

CMI Annual Researchers' Meeting
April 27-28, 2006
Nelson BC

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to allow for correct pagination in the printed version.)*

Acknowledgements

The Columbia Mountains Institute of Applied Ecology would like to thank **Rachel Holt**, CMI Director, for performing the duties of Master of Ceremonies at the meeting. We are grateful for the time our **presenters and field trip leaders** took to prepare for and attend the meeting.

We would also like to thank the **Nelson and District Rod and Gun Club** for allowing us to rent their hall at a reduced rate. **Alligator Pie Catering** did a great job of feeding us!

Thanks go out to the **students from Selkirk College** who arrived early and stayed late to help with the set-up and take-down of the room.

And, of course, we'd like to thank the **CMI members and other participants**, who travelled from various towns in British Columbia and Alberta to attend the meeting.

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Meeting Description

Just over fifty people attended this year's CMI Annual Researchers' Meeting at the Nelson and District Rod and Gun Club Hall. The meeting began at 1:00 p.m. on April 27 with presentations all afternoon, and reconvened on the morning of April 28 for the CMI's short Annual General Meeting. Presentations continued through the morning. A hot lunch was offered at noon, and then groups departed on field trips.

List of Speakers:

(Not all speakers provided a summary for this document)

1. **Monitoring of grizzly bear population trend and demography using DNA mark-recapture methods in the Owikeno Lake area of British Columbia:** John Boulanger, Integrated Ecological Research
2. **Current issues in the Kootenay Fish and Wildlife Section,** Ministry of Environment: Garth Mowat, Ministry of Environment, Nelson
3. **Elk movement patterns in the Slocan Valley:** Leo DeGroot, Ministry of Environment
4. **Columbia Basin western skink inventory and assessment, 2005 results:** Jakob Dulisse
5. **Historic influence of the Mountain Pine Beetle on stand dynamics in Canada's Rocky Mountain national parks:** Tom Braumandl, Biome Ecological Consultants
6. **Recovery efforts for the northern leopard frog in British Columbia, 2001-2005:** Doug Adama, Adama Wildlife
7. **Profile of non-timber forest products in southeastern British Columbia:** Michael Keefer, Kootenays Forest Innovation Society
8. **Mount Revelstoke and Glacier National Parks Ecological Integrity Monitoring Program:** Sal Rasheed and Jen Theberge, Parks Canada
9. **Endangered forest of the west Kootenay: A pilot project in the Incomappleux and Trout Lake area:** Rachel Holt, Veridian Ecological Consulting, and Deb MacKillop
10. **Overview of Central Kootenay Invasive Plant Committee:** Juliet Craig, Coordinator, CKIPC
11. **A Rocky Road: Whitebark Pine restoration activities on the Continental Divide:** Brendan Wilson, Selkirk College
12. **Stewardship Outreach Initiatives:** Patrick Daigle, Ministry of Environment, Victoria
13. **Kootenay Community Bat Project - A community approach to bat inventory and conservation:** Juliet Craig
14. **Multi-scale habitat selection by wolverine in British Columbia:** John Krebs, Columbia Basin Fish and Wildlife Compensation Program
15. **Update on program activities:** Angus Glass, Columbia Basin Fish and Wildlife Compensation Program
16. **Field trips**

Presentation Summaries

About the Presentation Summaries

Presenters provided the following summaries. Contact information is provided for all presenters, along with an invitation to contact the presenters directly for more details about their work.

1. Monitoring of grizzly bear population trend and demography using DNA mark-recapture methods in the Owikeno Lake area of British Columbia

John Boulanger, Integrated Ecological Research, Nelson, BC
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Stefan Himmer, Arctos Wildlife Services, Crescent Valley, BC
shimmer@netidea.com

We used DNA sampling and mark-recapture modeling to estimate trend, population size, and the demographic response of a coastal British Columbia grizzly bear population to low salmon escapement levels from 1998-2002. We contrasted the demography of three sampling areas in response to temporal and spatial variation in salmon availability. Trend (λ) estimates from the Pradel model in program MARK suggested that salmon availability was too low in the first two years of the study to sustain bear populations. One of the sampling areas exhibited higher levels of salmon availability in later years of the study leading to increased rates of addition. Apparent survival rates increased in all areas potentially due to increased salmon availability. Joint interpretation of λ and superpopulation estimates allowed assessment of whether salmon availability levels were high enough to sustain current population sizes of bears on salmon streams.

This study illustrates how joint modeling of separate sampling areas can be used to assess spatial variation in population demography and trends as well as increase precision of estimates for individual sampling areas. It also illustrates how DNA mark-recapture can be used as a methodology to explore the affects of changes in environmental conditions on population demography and trend of grizzly bear populations.

Reference

Boulanger, J., S. Himmer, and C. Swan. 2004. Monitoring of grizzly bear population trend and demography using DNA mark-recapture methods in the Owikeno Lake area of British Columbia. *Canadian Journal of Zoology* 82:1267-1277. (Download at <http://www.ecological.bc.ca/references.php>)

2. Current issues in the Kootenay Fish and Wildlife Section

Garth Mowat, Senior Wildlife Biologist, BC Ministry of Environment, Nelson BC
garth.mowat@gov.bc.ca

The Kootenay Region is diverse in flora and fauna and issues in wildlife management cross the spectrum from endangered species conservation to more traditional management of game species. Cervid numbers have increased in most areas while bovid numbers appear similar through the recent past. This talk highlighted a few of the challenges in wildlife management in the Kootenay Region of British Columbia.

