Strategies to reduce Climate Change Impacts. Sara Wilson, co-author of the report with Richard Hebda, will present the report’s findings, as well as additional work she has

undertaken since in Ontario, which provides values for ecosystem services such as water supply, flood control and climate regulation. Sheila Harrington will give an overview of the areas protected by BC's conservation land trusts, how they work with regional and provincial park agencies, and the public to protect both public and private lands in BC. Sheila will end the discussion with a description of further research on Conservation Offsets that the LTABC has underway now.

Mark Hebelwhite and Marco Musiani - *The challenge of woodland caribou conservation in the Canadian Rockies: are more parks the answer?* Woodland caribou are declining across Canada likely because of the effects of human development and of land use changes including forestry, energy development, and global warming. Under the species at risk act (SARA), identification and protection of critical habitat is required to recover threatened populations. We review the recent development of a critical habitat framework for caribou across Canada that suggests a role for integrated habitat protection and restoration measures adopted consistently throughout caribou range. This approach emphasizes the importance of adequately-sized parks and protected areas. As a sample-case, we review the status of 8 caribou herds in the transboundary Canadian Rockies and find support for the hypothesis that parks and protected areas contribute to caribou recovery. We also present results of new genetic analyses that shed light on the potential impacts of human activity on population survival and we suggest how parks may help caribou cope with climate change.

Jay Honeyman - *A retrospective evaluation of the effectiveness of aversive conditioning on grizzly bears in Peter Lougheed Provincial Park, Alberta, Canada.* Using a post hoc study design, I evaluate the effectiveness of aversive conditioning (AC) as a non-lethal management technique to reduce bear-human conflict, and ultimately reduce bear mortality. I found a decrease in developed site use by radio-collared grizzly bears in Peter Lougheed Provincial Park (PLPP) after the onset of AC. Also, wariness of collared bears increased with application of AC, both short-term and long-term. Wariness of non-collared grizzly bears also increased after application of AC. Grizzly bear mortality and relocation rates in the period after AC began

decreased by half within PLPP, while at the same time increasing five-fold on adjacent lands where AC was not a commonly used tool. Finally, there was a decrease in the number of bear-related facility management actions after the onset of AC. I conclude that AC is an effective management tool to reduce human conflicts with grizzly bears and promote bear population stability.

Glen Hvenegaard, Kim Macklin and Paul Johnson - *Innovative park interpretation for children: Evaluating the use of improvisational theatre games.* Effective interpretation for children encourages fun, the use all senses, and interaction with others and the environment. In 2006, with support from Parks Canada and the University of Alberta, we implemented a daily 2-hour program for children aged 6-12 in Banff National Park. The program was called Fostering the Future and used improvisational theatre games. Based on evaluation data, children said they learned the most from games that included interaction, novelty, children having some control, the use of a variety of senses, new perspectives, and making connections. As well, the most enjoyed games involved suspense, competition, fun, novelty, and new perspectives. Interpreters also found that learning and enjoyment were enhanced when the activities promoted creativity, formed positive group dynamics, met basic needs, included an element of adventure, and excluded attendance by parents. Children who learn and have fun with interpretive experiences will be more likely to be park stewards of the future.

Craig Hyslop, Rick Rollins, and Carleigh Randall - *The role of commercial tour guides in protected areas.* With the growth of nature-based tourism in British Columbia, private sector guiding companies are applying for permits to operate within provincial and national parks. This study reviews guidelines and policies developed by park agencies in BC for commercial guiding operations, and compares this approach to theoretical constructs derived from the ecotourism and tour guiding literature. The paper illustrates this analysis with a comparison of two case studies: kayaking in the Broken Group Islands region of Pacific Rim National Park; and rock climbing in Hat Nopparat Thara-Mu Kho Phi Phi National Marine Park in Thailand. In both studies, guides

perform well in their “instrumental” role (providing a safe experience) and “social” roles (maintaining group harmony) but they do not perform as well in their “interactionary” role (minimizing environmental impacts and promoting environmental stewardship), or “communicative” role (interpreting natural and cultural history). This research may help inform park agencies in BC about approaches to the management of commercial guiding operations, in ways that promote management objectives and contribute to sustainable tourism development.

Nicole Kroeker - *Garry oak ecosystems restoration and species at risk (re)introductions in Gulf Islands National Park Reserve*. Gulf Islands National Park Reserve protects some of Canada’s most threatened natural regions including Garry oak and associated ecosystems. To enhance the national park reserve’s ecological integrity, Garry oak ecosystem restoration and species at risk (re)introductions are underway. Ecosystem restoration and species at risk (re)introduction activities include exotic plant species control; re-vegetation with native plant species; exclusion of intense browsing and grazing pressure from deer and geese; and a small-scale experimental translocation of an endangered plant species to an islet in the park reserve. Site-specific ecological monitoring programs essential to evaluating the effectiveness of restoration management prescriptions will be discussed along with implications for short- and long-term management of ecosystem restoration and species at risk recovery sites in Gulf Islands National Park Reserve.

Will MacKenzie - *Getting High on BEC: new knowledge from a provincial classification of alpine and subalpine ecosystems*. The biogeoclimatic ecosystem classification (BEC) system represents a successful application of ecological principles to the real world of resource management. Early work on BEC focused on forested ecosystems; but with this aspect of the classification nearing completion, several projects to classify non-timber ecosystems have been undertaken. The alpine represents the largest omission in the classification, as it covers over 15% of the British Columbian landscape but is labeled simply as “Alpine Tundra” from the Flathead to the Tatshenshini, masking the

incredible ecological diversity within this region. This talk will illustrate the emerging regional and site classification of BC’s diverse alpine ecosystems and some important implications for protected area research.

Monica Mather - *The Role of Protected Areas in the Maintenance of Marbled Murrelet Nesting Habitat*: In the terrestrial environment, Marbled Murrelets are threatened by the historic, current and future loss of old growth nesting habitat from activities including forestry and other resource uses. In order to ensure protection of sufficient terrestrial habitat to down-list the species from its Threatened Status, the Marbled Murrelet Recovery Team recommends the maintenance of 70% of 2002 estimates of suitable habitat throughout coastal BC. The BC Coastal Marbled Murrelet Suitability Model is an ongoing project intended to provide the best available strategic information on Marbled Murrelet nesting habitat abundance and distribution throughout coastal BC. One objective of this model is to estimate the distribution and abundance of nesting habitat in Protected Areas and determine how much habitat they maintain and subsequently how much more habitat is required to meet Recovery Team recommendations. Preliminary results of the analysis show approximately 30% of the existing habitat is found in Protected Areas. The distribution of this habitat varies throughout the coast with 24% habitat maintained in protected areas on western Vancouver Island and the southern Central Coast to 60% protected in new and existing areas in Haida Gwaii. An explanation of the model, the distribution of the habitat in Protected Areas and the significance of its findings in relation to Marbled Murrelet recovery will be presented.

Lindsay McBlane, Krista Royle & Greg MacMillan - *Spatial Decision-Support for National Marine Conservation Areas in the Southern Strait of Georgia and Gwaii Haanas*. In 2007, Parks Canada’s Western and Northern Service Centre embarked on two spatial decision-support projects supporting National Marine Conservation Area (NMCA) in the Southern Strait of Georgia and Gwaii Haanas. Using a mixture of traditional GIS and a conservation planning software, Marxan, the goals of the two projects are to: aid in the identification of areas of high conservation value; identify areas of importance to resource use and

visitor experience; delineate options for highly protected zones; and assist in creating a zoning plan that reflects the shared visions, principles, goals and objectives of the NMCA reserve. An independent Science Network, composed of physical and social scientists, informs the work who using available scientific knowledge and data make recommendations on socio-economic, cultural, and biophysical principles. The recommendations from the Science Network have lead to the regionalization of biodiversity and the identification of conservation features/values targeted in the Marxan analysis.

Amanda Mercer and Rob Hood - *Living by the park: An exploratory study on locals' views in an area experiencing tourism growth*. The North Shuswap is a region experiencing considerable growth in tourism. Shuswap Lake Provincial Park and Roderick Haig-Brown Provincial Park are two of the attractions in the North Shuswap region that benefit both tourists and locals. In light of growing tourism, this session will report the results of a study designed to explore local residents' views on tourism growth in the North Shuswap, specifically their experience living in close proximity to the Provincial Parks.

Kathy Parker and Michael Gillingham - *Predator-Prey Strategies In The Muskwa-Kechika*. The Muskwa-Kechika Management Area in northern British Columbia supports one of the largest intact large-mammal predator-prey systems in North America. Our goal is to quantify interactions among focal species (grizzly bears, wolves, woodland caribou, Stone's sheep, moose, elk). We defined spatial and temporal patterns associated with predator and prey use of a relatively non-impacted landscape. Our studies combined field-based research with global positioning satellite (GPS) locations to quantify movements and distributions; remote-sensing images to index vegetation biomass and quality; use and resource selection models; stable isotope assessments of predator food habits; and the trade-offs between forage and predation risk for ungulates. Even with seasonal variability in strategies among and within species, the commonalities related to food resources and energetic demands help us understand system function. Our findings will inform land management decisions and conservation

area assessments to help minimize future impacts of increased access to the area.

Marlow Pellatt - *Climate Change Impacts and Adaptation in Canada's National Parks*. The adaptation of ecosystems to the impacts of climate change is being experienced at a global level. The need to develop policy and management actions that help Canadians understand impacts, mitigate greenhouse gas production, and adapt to changing climate is imperative. Parks Canada has identified the need to develop a "climate change adaptation strategy". The scope of this task includes ecosystem and heritage resource protection, visitor experience, and public education. It also encompasses terrestrial, fresh water, and marine environments. I will also present examples of research actions in Canada's National Parks, e.g., the development of bioclimatic envelope models to assess how Garry oak ecosystems may respond to climate change, and discuss the role that protected areas may play in ecosystem conservation in a changing climate. I will discuss the complex and sometimes conflicting aspects of global climate change and how they may affect a protected area agency like Parks Canada.

Sarah Poirier - *Effects of interpretive wildlife watching tours on tourists in Tofino, BC*. An important role of protected areas is to be able to engage the visitor to learn about and reflect upon the environment, enabled in part through interpretation. This study consisted of collecting questionnaires from 492 passengers on wildlife watching tours operating out of Tofino, which passed through the waters around Meares Island and Vargas Island. This survey gathered data on visitors' basic knowledge of the species they observed on the tours, the importance of various attributes of a tour, general visitor attitudes and behaviours towards conservation, and whether they believed that their attitudes and behaviours were affected by the information that they received on their tour. This study has possible implications for educators, interpreters, developers of interpretive programs, and all those involved with the dissemination of information to the public, whether through private or public venues.

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Kate Reade and Pamela Wright- *Comparing resident and visitor perceptions of forest health management strategies in Mt. Robson Provincial Park.* Historic practices of fire suppression within protected areas, combined with changes in climate have led to conditions of heavily stocked, even-aged monocultures that are prone to insect infestations and forest fires that are outside the range of natural variation. Mount Robson Provincial Park, and the surrounding Robson Valley, is an exemplar of these issues and the associated management response has been to explore and implement a range of active management techniques such as prescribed fire and varying scales of tree removal. Successful engagement of stakeholders in response to these types of management challenges requires understanding and positive attitudes towards active management techniques. However, various publics appear to have different levels of understanding, attitudes and perceptions about forest health management. We compared data regarding the attitudes and perceptions towards forest health management of both residents of the Robson Valley and visitors to Mt. Robson Provincial Park. We found that although both residents and visitors were supportive of active management within protected areas for a wide range of reasons, visitors were supportive for ecological restoration motivations and of prescribed fire as a management tool. In contrast, residents were more concerned about the potential negative effects of prescribed fire and were more concerned about private property, public safety, and the potential economic losses resulting from burning, as opposed to harvesting.