3. Elk movement patterns in the Slocan Valley

Leo DeGroot, Wildlife Biologist, BC Ministry of Environment, Nelson
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Rocky Mountain Elk (*Cervus elaphus nelsoni*), an indigenous ungulate species in the Kootenay region of British Columbia, are considered as problem wildlife by some residents due to the damage that they sometimes cause to gardens, orchards, and crops. Others place a high value on the elk for hunting, viewing, or simple aesthetic purposes. Wildlife managers are attempting to satisfy the differing sets of values, but have been lacking critical local behavioural and demographic information. We designed the Slocan Valley Elk Study to supply this missing information, so that management can focus on the problem individuals.

The Study was a joint project that began in the fall of 2002 and continued until the spring of 2005. It was funded primarily by the Habitat Conservation Trust Fund from the Arrow Wildlife Trust Account. The Ministry of Environment and the Columbia Basin Fish and Wildlife Compensation Program have also contributed funds. The Ministry of Environment has administered the project.

We captured fifty five elk over two winters. Sixteen elk were fitted with Very High Frequency (VHF) radio transmitting collars, eight with Global Positioning System (GPS) collars. The remainder plus the elk with VHF collars were also fitted with coloured and lettered collars for visual identification. We located the VHF collared elk weekly; the GPS collars were programmed to record locations several times daily. A system for the public to report sightings of the elk with the visual collars was set up, however little information was gained from this endeavour. All reported results are from the GPS and VHF collared elk.

Our results indicate that the elk winter at low elevations at or near the main valley bottoms and proximal to human settlement. Approximately 20% of the population remained at these low elevations all year. Another 25% of the population moved away from human settlement in April or May, and did not return until mid October. This movement was usually vertical but in some cases it was lateral. The remaining 55% traveled back and forth a number of

times during the summer season, but were usually away from human settlement from mid August until mid October. The maximum straight line distance traveled by an individual was 20 km; 5 – 15 km was a more common distance for the elk that did migrate. Their return date to their winter range was consistent and the average return date was October 10th. We found that the 1200 meter elevation contour was the best fit for separating the elk that migrated vertically and those that did not.

To provide a population estimate of the elk in the study area we undertook a winter aerial survey. This survey covered the complete study area below 1200 meters in elevation. We spotted 188 elk spotted including eight of the 43 collared elk. Two different mark – resight programs estimate the population at 923 and 1010 animals respectively. A sightability model was also used; it determined a population estimate of 362 elk. The large discrepancy in population estimates may result from a combination of the high vegetative cover over much of the study area, the lack of fresh snow, and the lack of complete snow cover. Former harvest levels were based on an elk population of 375.

Changes to the antlerless Limited Entry Hunt (LEH) within the study area have been proposed. A total elk population of 600 has been used in the allocation calculations. Proposed changes include limiting the hunt to elevations below 1200 meters and a higher harvest rate prior to October 10, a time when the non problem elk are generally at higher elevations.

4. Columbia Basin western skink inventory and assessment, 2005 results

Jakob Dulisse, Jakob Dulisse Consulting, Nelson, BC
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The western skink (*Eumeces skiltonianus*) is listed as a species of “Special Concern” by the Committee on the Status of Endangered Wildlife in Canada and is blue-listed (vulnerable or sensitive) by the British Columbia Conservation Data Centre. This presentation summarises an inventory and habitat assessment for this lizard at risk in the west Kootenays during the summers of 2004 and 2005.

Western skinks were located at 41 out of 91 sites surveyed. In addition to these surveyed locations, data compiled from other sources confirmed skinks at another 86 locations to make a total of approximately 127 known occupied sites within the project area. The easternmost records were for the Creston Valley and skinks were confirmed at many locations northward along Kootenay Lake as far north as Pilot Bay and Ainsworth. Vallican remains the northernmost confirmed western skink location in the Slocan Valley but the species may occur at New Denver and Roseberry. Western skinks are relatively common from Syringa Provincial Park, south along the Columbia River valley to the U.S. border and throughout the Pend d’Oreille River valley. At occupied sites, western skinks were the most commonly encountered reptile and they often co-occurred with northern alligator lizards (*Elgaria coerulea*) and rubber boas (*Charina botae*). Skinks were distributed primarily in low elevation dry forest and mixed grassland habitat. Important habitat components included sites

with warm aspects, loose soil substrates, and an abundance of cover objects, such as rocks with nearby grass, shrubs or woody debris.

The conservation of skink habitat is especially important considering the patchiness of suitable sites in many areas and the species' apparent lack of ability to move between habitats. Loss of habitat through development activities and forest in-growth are probably the two main threats facing the western skink in the study area.

Reference

To download Jakob's report on this project visit the web site of the Columbia Basin Fish and Wildlife Compensation Program "Reports" section at <http://cbfishwildlife.org/reports/> and type the keyword "skink".