Kathy Rettie - *Species at Risk: the Human Side.* Mosquito Creek area of Banff National Park is frequented by caribou and backcountry users; cameras, track sticks and onsite surveys are employed to collect natural and social science data

Kimo Rogala - *Mixed methodology to meet complex management questions.* Kimo Rogala presents the suite of tools used to conduct research in Waterton Lakes National Park where managers are engaged in area planning for the Blakiston Valley, plus have concerns over park-wide year-round levels and types of human use.

Rick Rollins and Dave McCallum - *Resident and Visitor Perceptions of the Marine Environment in Gulf Islands National Park.* In January 2008 the Land Trust Alliance of British Columbia released an extensive report entitled *Mitigating and Adapting to Climate Change* through the Conservation of Nature in BC. This report was commissioned by LTABC to provide economic rationale and valuation for the protection of nature, and to address conservation strategies given the likely impacts of changing environments in BC's protected areas. The report has three parts: The Values of Nature in an Era of Climate Change, Nature under Threat from Climate Change, and Strategies to reduce Climate Change Impacts. Sara Wilson, co-author of the report with Richard Hebda, will present the report's findings, as well as additional work she has undertaken since in Ontario, which provides values for ecosystem services such as water supply, flood control and climate regulation. Sheila Harrington will give an overview of the areas protected by BC's conservation land trusts, how they work with regional and provincial park agencies, and the public to protect both public and private lands in BC. Sheila will end the discussion with a description of further research on Conservation Offsets that the LTABC has underway now.

Rick Rollins and Lynn Wilson - *Managing for Conflict at Elk Beaver Regional Park.* Elk-Beaver Lake Regional Park is one of the most preferred outdoor recreational settings within the Capital Regional District, attracting a number of user groups including swimming, rowing, sport fishing and waterskiing. The CRD receives many reports of crowding and conflict between user groups. In order to document the extent of these issues, and formulate a management response, a focus group with representatives of different user groups was conducted early in 2007. The results of the focus group were used to develop a questionnaire used to conduct interviews with visitors to the park in the summer of 2007 (n= 588), to determine the prevalence of conflict, where it was occurring, and how people responded (coped) with conflict. This was followed up with observational counts of use levels measured over a 12 month period from July 2007 to June 2008. Results and management implications are discussed.

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Nancy-Anne Rose and Philip J. Burton - *Using Bioclimatic Envelopes to Identify Temporal Corridors for Conservation Planning in the Context of Climate Change*. A changing climate means that protected areas may no longer be able to sustain the biological features they are expected to protect through time. To address this issue, we identified bioclimatic envelopes of selected targets, using the ClimateBC interpolation tool and ArcMap GIS software. The overlap of a target's bioclimatic envelope for four future time slices under the CGCM3A24 climate scenario represents its 'temporal corridor,' designating locations where it could persist over time. For example, the areal extent of the Interior Douglas-Fir biogeoclimatic zone increases, but with only 0.03% of its current range persisting in BC's Central Interior. Ideal bioclimatic conditions for the rare lichen *Nephroma occultum* are predicted to increase by 17%, with suitable climate likely to persist in its current locations. The concept and application of temporal corridors could be an important component of future protected area planning and biodiversity conservation.

Leona Shaw, Jane P. Young & Beverly John - *The Ecology of Food and Medicine Plant Gathering Sites as Defined by Tl'azt'en Nation*. In recent years, the important role that indigenous people and their knowledge will play in conservation and management of natural resources has been recognized. The desire to understand the connection between ecological and socio-economic systems has resulted in an interest to combine the knowledge gained from Traditional Ecological Knowledge (TEK) and western science. This research is a community-based partnership project between UNBC and Tl'azt'en Nation. The knowledge being collected includes TEK and western science information relating to both the ecology of food and medicine plant gathering sites and the criteria for gathering of individual plants by Tl'azt'en Nation. The intent of this study is to consolidate information relevant to protection of traditional gathering sites, which can be formulated into policy for Tl'azt'en Nation's continued management of their traditional lands. This information will also be used by local land managers towards the protection and preservation of plant gathering sites.

John Shultis - *Declining Park Visitation?: Comparing Parks Canada, National Parks Service and BC Parks Responses*. After decades of continuous growth in protected area visitation, user numbers in many park systems has stagnated if not declined in Western nations over the last 10-15 years. These declines in visitation have proven to be worrisome to park agencies for a number of reasons; for example, they may compromise recent efforts to increase revenue generation from user fees and could affect the political and social influence of these agencies. After reviewing the internal and external discussions of the perceived reasons behind declining visitation in the National Parks Service (USA), Parks Canada, and BC Parks (British Columbia, Canada), several commonalities are identified. That is, similar reasons for the declines have been independently assessed by these three park agencies, although empirical proof of these reasons is not always present. Moreover, several potential reasons for the declines are ignored by these agencies. Similar agency operational responses to declining visitation are also identified and discussed. The paper concludes with an assessment of the ideological and political reasons underlying these commonalities and the possible effectiveness of the proposed operational changes to future park visitation.

Jovan Simic, Kathy Rettie & Pam Wright - *Environmental consciousness of RV visitors to Rocky Mountain National Parks*. RV travel is a growing market but remains largely under-studied. More and more visitors to National Parks choose to travel in an RV. The goal of the study presented in this paper was to investigate the environmental consciousness of RV visitors to National Parks and determine their awareness of the negative environmental impacts of RV traveling, as well as the actions they take to mitigate these impacts. A paper-based intercept survey of RV travelers was conducted in the summer of 2007 at three major campgrounds in the Mountain Parks: Whistlers (Jasper), Tunnel Mountain (Banff) and Lake Louise. The results reveal that less than half of the RV visitors are aware of their ecological footprint while traveling in an RV, and an even smaller number takes measures to reduce their ecological footprint while traveling in an RV. However, the study results also show that some RVers are more environmentally conscious than others. The paper concludes that with the growing

number of RV travelers, National Parks are a perfect place to educate the visitors and raise the environmental awareness. These issues are further discussed in relation to the Parks Canada mandate.

Heather Steere and Rob Hood - *Becoming an UNESCO Heritage Site: The Case of Clearwater, BC*. This session focuses on the challenges faced within a rural community in attaining UNESCO World Heritage Status (UWHS), in this case Clearwater, BC. Clearwater is being led for the first time by a town council since becoming incorporated in 2007.

Groups within the community are pursuing the goal of gaining UWHS both from a conservation and tourism perspective. Within this context there is a conglomeration of ideas, opinions and requests from various interest groups aside from the precise criteria set by UNESCO in gaining UWHS. Consequently the collaboration process is a complex and intricate matter. Both observation and qualitative research techniques were used to understand this case on an economic, environmental and social front, and to describe the process and challenges faced by the community in reaching UWHS.

Tory Stevens and Eric Lofroth - *Wildlife Without Borders: Wolverines in the North Cascades*. The wolverine population in the North Cascade Ranges straddles the international boundary. Historically this genetically distinct population was thought to be extirpated from Washington but has recently been rediscovered. It is unknown whether this represents an expansion of remnant populations in the North Cascades or re-establishment from other parts of Canada or the United States. Research currently underway in the U.S. will be augmented by work over the next 4 years on the Canadian side of the border, primarily in E.C. Manning and Skagit Valley Provincial Parks. We will gather information to assist managers and scientists understand the ecology and distribution of this elusive species. Harvest, recreational activities and habitat fragmentation can all affect wolverines. Accurate information will aid numerous land management agencies in Canada and the United States to make informed conservation and management decisions. We will outline the ongoing project, provide details on progress to date and discuss potential application of research results to management.

Tomas Tomascik - *National Marine Conservation Areas Science Network on the Pacific Coast*. The Canada National Marine Conservation Areas Act (2002) provides Parks Canada with the authority to establish a system of national marine protected areas with the purpose of protecting and conserving areas representative of Canada's natural marine heritage for the benefit, education and enjoyment of the people of Canada and the world. The NMCA Act provides a mandate for Parks Canada to demonstrate, in collaboration with other governmental agencies, how protection and conservation practices can be harmonized with ecologically sustainable resource use in marine ecosystems. In October 2003, Canada and British Columbia signed a Memorandum of Understanding committing the two governments to advance NMCA proposals on Canada's Pacific Coast. The two levels of government are committed to partner towards completion of a comprehensive NMCA Feasibility Study for the Strait of Georgia Marine Region and the development of an Interim Management Plan for the proposed Gwaii Haanas National Marine Conservation Area Reserve (NMCAR), representing the Hecate Strait and Queen Charlotte Shelf Marine Regions. The Feasibility Study and Interim Management Planning processes examine a broad range of scientific, economic, social, cultural and traditional knowledge sources for developing, evaluating and advancing the NMCA proposals. As the lead proponents for the NMCA initiatives, Parks Canada recognized the need for, and value in, establishing an interdisciplinary science network to provide support to the NMCA initiatives. This network, known as the Pacific Coast NMCA Science Network (NMCA-SN), brings together leading researchers and practitioners, including traditional ecological knowledge (TEK) experts, from a range of marine (natural and social) science disciplines to advance research, expand understanding and provide guidance concerning marine conservation area principles and management priorities. The NMCA-SN draws on the scientific and TEK expertise of its members and other sources to provide robust advice to the NMCA project teams.

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Mike Tranel - *Resolving conflicts in protected areas when values range from economics to the intangible.* Management decisions in protected areas are often choices among very different, and often conflicting, values. The role of the protected area manager is to advocate the full range of values for which the area was established and to make the critical decisions in favor of those values. Although parks and protected areas are thought of as conservation units, there are many cases in which cultural practices and values do not support nature conservation. This presentation will focus primarily on examples from the US National Park System and contrasts with the US Forest System. Since its establishment in 1916, the US National Park Service has had the legal basis, and in fact requirement, to protect a full range of values. In many cases managers have compromised conservation in favor of utilitarian values and have made long-term decisions with limited supporting research. In recent years, however, there are more examples of effective use of research in making value-laden decisions, even in cases where the values being protected are intangible or very difficult to measure. Management decisions and challenges in the US national parks parallel those found in other protected areas around the world. A common denominator is the inevitable conflict among values and the challenge to park and protected area managers to decide which values take precedence.

Ross Vennesland, Matt Fairbairns, Louise Blight, Danielle Bellefleur & Philip Lee - *Back from the Grave – The Return of an Extirpated Plant to BC's West Coast.* Pink Sand-verbena (*Abronia umbellata*) is a low-growing annual restricted to coastal sand habitats from California to southern BC. In Canada, the species is known from only three sites on the west coast of Vancouver Island. In the past 50 years it has been observed at only one of these sites (Clo-oose Bay), but the last observation there was in 2001. *Abronia umbellata* breviflora is listed as Endangered in Canada under the Species at Risk Act, and has been assessed by NatureServe globally as critically imperiled (T2). The Pink Sand-verbena Recovery Strategy recommends re-introducing the species at Clo-oose Bay and two other sites. We discuss the results from the first year of our re-introduction (at Clo-oose Bay). Results have been promising, with high survivorship through the growing

season. The project has been designed as an experiment to help guide restoration activities for other rare plants, with comparisons between dune and beach habitats, seeds versus transplants and fertilized versus unfertilized plants.

Leanna Warman and Tory Stevens - *Ecological Baseline and Monitoring of Vegetation on Conservation Lands.* The Nature Trust of BC (TNT) and Ministry of Environment (MoE) partnered on a project to collect ecological baseline data and establish permanent plots for monitoring change over time on conservation lands in three BC regions (Vancouver Island, Okanagan, and Kootenay) during 2007 and 2008. Detailed data was recorded by a crew operating under the BC Conservation Corps Program for a variety of ecological characteristics; including vegetation, soils, coarse woody debris, and wildlife trees on 20x20m plots; incidental locations of habitat features such as wildlife trees, burrows, and nests; and human disturbances. As part of MoE's Conservation Risk Assessment of conservation properties, locations of major geological landforms and permanent natural features were also identified. The permanent plots will allow TNT and MoE to manage for the habitat values identified and monitor the effectiveness of any targeted management activities, as well as the effects of natural processes such as climate change.