5. Historic influence of the mountain pine beetle on stand dynamics in Canada's Rocky Mountain national parks: Tom Braumandl, Biome Ecological Consultants

Pamela Dykstra and Tom Braumandl. Biome Ecological Consultants Ltd. Nelson, BC
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The current mountain pine beetle (MPB) epidemic is exceptionally extensive and severe, with approximately 8.7 million hectares in the red-attack stage in fall 2005, and a cumulative impact affecting 400 million m³ of timber to date. Management actions, such as the salvage harvesting that will cover large areas of the MPB disturbance, tend to have an additive effect on disturbed ecosystems, removing or damaging biological legacies and delaying ecosystem recovery. Uncertainty about natural stand development leaves an absence of empirically-based direction in ecosystem management, such as how to continue to maintain stand and landscape function in landscapes subject to salvage harvesting, and what is the successional progression and the expected time to recovery in landscapes disturbed by mountain pine beetle.

This temporal scale suggests the need for a long term perspective to quantify ecosystem factors such as time lags in recruitment or persistence times of habitat elements. Under a policy of minimal disruption to natural processes, the ecological conditions in the Rocky Mountain national parks (RMNP) allow study of the natural process of stand development that follows disturbance by the mountain pine beetle. Repeated infestations of mountain pine beetle have occurred in the RMNP. As a result, the landscape is now composed of stands in different states of recovery from temporally spaced disturbance events.

The objective of this study was to establish baseline information on the ecological characteristics that occur at different stages of succession, resulting from mountain pine beetle disturbance at different time intervals. We presented our findings about stand conditions following two historic mountain pine beetle outbreaks events in the 1940's and 1980's.

6. Recovery efforts for the northern leopard frog in British Columbia, 2001-2005

Doug Adama, Adama Wildlife, Golden BC
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Confined to a single 400-hectare wetland in southeastern British Columbia, the southern mountain population of the northern leopard frog (*Rana pipiens*) is listed as “Endangered” by the Committee of the Status of Endangered Wildlife in Canada and protected under the federal *Species at Risk Act*. Recovery efforts underway since 2001 have included head-starting, reintroduction, habitat enhancement, and population monitoring.

During this five-year period, 10,147 *Rana pipiens* tadpoles (Gosner stage 30) and 14,487 *Rana pipiens* metamorphs were reared in captivity and released into the wild. Habitat enhancement has entailed channelization and vegetation control. In the final year of the project we documented successful breeding at two new sites of which one was “enhanced” the previous year. These results suggest that reintroduction can be a viable recovery method for pond-breeding amphibians, particularly when coupled with habitat enhancement. While these results are positive, the population remains extremely vulnerable and recovery efforts are confounded by the presence of the chytrid fungus, *Batrachochytrium dendrobatidis*.

7. The Kootenay Morel Case Study

Michael Keefer, Kootenays Forest Innovation Society, Cranbrook BC
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also Richard Winder and Tom Hobby.

Morels (*Morchella*.:Fr. ssp.) are widely known as being amongst the finest of wild fungal foods. In western North America, they are best known to fruit after wildfires. The summer of 2003 in the Kootenay Region of BC was characterized by intense heat, smoke from wildfires and a backcountry travel ban. As was expected, the spring/summer period of 2004 saw a major harvest of morels in the Kootenay region following these wildfire events.

There are many unanswered questions concerning the *Morchella* spp., and how the life cycle and ecology of this fungus interact with fire and other disturbances. This research used ecological and social survey methods together in order to gain scientific data and contemporary ecological knowledge as well as socio-economic data from the morel pickers. Following the data collection phase, data was entered into a standardized database that is being used for storing information from all the Canadian NTFP case studies being conducted through the Centre for Non-Timber Resources at Royal Roads University. Found within this paper are estimates of the total production and value of this morel harvest. Results from the ecological portion of this study indicate that morels fruit most prolifically in the mid - levels

of fire intensity. Morels were also documented to be fruiting in association with trees attacked by the mountain pine beetle (MPB).

The study confirmed that morels offer a significant yet largely cyclical economic opportunity that has the potential for further development in both the post – wildfire environment and in the areas of BC affected by the MPB infestation.

8. Mount Revelstoke and Glacier National Parks Ecological Integrity Monitoring Program:

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Parks Canada Agency has a legislated mandate to report on the condition of ecological integrity (EI) in national parks. This is accomplished by the State of the Protected Heritage Areas Reports and the State of the Park Reports. The State of the Protected Heritage Areas Report is developed every two years and is used to communicate the state of EI in the overall national park network. The State of the Park Report is developed every five years to identify the key ecological issues facing each individual park.

Data generated by park EI monitoring programs will be used as the basis for the State of the Park Report. Specifically, condition monitoring is aimed at answering “What is the state of park EI?”. Condition monitoring provides medium or long-term monitoring data for reporting overall park EI. It is summarized in 6-8 EI indicators which are comprised of a small suite of EI measures selected to measure ecosystem biodiversity, processes, and stressors. The monitoring program will track the current condition and trend of these measures.

Mount Revelstoke and Glacier National Parks (MRGNP) occur in the montane bioregion, which includes Banff, Jasper, Waterton Lakes, Kootenay and Yoho National Parks. Based on consultation and ecosystem models, the 6 bioregional indicators that all these parks will use to report out on the state of EI are: Terrestrial Ecosystems, Aquatic Ecosystems, Native Biodiversity, Geology / Landscapes, Climate / Atmosphere, and Awareness and Support for EI. For each of these indicators there is a suite of measures that will be collected and summarized. We will present a list of potential measures that might be used to report out against the 6 indicators for MRGNP. Through consultation and work with our provincial partners, MRGNP will develop an implementation strategy for developing these measures for their EI monitoring and reporting program.