Roger Wheate, Brian Menounos and Tobias Bolch - *Glaciers in western parks and protected areas: melting rates across the cordillera.* At the 2006 forum, the Western Cryospheric Cordilleran Network (WC2N) examined the distribution of glaciers in protected areas based on BC provincial mapping in the 1980s. We have now updated these results with 2005 extents derived from satellite imagery and calculated annual retreat rates for this 20 year period by region and for selected protected areas. Our research includes analysis of older maps and photographs to identify glacier changes since 1900 along with recent surface elevation lowering and thus ice volume loss using digital elevation models from stereo-imagery.

Mathew Wheatley, Gabor Sass and Irena Creed - *Harnessing the satellites for protected areas management: using predictive hydrology maps to mitigate effects of adjacent development*. Many protected areas are considered environmental benchmarks which serve to indicate reference conditions for ecological systems; however, area-boundary selection often is an administrative exercise, arguably with no consideration to the ecological function of the resulting area. Wetlands support relatively high biodiversity in protected areas. But, because hydrological connectivity to adjacent landscapes is difficult to assess, inclusion of a wetland within a park does not guarantee its protection, and park managers often are unaware of how adjacent development affects wetland ecology. In this study we demonstrate the use of long-term archived satellite imagery and Lidar to map fine-grain spatial and temporal hydrological connectedness of the landscape. Focusing on Sundance Provincial Park near Edson, Alberta, we show how remote-sensing can enable managers to assign a probability of hydrological impact regarding adjacent development, allowing a more hydro-ecological approach to mitigating adjacent development and necessarily avoiding traditional “buffer zone” approaches.

Darrel Zell - *Visitor Behaviour Modeling*. Connecting spatial and temporal patterns of visitors, this tool can be used to forecast how possible management decisions (e.g. opening/closing facilities, rerouting roads/trails) will affect both the visitor experience and the ecological integrity of the park. Darrel Zell links the modeling process to specific landscapes and management issues in the mountain parks.

Discussions and Roundtables

Stuart Gale - *Taking Nature's Pulse: The Status of Biodiversity in British Columbia*. *Taking Nature's Pulse: The Status of Biodiversity in British Columbia* was released on July 9, 2008 by Biodiversity BC a partnership of government and non-government organizations established to support improved biodiversity conservation and planning. The report is the result of a collective effort by more than 50 science experts – both provincial and international, representing some

of the best ecological thinking in B.C. *Taking Nature's Pulse* provides 23 major findings that highlight what is important about biodiversity in B.C. It concludes that “B.C.’s biodiversity is globally significant because of its variety and integrity, but without immediate action is vulnerable to rapid deterioration, especially in light of climate change.” *Taking Nature's Pulse* is a great beginning and provides a solid foundation for moving forward. What’s important now is to take the necessary action to ensure that we take care of our ecosystems and natural diversity.

Julian Griggs and David Luff - *The Muskwa-Kechika Management Area: Lessons Learned in Conservation Planning and Multi-Stakeholder Collaboration*. The Muskwa-Kechika Management Area (M-KMA) was established by the Government of British Columbia in 1998 through the proclamation of the *Muskwa-Kechika Management Area Act*. The M-KMA represented the ‘highwater-mark’ in terms of the development and implementation of a provincial land-use planning and management framework that included the creation of the M-KMA Advisory Board. Although some progress has been made, a decade later, the anticipated land-use planning and management framework for the M-KMA is not yet in place and the Advisory Board is struggling to maintain its profile and relevance. This paper provides a framework for the systematic assessment of the conservation planning and multi-stakeholder collaboration arrangements anticipated for the M-KMA and provides insight into various aspects of the Advisory Board experience, underlining critical factors for success such as leadership, managing independence and autonomy, effective government relations, the framing and use of technical capacity and research studies and the importance of constituency building.

Pat Maher, Nicole Vaugeois and Dan MacDonald. *Tourism, Protected Areas and community relationships: A discussion panel*. Parks and protected areas are key tourism assets for rural communities. This panel will discuss the manner in which protected areas and the agencies that manage them relate to communities (aboriginal and non aboriginal) that are pursuing tourism development in British Columbia. Panelists from across the province will speak to the importance of parks and protected

areas in rural tourism development as well as highlight potential strategies to enhance collaboration between protected areas agencies and stakeholders in tourism. The panelists will be chosen based on interactions with the Tourism Research Innovation Project (TRIP) extension tours to rural areas of BC throughout the last three years. These extension tours took university and college students into rural areas with a purpose of showing them the manner in which tourism “really works”. The session will be of interest to those involved in protected area management, community economic development and nature based tourism operations.

Tory Stevens, Kristi Ciruna, Eva Riccius & Dominique Sigg - *The Conservation Framework and Research Priorities*. The Conservation Framework is a new Ministry of Environment initiative to help set priorities and identify actions in a world of increasingly scarce resources and difficult choices. The Framework will have 3 components: species, ecological communities and landscape. Each of these components is in a different state of development or implementation. The framework will be presented and applications to research explored from 3 perspectives: the emerging research framework for the ministry, the species component and the landscape component.

Lynn Wilson and Marilyn Fuchs - *Identifying research challenges and opportunities within B.C.'s regional parks systems*. A roundtable discussion is proposed that focuses on identifying challenges and opportunities to conducting, sponsoring, partnering, and/or applying protected areas research at the regional district level. In order to provide some context to the discussion, an overview presentation will examine how the parks/protected areas function is embedded within the different regional districts in B.C., and the extent to which differences in structure, staffing, resources, protected areas system, etc. impacts the capacity of regional districts to integrate and/or apply research into their protected areas management function. Overcoming barriers to implementing and applying research can be a challenge for all levels of local government (e.g. municipal, electoral area, or regional district) involved with managing parks and/or protected areas. This roundtable

discussion will be of value to local governments, students, academics, and/or senior levels of government staff interested in protected areas research at the local government level.