9. Endangered forest of the west Kootenay: A pilot project in the Incomappleux and Trout Lake area Rachel Holt, Veridian Ecological Consulting, and Deb MacKillop

Rachel Holt, Veridian Ecological Consulting,

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Prepared for: Columbia Basin Fish and Wildlife Compensation Program *and* ForestEthics
March, 2006.

Within the Inland Temperate Rainforest, wetter portions of the Interior Cedar Hemlock zone are naturally dominated by old-growth forests. Old-growth forests can be defined in various different ways, including using age, development stage or structural attributes; but using a variety of criteria to rank the “old-growthness” of stands has been promoted (Franklin and Spies 1991) as a robust approach to assessing and ranking the values associated with individual stands.

In this pilot project we used an existing index of old-growthness to identify old-growth forests with “exceptional” conservation values (Holt and MacKillop 2002). This approach uses a number of different variables (including tree ages, tree and snag sizes, etc.) to identify those stands that contain unusual or extreme old-growth associated attributes. Potential high value stands were located and sampled for a variety of structural attributes and ages of trees. The old-growthness of these potentially exceptional forests was then compared to that of a larger sample of old-growth forests using data from a previous study (Holt and MacKillop 2002; MacKillop 2003).

This pilot study was limited in geographic scope – study areas were chosen from accessible areas within the Incomappleux drainage and within the Trout Lake and Upper Lardeau Areas. Nine different areas were sampled and data were summarised for individual sample sites within each area. A number of the areas sampled stood out as having exceptional old-growthness based on both age and stand structural values.

Outstanding areas include:

- a) The upper Incomappleux drainage from the McDougal / Incomappleux confluence (referred to as Battle Brook, North and West Incomappleux in this study) which contained some of the oldest (estimated between 1200 and 1500 year old) trees, and huge stand structures (many trees with 2 and 3m diameters at breast height). This area has additional conservation value because it is currently unfragmented by roads and is adjacent to the boundary of Glacier National Park. This area also has known locations of rare oceanic lichens (Arsenault 2004; Spribille 2002; 2004). This area is within Pope and Talbot’s Tree Farm License 23.

- b) Small, remnant areas located in the mid section of the Incomappleux drainage (areas referred to as Scott and Ruby Silver) which have very old and very large trees, and so have very high stand-level old-growthness. Their total conservation value is lower than the far end of the Incomappleux because they are located within a heavily harvested local landscape. However, they remain valuable as remnant patches of very old forest in this portion of the drainage. These areas have not been sampled for the presence of old-growth associated rare lichens. These areas are within Pope and Talbot's Tree Farm License 23.
- c) Trout Lake Private Land #1. This area is a relatively small area with very old trees (estimates range from ~800 – 1400 years old) and very large trees (up to 2.7m dbh). The location of this area increases its conservation value, as it is adjacent to a large low elevation wetland-lake complex that also has high biodiversity values. This area is private land and there is a conservation opportunity through application of a conservation covenant or similar tool.
- d) The Lardeau Alpha area is located on a small, narrow bench area adjacent to the Lardeau River (close to Ferguson). Two areas (~2 km apart) were sampled here: one in 2005 and another in a previous project (Holt and MacKillop 2002). Both sampled areas are located on Crown Land (Arrow Timber Supply Area) and were found to have high old-growth structural value (trees up to 1.9m dbh).
- e) Boyd Creek (a tributary of the Incomappleux) contains high value old-growth forests, which are not as large-structured or as old as some of the stands identified in this study. However, we also note that Boyd Creek is at higher elevation, in a different mesoslope position, and of a drier site series than the other stands sampled. Given these differences, it should not be expected to contain the same exceptionally large attributes as the wetter sites. We did find that some sites within the Boyd area contained unusually old hemlock trees (500 years plus) and old and large western red cedar trees (~500 – 800 years old and 1.8m dbh). This area remains of conservation interest even though it is not "exceptional" old-growth because of its old-growth trees (600 / 700 years old), its location as potential connectivity to the Westfall, and as value for mountain caribou recovery habitat. This area is within Pope and Talbot's Tree Farm License 23.

When assessed for combined stand and landscape level attributes, the upper Incomappleux areas and the Trout Lake Private Land #1 were given the highest old growth rating. Note however that the conservation values of these stands are based on a stand level assessment of their old-growthness and a landscape level assessment of their size and location. Many other factors can also contribute to conservation values (e.g. habitat values of particular areas), but these additional factors were not included in this assessment.

The strongest conservation opportunities exist for the Trout Lake private land area #1, which has the possibility of having some form of conservation covenant applied to it. This approach

would allow its attributes to be maintained while providing value to its present owner. Without this, the long-term future for this stand is uncertain.

Conservation opportunities for the areas located within TFL 23 (e.g. the McDougal/Incomappleux area and Boyd Creek) are currently poor, given current management regulations for crown land. Landscape planning does not differentiate between average old-growth of approximately 250 years in age and the exceptionally old and large structured forest identified in this project. Old Growth Management Areas, which are intended to maintain local biodiversity values within landscape units, are preferentially located outside the timber harvesting landbase (Province of BC 1999). Although not mandated by current policy, Pope and Talbot have suggested they may have an interest in deferring harvest in one of the sites identified in this study (Battle Brook), but have existing cutting permits and road layouts for other identified exceptional stands in the same general area (North and West Incomappleux). This entire zone (from the junction with McDougal Creek and the Incomappleux) makes a logical area for conservation since it contains exceptional old-growth values and is adjacent to the Glacier National Park boundary.

Boyd Creek remains relatively intact (at least in its upper portions) but conservation opportunities within the timber harvesting landbase remain very poor. There are no measures within provincial policy that encourage protection, or low impact harvesting. Harvesting to-date in this area has been clear-cut harvesting, which is incompatible with natural disturbance regimes in this forest type. Identifying exceptional areas within Boyd Creek as retention areas (e.g. as wildlife tree patches) and maintaining old-growth structures throughout any cutblocks (i.e. high level retention partial harvesting) would maintain some of the conservation values in this area, and may improve the value of the area for mountain caribou recovery habitat (Milt Hamilton pers. comm.).

Conservation opportunities for the Lardeau Alpha area, which is on crown land, are reasonable because the area lies between the road and the Lardeau River. Some of this stand would be maintained as part of the default riparian management requirements under the Forest and Range Practices Act (FRPA), although the whole stand would not be protected. We suspect that additional similar areas exist along the river on similar bench sites and should be protected under the discretion provided as part of FRPA.

In addition, we recognise that this pilot project did not locate all exceptional old-growth or high conservation value forest stands. A basic theming of potential areas where these forests may exist shows that other areas may remain. For example, relatively large potentially exceptional forests remain in the Incomappleux drainage along McDougal Creek, in Boyd Creek, above Menhinick and Scott Creeks, and above McRae Creek. These sites should be explored for exceptional old-growth values before additional important conservation opportunities are precluded. Very few potential sites remain in the heavily harvested Trout Lake study area, other than those sampled here.

Reference

Full report available at: www.veridianecological.ca

10. Overview of Central Kootenay Invasive Plant Committee

Juliet Craig, Coordinator, Central Kootenay Invasive Plant Committee
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Did you know that invasive plants have impacted the blue-listed western skink? Or that one of the largest rush skeletonweed infestations in the province occurs in the central Kootenays?

Invasive non-native (alien) plant species are brought to Canada, either accidentally or intentionally, and include species such as purple loosestrife, spotted knapweed, and common tansy, to name just a few. These plants are highly competitive because they produce large numbers of seeds, form deep taproots, or flower early. Because they arrive in Canada without their natural predators to keep them in balance, they can spread rapidly, forming dense patches over huge areas, and they have economic and ecological impacts.

The Central Kootenay Invasive Plant Committee (CKIPC) formed by concerned local citizens, land managers, and government and non-government agencies who share a common concern about the increase of non-native invasive plants in the Central Kootenays. The goals of the CKIPC include education, prevention, coordination, inventory, and information sharing. In its first year, the CKIPC carried out numerous projects to fulfill these goals.

Reference

Web site of the Central Kootenay Invasive Plant Committee
<http://www.kootenayweeds.com>

11.A Rocky Road: Whitebark pine restoration activities on the continental divide

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No summary available.

12. BC's Stewardship Outreach Research Initiatives

Prepared by Dr. Jenny L. Feick, Ministry of Environment, Victoria B.C.

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Presented by Patrick Daigle, Ministry of Environment, Victoria B.C.

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The Environmental Stewardship Division in BC's Ministry of Environment (MoE) initiated two outreach projects in 2005 that commissioned social science research to inform policy decisions and achieve stewardship objectives. These two projects were the ESD Stewardship Outreach Project and the Healthy Ecosystems Healthy People ActNow Project. In the Stewardship Outreach Project, an on-line staff survey and a pilot social marketing research project in the Okanagan Region informed the development of an outreach strategy and support materials for staff. The ActNow project used literature reviews, as well as phone and on-line surveys to investigate how to engage more people in doing outdoor stewardship activities that would both benefit the environment and individual volunteer's personal health and well-being.

Environmental Stewardship Division Stewardship Outreach Project

The results from a 2004 review of compliance with the Ministry of Water, Land and Air Protection's environmental requirements resulted in the Compliance Directive, which mandated ministry staff to undertake 30 hours per person per year of community outreach to promote voluntary compliance. Each individual was to have a goal related to outreach in their Employee Performance and Development Plan. By February 2005, the Ministry of Environment further re-enforced the ministry's re-engagement in stewardship outreach through a new goal in its Service Plan – British Columbians understand that they share responsibility for the environment.

In the spring of 2005, the Assistant Deputy Minister of the Environmental Stewardship Division initiated the Stewardship Outreach project to increase environmental stewardship and voluntary compliance among the division's clients and stakeholders, in others words, behaviour change. The project aim was to develop interim direction, support material and a strategic plan for developing effective outreach activities for the Environmental Stewardship Division. As the project manager, I established a project team and working groups to produce the four deliverables: assess outreach activities and materials, provide interim direction (one year), develop an outreach strategy (three-five years), and develop outreach materials.