Research Snappers

Danielle Bellefleur, Phil Lee and Ross Vennesland - *Re-Establishment of a North Pacific Beach Dune Ecosystem on the West Coast of British Columbia*. European dunegrass (*Ammophila arenaria*) has impacted multiple dune beach sites in Pacific Rim National Park Reserve by reducing habitat for native species and reducing sand transport in both the foredune and the open dune areas. By removing this invasive, we hope to re-establish a healthy dune ecosystem by increasing sand transport and improving habitat for native dune species.

Trudy Chatwin - *Scientifically Based Seabird Viewing Guidelines*. The majority of seabird nest sites in British Columbia are protected in Ecological Reserves, Provincial or National Parks. Seabird nest and roost sites are important to maintaining British Columbia's biodiversity and as well provide wildlife viewing opportunities. Responsible wildlife viewing promotes stewardship and conservation of biodiversity and protected areas. Despite recognition that boater disturbance is a growing problem for seabird nest-sites there has been no study in British Columbia to document disturbance thresholds. There is a strong need to set seabird viewing guidelines based on empirical data rather than opinion. My project experimentally researches distance, timing, and boat type disturbance thresholds at Pelagic Cormorant, Double-crested Cormorant, Brandt's Cormorant, Pigeon Guillemot, Tufted Puffin, Glaucous-winged Gull and Black Oystercatcher nesting and roost sites around Vancouver Island. The information collected will be used to recommend scientifically-based viewing time and distance guidelines for protected nest sites as well as roosts. Reasonable scientifically-based guidelines will improve boater behavior, awareness of wildlife issues, provide protection of seabirds during critical nesting periods and therefore sustain tourist wildlife viewing over the long term. My paper will outline the methodology used for the study and highlight preliminary results.

Nadine Heck and Philip Dearden - *Challenges in assessing different user groups' opinions on marine management at Pacific Rim National Park Reserve*. The aim of the research was to identify different groups' opinions on current management, and their management preferences and information requirements for future evaluations of the marine park environment. Pacific Rim National Park was chosen as one case study. Parks Canada provided information for identifying stakeholder groups and supplied management plans, tourism development numbers, and information on previous park management. However there were many challenges in obtaining primary data. Information was obtained most easily from commercial fishermen in adjacent communities. Getting recreational fishing charters was more difficult. Collecting the opinions of current Park management staff would have contributed significantly, but was not possible since this was not approved as the agency's perspective. In addition, information on some stakeholder groups such as previous researchers was not possible as permit information was not released by Parks Canada. Evidence was seen of other research groups undertaking research all around the park but not within park waters due to challenges with the permitting system. Approaches need to be found whereby park agency personnel can offer professional opinions for research purposes that are unconstrained by political considerations

Andy MacKinnon, Sari Saunders & Heather West - *Developing a permanent plot network for long term, spatial evaluation of old-growth dynamics in the coastal temperate rainforest*. We are remeasuring historic, stand-mapped plots in protected areas and adding new plots to this permanent, regional network for studying coastal old growth forests. We have mapped, measured and tagged trees, snags and coarse woody debris. Nested measurements of understory vegetation, soils, and light are also available. Analysis is focusing on spatial patterns of species composition and structure, and temporal dynamics of growth, mortality, and decay. To date, we have collected data for 1 ha plots in two floodplain and two upland systems from western Vancouver Island and the Kitlope Valley; historic plots also exist in Tahsish-Kwois. We present summary, comparative information on structure and composition in these forests. We consider the hypothesized influences of contrasting sites types, disturbance regime, and regional context

(latitude) on contrasting spatial structure. We discuss the challenges and benefits of building this research network within protected areas, including the permitting process and First Nations collaboration.

Jane Young and Lisa Poirier - *Importance of Wetland Research in the North-Central Intermountain Ecological Region (IER) of British Columbia*. Wetlands are widely recognized to have significant value as components of landscapes. In the north-central Intermountain Ecological Region (IER) of British Columbia, wetlands of diverse types and sizes abound and, unquestionably, are of major importance for all organisms. Despite this importance and the efforts of conservation groups worldwide, wetlands are increasingly being threatened by human and ecological disturbances of various types. An inventory of wetlands and wetland types is not readily accessible for this region, and managers and researchers perceive an urgent need for better inventory and assessment. In addition, while the role of disturbance has been well studied in other aquatic systems (e.g. streams) and in other regions (e.g. prairie potholes), there has been relatively little work on wetlands in the north-central IER. It is therefore critically important to collect baseline data to understand the impacts of disturbances and long-term changes (e.g. climate change) on these wetlands.

Posters

Carita Bergman - *Reducing density of introduced deer increases species richness*. The integrity of terrestrial ecosystems in Gwaii Haanas National Park Reserve and Haida Heritage Site has been severely compromised by the impacts of introduced species, particularly browsing by introduced deer. With the management techniques currently available, it is not logistically feasible to completely eliminate deer from Gwaii Haanas. We have, therefore, chosen a goal that is realistic and achievable: to restore examples of the native biodiversity and ecosystem processes. We use a combination of two approaches to achieve our management objectives: culling on small islands and deer browsing exclosures in representative ecosystem types. Culling efforts on two islands have been ongoing since 1998/2002, while exclosures

have been in place for approximately a decade. Monitoring of vegetation and songbirds has shown increases in species richness and abundance on islands where deer are reduced, and within grazing exclosures. This information provides useful context as we consider larger scale projects addressing whole island restoration.