In examining the literature in the field of outreach, research shows that information campaigns do not work in changing behaviour (McKenzie-Mohr and Smith 1999). Information is necessary but not sufficient to change behaviour. We need to be much more client-focused and to better understand the psychology of our clients and stakeholders. Everyone makes decisions for what seem like good reasons to them. By understanding better what our clients and stakeholders see as barriers to complying with ministry regulatory

requirements or engaging in stewardship and the benefits they think they derive from their current practices, we gain insights that help us design programs that reduce barriers and increase the incentives.

Information is sometimes a barrier, but often people know what they should do, they may even believe they should do it. But they're not doing it because of other factors such as peer pressure, convenience, cost, etc. The community-based social marketing approach involves conducting social science research to determine the barriers and benefits associated with a particular desired behaviour by a particular target audience. This could be anything from studying the barriers and benefits associated with various stewardship actions by private landowners to protect species at risk on their land, or voluntary compliance with the *Forest and Range Practices Act* by a forest company.

The Division Management Committee endorsed that community-based social marketing approach be used in developing the Environmental Stewardship Division Stewardship Outreach Strategy.

An important approach we took with the Stewardship Outreach Project was to listen to our staff. It's hard to say where you want to go within a strategy unless you know where you are, and what you need. So, rather than a top-down prescriptive approach, we based our outreach strategy on solid baseline information and a needs assessment from a survey of Environmental Stewardship Division staff conducted in October 2005, as well as the advice, feedback and suggestions provided by project team members and other staff. We respected the work that was already being done by staff and learned from it. The staff survey informed the strategy and will also help guide future development of outreach materials. Here are a few of the key results:

- Nearly 60% of Environmental Stewardship Division staff were aware of the ministry direction to have each employee spend approximately 30 hours per year on outreach;
- Approximately half of Environmental Stewardship Division staff (56.6%) have goals related to outreach incorporated into their Employee Performance and Development Plans;
- Awareness of the ministry outreach goal is lowest among auxiliary, co-op, seasonal and new full-time staff;
- Of those doing outreach, the majority already spend an average of 115 hrs/yr;
- Most respondents support maintaining or increasing the amount of outreach they do;
- Many expressed enthusiasm for the division's re-engagement in outreach.

Environmental Stewardship Division employees carry out a huge array of outreach activities. The most common activity cited was distributing printed outreach materials (54%). This was followed by two others, each that were named by 48% of the respondents – giving a talk or presentation to a small group, and providing advice or information to stewardship groups (48%). The least common outreach activities cited were developing and implementing a workshop or training session and developing on-line outreach materials, both of which were named by 26% of the respondents.

This is baseline information about what employees are already doing. It does not reflect what they think they should do, nor is what they think most effective.

Incidentally, among our staff who had done outreach in the 12 months prior to the survey, they spent on average 13.6 hours doing outreach activities. The average outreach effort of Environmental Stewardship Division staff using mean values demonstrated that employees who did outreach spent about 115 hours on those activities in the previous year, well in excess of the 30 hour minimum articulated in the 2004 Compliance Directive.

Staff also identified what they saw as barriers to conducting outreach activities. Not surprisingly, the major barriers that respondents said prevent them from doing outreach are time and resources. Staff said that with existing workloads they do not have additional time to spend on outreach. There are too many other priorities and key functions in their regular duties that get placed above outreach. Staff expressed frustration that positions and budgets devoted to extension were cut and now remaining staff are expected to add this function to their regular duties. Staff were also concerned that existing outreach materials are out of date but that there are no resources available to update them.

The absence of a formal approach or strategy for outreach was mentioned as a reason preventing some staff from doing outreach. Fifty-five per cent of respondents reported requiring direction on what messages to convey as a reason preventing them from doing outreach and 45% said they needed direction on which audiences to focus their outreach efforts. Many expressed confusion because of the reversals in direction on whether or not it was “okay” to do outreach.

In terms of their needs for outreach materials, staff considered an array of outreach materials to be useful to support their work in outreach. Sixty per cent indicated that they found printed outreach materials very useful or extremely useful. Half said that online databases, interpretive media and online outreach materials were very or extremely useful. Staff pointed out that the usefulness of different types of outreach materials depended on the issue and audience being addressed.

Staff also provided feedback on their outreach needs. Developing a database of existing outreach materials that staff can adapt to their specific needs was the item with the most responses as both high and medium priority (40.5% and 42%). The action most staff identified as a high priority was developing clear direction on appropriate division-wide messages (51% high, 30% medium). Another important item was to develop clear direction on how to determine priority target audiences for outreach (42% high, 34% medium).

Researching barriers to voluntary compliance and shared stewardship among Environmental Stewardship Division’s clients and stakeholders was identified as a high priority by 39% of staff and as a medium priority by another 34%. Seventy-one per cent of respondents said providing professional development training in outreach methods was a high to medium priority.

A pilot project conducted in the Okanagan Region by the South Okanagan Similkameen Conservation Program, a partnership involving 35 organizations, including all levels of government, First Nations, academic institutions, and NGOs, also informed the strategy development. Bryn White, of Okanagan College, co-ordinated a project which applied the community-based social marketing approach to grappling with how to effectively use outreach as a tool to protect species and ecosystems at risk, which in the Okanagan Region, are primarily affected by private landowners, urban development, and orchard and vineyard expansion. The South Okanagan Similkameen Conservation Program hired the Institute for Media, Policy, and Civil Society, a Canadian charitable organization based in Vancouver, to conduct social science research on residents in the South Okanagan. Conclusions drawn from this pilot project include:

- Awareness about species and the environment, especially species at risk, is extremely low among residents of the South Okanagan;
- In terms of credibility, scientists and conservationists are credible messengers, as long as they are moderate in tone and “armed with facts”;
- “Okanagan Pride”: the unique nature of the South Okanagan is extremely salient. “Quality of life”, “unique in Canada” and “future generations” are all powerful drivers to motivate residents to care about local native species and ecosystems.