Ian J.W. Giesbrecht I, Ken P. Lertzman I, Andy MacKinnon - *Fine scale variation of understory light and vegetation in two contrasting Sitka Spruce (Picea sitchensis) floodplain forests of coastal British Columbia*. Stand level structural and environmental heterogeneity are associated with biologically diverse forests and have become an important focus of management. Understory light transmission, a critical habitat variable for plants, tends to increase in amount and heterogeneity in older stands, as do various attributes of understory vegetation (e.g., biomass and diversity). In this study we describe and compare fine scale variation of understory light and understory vegetation in two structurally contrasting unmanaged *Picea sitchensis* stands in protected floodplain forests of coastal British Columbia. We estimated cover of each plant species in 25 2m x 2m subplots within a 100m x 100m macroplot in each forest. We took hemispheric canopy photographs at 50 locations in each macroplot. Hemispheric photographs were analyzed to determine light transmission. Our results describe a reference condition that can inform stand management treatments, where there is an objective to maintain or restore understory vegetation characteristics of unmanaged forests.

Connie Miller Retzer - *Connecting the Dots – Linking the Research Community with Park Manager's Needs on Vancouver Island*.

Vancouver Island's provincial protected areas have been the site of research initiatives which have contributed significantly to the knowledge and conservation of our natural areas. This presentation will summarize highlights from the past, but the focus will be on new research opportunities identified as priorities by protected area managers. Potential topics have been chosen explicitly to link the research community with park management needs. Proposed fields of study will include: hydrological investigations in fluvial environments, old growth structure and succession rates, introduced species in

estuarine environments, declines in sea-bird nesting habitat, Garry Oak ecosystem restoration, species at risk assessments in marine ecosystems, DNA analysis of feral goats, bat habitat and migration routes, plant ecology and species at risk, biogeography and climate change, water quality assessment of wetlands, shorebird populations and eelgrass changes, management strategy for shoreline areas, urban interface impacts, and the development of recreational viewing strategies for marine mammals.

Randy Moody and Joanne Vinnedge - *Whitebark Pine – Initiating Restoration Efforts in British Columbia*. Whitebark pine (*Pinus albicaulis*) is a 5-needle stone pine found at high elevations throughout western North America. The distribution of Whitebark pine across the landscape is almost exclusively due to the caching activities of Clark's nutcrackers (*Nucifraga columbiana*). The seeds are also a very important source of wildlife food for red squirrels and grizzly bears. Whitebark pine is blue listed (vulnerable) in BC due to a combination of threats including: white pine blister rust, mountain pine beetle, climate change, and forest succession. White pine blister rust (*Cronartium ribicola*) is an exotic fungal disease that kills cone-bearing branches, and eventually kills the tree. Mountain pine beetles also kill trees, including some that exhibit rust resistance. Climate change may reduce suitable habitat for whitebark pine. Fire suppression has allowed for successional replacement of whitebark pine by more shade-tolerant species. This poster reports on two recent restoration efforts; both directed at collecting seed for the purpose of gene conservation and restoration. In the Fort St. James Forest District 145,000 seeds were collected, which helped to markedly increase the provincial seed bank numbers. The project was also successful in that it provided a valuable opportunity to increase awareness and understanding about a threatened species.

Liz Murphy, Sybille Haeussler & Adrian de Groot - *Grassland Restoration in Southern Skeena Region Park*. Low elevation grasslands are among the most biologically rich and least resilient ecosystems in the Skeena Region. Recently, some of the best remaining grasslands have achieved protection within Provincial Parks and Reserves. These protected

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grasslands remain severely threatened by tree and shrub encroachment, and by invasive alien species. BC Parks has been working with the Bulkley Valley Research Centre, the Northwest Fire Centre and several other community partners to develop effective restoration treatments for red-listed grasslands. Prescribed burns were carried out at the Hubert Hill/Toodtenia Reserve near Smithers and Uncha Mtn-Red Hills Park near Burns Lake, and cutting/girdling trials are underway at several sites. Monitoring data show that prescribed fire was more effective than expected at inhibiting aspen regrowth on drought-stressed sites, but so far, the treatments have not increased grass and forb abundance. We are pleased that the treatments have not reduced vascular plant diversity nor increased alien species invasion.

Liz Murphy, Sybille Haeussler & Adrian de Groot - *Northwest Whitebark Pine-Lichen Woodlands in Peril*. In 2008, several new Provincial Parks and Protected Areas were declared in the scenic Bulkley Ranges southwest of Houston. An important feature of these new protected areas are extensive whitebark pine woodlands near their northwest range limit. Whitebark pine woodlands in the Skeena Region have distinctive white carpets of reindeer lichens and are important wildlife habitat as well as traditional hunting-gathering sites for the Wet' suwet'en. Alarming, these blue-listed ecosystems are in rapid decline. The Bulkley Valley Research Centre with several other community partners undertook stand reconstruction research to learn about the origins of these threatened ecosystems and their response to cumulative environmental stress. Pine trees 400-500 years old that withstood low severity wildfires are rapidly succumbing to mountain pine beetle and white pine blister-rust. A 1974 wildfire had little whitebark pine recruitment. We strongly recommend that seed collection and nursery propagation of rust-resistant trees begin immediately to allow restoration planting.

Jennell Rempell - *Looking into the Loop: Assessing students' experience of outdoor learning and the impacts of sequential wetlands programming*. There is growing awareness in North America of the need to reconnect with nature, and parks are increasingly important settings for children's environmental education. Using an innovative partnership model,

Alberta Parks, Ducks Unlimited Canada and the City of Calgary Parks together provide curriculum-connected, sequential indoor and outdoor programming to grade 5 students in the Calgary area, using Fish Creek Provincial Park for field study. Classes participate in pre, field study, and post-field study programs, designed and delivered by education staff to build on students' knowledge, understanding, attitudes and value of wetlands in local and provincial contexts. This represents a significant commitment to supporting students' learning, providing locally-relevant and high-quality environmental education programs. Student pre/post surveys, wetland drawings, and long-term interviews were used to illustrate the short and long term impacts on students' learning. Discussion will include the strengths and weaknesses of different evaluation methodologies, insight into how students understand "wetlands", and the significance of the students' experience in environmental education program design, delivery and evaluation.