The Institute for Media, Policy, and Civil Society provided the following recommendations to SOSCP, based on the research:

- Help residents first learn about and “fall in love” with the unique species and ecosystems here;
- Do NOT campaign against vineyards or orchards. Residents view them as an intrinsic part of the natural environment they love;
- Give residents something simple to do – like an “adopt-a-plant” project;
- As more people become aware and concerned, draw them in further, educate them about threats, and offer tiered levels of engagement;
- Consider “trickle-up” programs that reach out to children first, then their parents;
- Consider reaching out to businesses for sponsorship of such programs, or for employee participation.

Healthy Ecosystems Healthy People ActNow Project

The BC Ministry of Health ActNow Program is a partnership between the Ministry of Health and other ministries to help achieve the BC government goal to lead the way in North America in healthy living and physical fitness. The Ministry of Environment’s Environmental Stewardship Division has several ActNow projects, all of which support the health goal as well as the other BC government goal to lead the world in sustainable environmental management. The project I manage is called Healthy People Healthy Ecosystems.

The Healthy People Healthy Ecosystems ActNow Project promotes the link between taking care of the environment while also taking care of one's own health by getting involved in doing outdoor stewardship volunteer work. Stewardship initiatives, such as ecological restoration, monitoring, clean-up efforts, or invasive species eradication, can foster healthier lifestyles as well as healthier ecosystems.

The first phase of the project (Jan – April 2006) focused on research. We conducted social marketing research to determine barriers volunteers perceive to engaging in participation in outdoor stewardship activities, and identified effective incentives for volunteering. In the second and third years (2007/08) we will apply research results to increase stewardship volunteering. The following types of research were carried out:

- Literature review on motivations, barriers and priority audiences associated with volunteering with stewardship organizations (by graduate student Ronnie Wahl of UBC);
- Phone survey with 81 stewardship groups to establish a baseline of information regarding the issues around engaging more volunteers in outdoor stewardship activities (by consultant Angela Smailes);
- On-line survey conducted with 260 members of the stewardship groups previously surveyed (by project manager Edwin Hubert);
- BC-wide phone survey to help develop profiles of potential target audiences, i.e. where to focus outreach efforts to achieve increased participation (by Institute for Media, Policy, and Civil Society).

Findings From First Year HEHP ActNow Project Research

Of those who participate in outdoor stewardship activities and rated their health compared to others their age, 90% rated their health at good or better than good (good - 27%, very good - 38%, excellent - 26%). Nine per cent of respondents rated their health as fair; one as poor (n=175).

Little research exists on demographics of who volunteers for stewardship work. An interesting trend is that more people volunteer the older they get.

- Of the 18-24 year olds, 70% were students, 80% were female (n=10).
- Of the 25-34 year olds, 63% were full-time employed and 20% were students, and 73% were female (n=15).
- Of the 35-44 year olds, 52% had children under the age of 18, and 80% were females (n=21).
- Of the 45-54 year olds, 40% had children at home, and 58% were female (n=39).
- Of the 55-64 year olds, 40% were retired, 32% were full-time employed, and 47% were female (n=53).
- Of the 65+ year olds, 91% were retired, 40% were females (n=33).

From the on-line stewardship membership survey, we also found that: 80% don't have children under the age of 18 (n=167); 32% are full-time employed, 31% retired, 15% self-employed, 9% part-time employed, 3% unemployed, 6% students, and 3% stay-at-home parents, and there is no strong trend on household income; instead there is a wide range of incomes.

In terms of the different types of people who volunteer for stewardship groups, researchers categorized them as follows:

- The Friends - being influenced or invited by one's friends or peer group is a mechanism that often leads to participation in volunteer groups. The on-line membership survey confirmed this, showing that 85% of people participate with friends (n=200);
- The Helpers - people who have a helping disposition;
- The Enjoyers - people who enjoy spending time in natural areas and local green spaces. Again, the on-line survey showed that 93% of volunteers are motivated by being active in the outdoors (n=224);
- The Sleepers - those people who belong to a stewardship group, but who do not actively participate in its activities, and those who were once active, but for whatever reason discontinued their participation.

The research also revealed both incentives to volunteer as well as barriers to volunteering as identified in the table on the following pages.

Incentives for Volunteering	Barriers to Volunteering
<i>Altruism</i> – want to help community, environment, etc. (from lit review)	<i>No feeling of personal achievement</i> (from lit review)
<i>Self-interest or egoistic motives</i> – derive personal benefits (from lit review)	<i>Burnout</i> (from lit review) ¹
<i>Learning Opportunities</i> - (from lit review & on-line survey) 42% of respondents want more training, and 26% of respondents would like their skills/expertise better used	<i>Disorganization</i> and lack of management in the group (from lit review). 19% of respondents want better organized events (n=186)
<i>Social</i> - making new friends, interacting with others, feeling part of a larger group or community (lit review & on-line survey)	<i>Capacity Issues</i> - group lacks resources, e.g. funding, technology, & adequate volunteer support (from lit review)
<i>Career development and recognition</i> (from lit review & on-line survey)	<i>No pay-back</i> - unable to fulfill the self-interested needs they hold for volunteering (from lit review)
<i>Improve environment</i> - 100 % of people doing outdoor stewardship activities are doing it to support healthy environments (n=224) and 97% are doing it to solve an environmental problem (n=224) (on-line survey)	<i>Lack of recognition</i> - feeling unrecognized or unappreciated by the group or larger segments of society (from lit review) ²
	<i>Time away from family</i> - 49% of people with children under the age of 18 would like to bring their children along; 75% say time away from the family keeps them from volunteering (n=36) (on-line survey)

¹ This was not the case for people surveyed on-line - only 13% of volunteers reported feeling like they were doing too much volunteering, and 35% that they were doing too little volunteering (n=238)

² Again, not the case for people surveyed on-line.

13. Kootenay Community Bat Project - A community approach to bat inventory and conservation:

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Half of all bat species in British Columbia are considered vulnerable or threatened. The Kootenay Community Bat Project was initiated in 2004 (as the Slocan Valley Bat Project) as a community approach to bat inventory and conservation. This project promotes education and awareness of bats, identifies bat roost sites (particularly on private land), assists landowners with roost conservation planning, and involves community members in monitoring bat populations. Extension activities include numerous press releases, bat-house building workshops, interpretive programs and public mist-netting nights.

Residents are encouraged to report their bats so that Project biologists can visit their roost sites, identify species present, and discuss and address their issues. As well, they provide strategies to conserve and enhance roosts, and encourage residents to monitor their bat populations.

In the past two summers, over 180 roost sites (including 95 maternity roosts) have been identified for seven species of bats. Among these roosts are two maternity colonies for the threatened Townsend's big-eared bat (*Corynorhinus townsendii*), including the largest known colony in the region and a unique colony living within a resident's living room. In 2005, an "Annual Bat Count" was initiated to begin long-term data collection.

One of the greatest values of this project is the education and awareness component that is integral to each of the project activities. As a result of this project, residents are conserving bats and their roosts, and collecting unique and valuable data that contributes to the understanding and conservation of local bat species.

14. Multi-scale habitat selection by wolverine in British Columbia

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Eric Lofroth, Biodiversity Branch, Ministry of Environment, Victoria, BC

Ian Parfitt, Selkirk College Geospatial Research Centre, Castlegar BC

Wolverine (*Gulo gulo*) distribution in British Columbia includes multiple use lands where human use and resource extraction may influence habitat selection. We evaluated seasonal habitat selection by resident adult wolverine using radio telemetry locations from two multiple-use landscapes in British Columbia. Sex and season-specific univariate and multivariate analyses were conducted for each study area using terrain, vegetation, prey and human use variables expressed at three spatial scales. Results varied between study areas due

to differences in terrain and human use. Males used forested environments at elevations <1500 m during winter, and avalanche paths and riparian areas at higher elevations during summer. Females used rugged, higher elevation (< 2000 m) broad forested landscapes during winter, shifting to alpine and treeline areas during summer. Prey variables provided explanatory power in 1 of 4 winter models. We expected negative habitat associations between human use variables and wolverine, however male wolverine were positively associated, and females neutral with roads in winter. Winter recreation variables (snowmobiling, backcountry skiing, and helicopter skiing) also were not strong predictors wolverine habitat selection. Descriptive terrain and vegetation variables at multiple scales best discriminated used and available landscapes in our study areas. Our spatially explicit models can be used to support conservation planning for resource extraction and tourism industries operating in wolverine habitat.

15. Update on Columbia Basin Fish and Wildlife Program Activities

Angus Glass, Communications, Columbia Basin Fish and Wildlife Compensation Program
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Angus provided an overview of the projects underway at the Columbia Basin Fish and Wildlife Compensation Program. More information including reports on past projects is available at: www.cbfishwildlife.org.

16. Field Trips

Cottonwood Creek

Eileen Pearkes led this trip to view restoration work on Cottonwood Creek, located right beside the Rod and Gun Club Hall. The group walked the length of the creek from the falls to the mouth, exploring challenges to this urban restoration project and viewing some of the first changes that have been made. This is a joint project by the Cottonwood Creek Restoration Committee, the Nelson and District Rod and Gun Club, and students from Selkirk College. This undertaking demonstrates how a restoration project can create connections between science and the community.

Sproule Creek

Steve Arndt, of the Columbia Basin Fish and Wildlife Compensation Program, led this field trip to look at rehabilitation work. Sproule Creek is a small tributary of the West Arm of Kootenay Lake used by rainbow trout and longnose dace. A culvert under the highway was impeding access to the creek for fish from the lake, and the habitat in the lower reach of the creek had been degraded because of straightening for road construction. The group viewed large rock clusters and rock weirs that were used to improve habitat diversity in the degraded section, and viewed work done at the culvert outlet that has improved fish passage. The creek was in freshet conditions.

For more information on this project, go to www.cbfishwildlife.org , click on “Reports”, and use “Sproule” as the keyword.

Tour of laboratory at Wildlife Genetics International

Dr. David Paetkau took participants on a tour of his laboratory in Nelson. Dave’s web site is at: <http://www.wildlifegenetics.ca/> .