Jen Smith - *Active management in and around protected areas – from Stanley Park to Mt. Robson*. The complex topography and varied climate of British Columbia produces the greatest biological diversity of any province in Canada. Protected areas play a key role in the protection of this biodiversity. In recognition of this diversity, over 13 million hectares of the provincial land base has been reserved in protected lands (including parks, protected areas, ecological reserves, conservancies and conservation lands). Unfortunately, alien plants have invaded many ecosystems in the province, including those set aside in protected lands. The ecological complexity of British Columbia that is captured in protected lands requires a comprehensive and equally complex strategy for managing, monitoring and treating invasive plants. This poster presentation will outline the research that has been done throughout the Parks and Protected Areas (PPA) system in the recent past and will provide direction for further research that is needed in order to effectively and successfully inform invasive plant management.

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Tory Stevens - *BC Parks Research Needs*. All the regional park managers were contacted to supply information about issues in their area where management decisions would benefit from additional research. This poster is a compilation of all their ideas. It represents a sample of the research that could inform park management decisions.

Glenn Sutherland, Dan O'Brien, Louise F. Waterhouse and Alton S.

Harestad - *Identifying and allocating reserves that manage for species under changing landscape conditions*. We developed a dynamic reserve location model (RLM) to help planners select areas for species reserve management under changing landscape conditions. The RLM identifies candidate areas based on species requirements that are then ranked for management priority by one or more sets of weighted criteria. Criteria can be biological, ecological, or policy-based. In combination criteria express how an area meets different management objectives for a target species now and in the future, given dynamics created by changing landscapes. We demonstrate the method using the 'Endangered' Northern Spotted Owl (*Strix occidentalis caurina*) in British Columbia, Canada and by implementing a changing landscape represented as projected shifts in the "climatic suitability" envelope of current BEC zones by Hamann and Wang (2006). Our approach investigates how future uncertainty such as that from climate change can be accounted for in conservation area placement. We discuss the general applicability of the method for species management.

Steve Webb - *The newest and most complete map of the provincial park system!* We will have a large map of the provincial park system including all the new conservancies and other acquisitions and boundary changes over the last several years. Included in the display will be handouts of maps and descriptions of various designations. A BC Parks rep will be on hand to answer questions about boundary mapping and access to up to date mapping layers.

Heather West, Sari Saunders and Andy MacKinnon - *Dynamics of structure and composition in old growth temperate rainforest stands on the coast of British Columbia*. We are studying coastal old growth forests across a latitudinal gradient from central to southern BC. In 2007-2008, we located, remeasured (0.25ha) and expanded (1ha) plots in Sitka spruce (*Picea sitchensis*) floodplain ecosystems of Carmanah-Walbran Park on Vancouver Island and the Kitlope Heritage Conservancy on the central coast. We marked and mapped trees, snags, and cwd for development of digital stand maps. We recorded species, height, dbh, and vigour.

The Carmanah plot included 1183 features while the Kitlope plot included 281 features. Density and spatial distributions of live and dead wood and understory vegetation differ distinctly between these plots, while diameters and heights of the features are similar. Recruitment rates to canopy are higher in the Carmanah site; flood regimes limit recruitment in the Kitlope. These data will contribute to parameterization of stand dynamics models and to management for old growth representation and characteristics across a larger landscape.

Roy V. Rea, Dexter P. Hodder, Mari D. Wood, Kenneth N. Child and

Gerald W. Kuzyk - *Development of a Mineral Lick Identification and Classification System for use in Provincial Wildlife Habitat Feature Preservation Guidelines*. Mineral Licks used by ungulates for mineral soil acquisition are considered critical habitat features. Depending on the landscape, such features may or may not be abundant and are often sensitive to disturbance from land use and development activities such as forestry, mining and oil and gas exploration. Due to their ecological importance, the rarity of these features in some landscapes, and their sensitivity to disturbance, mineral licks should be protected from resource extraction, road construction, and other forms of human disturbance. Although protective measures are currently in draft form, no legislation currently exists that explicitly protects licks from the broad spectrum of land uses in BC. Due diligence and the reliance of professionals undertaking resource extraction activities in BC suggest that such features will be considered and protected routinely when encountered. Unfortunately, no guidelines on how to identify and classify licks for the purposes of establishing protective buffers in the face of land development are currently available to professionals and

many licks certainly go unrecognized in the field. In an effort to provide land planners and resource managers clear guidelines on mineral lick identification and classification for the purposes of assigning site-specific protective measures, we are developing a mineral lick classification system and handbook for British Columbia. We have determined the location of over 100 mineral licks in the province and continue to collect photographs and locations from government staff and land stewards and users from across the province. Once locations have been identified, we will field verify and assess mineral lick sites. Data will be collected for the purpose of developing a classification system based on lick type (i.e., dry vs. wet) lick size, trail network configuration, species use, and other variables relevant for classification. The classifications system will be used to design a guidebook on the type and size of buffers that should be used to protect these areas from surrounding land use activities.

Maria Cardinal - *Addressing Road Mortality of Stone's Sheep in the Sulphur / 8 Mile Project Area, Northeastern British Columbia*. The Sulphur / 8 Mile Stone's Sheep Project (www.synergyecology.ca/S8Msheep) is located within the Muskwa-Kechika Management Area of northeastern British Columbia. The project focuses on research addressing population demographics, habitat use and selection, herd health, and levels and causes of mortality of Stone's sheep (*Ovis dalli stonei*). The project area is bounded by the Alaska Highway (west and south) which runs through portions of Stone Mountain Provincial Park and Muncho Lake Provincial Park. Stone's sheep can frequently be observed along this highly traveled stretch of highway, making collisions with vehicles a likely mortality factor. Through our research we have found that a number of sheep frequently use the highway corridor and that common crossing points exist. As a result of their frequent use of this corridor, a number of sheep road mortalities have been observed. An outcome that we hope to achieve through our research is to help raise public awareness about this issue and to help implement management strategies that focus on reducing sheep-vehicle collisions in this area.