Abstracts

CMI Annual Researchers' Meeting
Senior's Centre, Nakusp BC
April 28, 2004

1. West Kootenay Fish Habitat Restoration: Progress Reports on Sproule and Blueberry Creeks

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Dam construction in the West Kootenay has resulted in blocked migration routes to historical spawning areas, and substantial losses of stream habitat due to impoundment. Other development activities, such as road construction, have also contributed to fish losses. One way of attempting to compensate for these losses is to restore and enhance remaining stream habitats. Starting in 1998, the CBFWCP has partnered with other organizations to restore fish passage in Sproule and Blueberry Creeks, and to rehabilitate fish habitat in a channelized section of Sproule Creek. This presentation will provide an update on the success of these projects. The work on Blueberry Creek has been remarkably successful. Migratory rainbow trout were observed spawning in the upper reaches in 2003, confirming that fish access has been restored to 26 km of stream habitat. A conservative estimate of the rainbow trout spawning run in this system was 2,000 fish in 2003. In Sproule Creek, passage through a highway culvert has been verified, and densities of juvenile trout have increased two- to six-fold in sections where structures were added to increase habitat diversity. The support and assistance of community groups has been very important to the success of these projects.

2. A Survey of the Status of the Western Toad (*Bufo boreas*) in Mount Revelstoke and Glacier National Parks

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The status of the Western Toad (*Bufo boreas*), and other amphibian species in Mount Revelstoke and Glacier National Parks has not been evaluated since 1982/83. Designated as a "species of special concern" by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) in November 2002, the Western Toad is also a candidate for endangered species status in the USA.

In order to gauge the current status of the Western Toad in the parks, an amphibian survey was completed in the spring and summer of 2003. Data was collected from approximately 50 different potential breeding sites, including a census of all amphibians present, predators, wetland morphology, vegetation, weather, water temperature and basic chemistry, UTM coordinates and elevation. The results will also be used to help design a long-term monitoring strategy that will facilitate regular evaluation of the status of the parks amphibians.

Preliminary results indicate that all four previously identified amphibian species are still actively breeding in the parks, however, there is evidence that toads may no longer be successfully breeding in important habitats beside the Trans Canada Highway, or at high elevation in Mount Revelstoke Park. An additional species, not previously thought to exist in the area, was found in at least three locations in Mount Revelstoke Park. The Coeur d'Alene Salamander (*Plethodon idahoensis*) is also a COSEWIC "species of special concern", and its presence in the area is an exciting find.

3. Understanding & Predicting the Hydrological Effects Of Fire In Watersheds

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In 2003, over 104 000 ha in the Kamloops Fire Region were burned in one of the worst urban-interface fire seasons on record. This exceptional fire season raises questions on the hydrological effects of fire. Research shows that the hydrological response of watersheds to fire is highly variable: some show little response to fire, while others show dramatic increases in streamflow, stormflow, and sedimentation. This talk will try to explain the reasons for the variable effects of fire and show the extent to which hydrological effects can be predicted. The effects of fire will be traced through the controlling environmental variables of weather, fuel characteristics, litter, and soil conditions. Particular emphasis will be placed on the role of fire-induced water repellent soils in increasing the risk of overland flow. The talk will be illustrated by examples from the Okanagan Mountain Park.

4. Inventory and Habitat Assessment of Great Blue Herons in the Columbia River Basin

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The interior subspecies of the Great Blue Heron (*Ardea herodias herodias*) is provincially blue-listed because of vulnerability to habitat loss and disturbance associated with development in prime breeding and wintering habitats. Valley bottom riparian and wetland areas in the Columbia River Basin represent key breeding and wintering areas for this subspecies. From 2002-2003, a comprehensive heron breeding inventory and habitat assessment was conducted within the BC portion of the Columbia Basin. As part of this initiative, a large-scale public awareness campaign generated heron sighting information from over 300 contributors throughout the basin. These locations were visited during the inventory, and information provided by the public was invaluable to its overall success. Numbers of active and successful nests, reproductive success, habitat characteristics, as well as disturbance and ownership status were determined for all breeding sites. A total of 32 breeding sites (20 active/12 historical) were found, and 24% (4 of 17) and 6.3% (1 of 16) of active sites failed in 2002 and 2003, respectively. Breeding site failure and low reproductive success at some sites was attributed to Bald Eagle predation and human disturbance. Sites had from 1-86 active nests (mean $\pm$ SE = 16.6 $\pm$ 3.6), and a total of 260 and 289 active nests were tallied during 2002 and 2003, respectively. Comparison of these results with those of a 1982 heron breeding survey suggest that although total numbers of active nests have changed little in the basin, average colony size (mean $\pm$ SE = 35.0 $\pm$ 7.9 in 1982 versus 16.6 $\pm$ 3.6 in 2002/2003) has decreased substantially. Breeding sites are primarily in mature and old forest structural stages with high canopy closure, and close to half of all sites are in pure coniferous stands. In 2002-2003, six breeding sites account for $\geq$80% of all active nests in the basin and >50% of breeding sites are located on private land. The potential implications of these results are explored, and based on initial findings, a stewardship brochure for landowners and land managers is developed. General and site-specific recommendations for conservation, management and monitoring of herons and their habitat are provided.

Note: The 2003 project report is available on the CBFWCP website (www.cbfishwildlife.org); the 2004 report will be available by late April.

5. The Selkirk Geospatial Resource Centre: Putting the Kootenays on the Map

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After several years of effort and through the work of many Kootenay people, Selkirk College was awarded over $1.5 million in innovation funding to develop the Selkirk College Geospatial Research Centre (SGRC) in the spring of 2003. The funds were primarily earmarked for state-of-the-art GIS, remote sensing, and relational database software and hardware. The vision of the SGRC is to provide geospatial research, education, and application development opportunities to the people of the Kootenay-Columbia region. By January 2004, the primary teaching facility had been constructed at the Selkirk Castlegar campus and the first intake of students for a new advanced diploma in GIS program had begun the first courses of their 12 month program. Several short ArcGIS courses and two major professional development courses, one focussed on sustainable forest management and the other on meteorology, snow science and avalanche forecasting, were provided in the fall of 2003 under the auspices of the SGRC, and a course in Natural Hazard Mapping will be offered in

May of 2004. Several research projects are underway in avalanche forecasting and resource data management.

The SGRC currently has three full-time instructor/researchers, 5 part-time instructors, and several associates. This facility and critical mass of research professionals provide an incredible spatial research and education opportunity for the region. The SGRC is proposing to develop a professional development GIS course (or courses) for biologists and ecologists. We would also like to develop new research initiatives in partnership with local consultants and agencies. In conclusion, Bring it On: get involved in the SGRC and together we can map out an exciting future right here in the Kootenays.

6. An Introduction to OUC's New Species at Risk and Habitat Studies Centre (SARAHS)

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OUC has recently received funding from The Canadian Foundation for Innovation for The Centre for Species at Risk and Habitat Studies (SARAHS). These funds will be matched by other agencies to a total of $2.2 M and further funding is anticipated as part of the UBC transition. Infrastructure requested to support SARAHS includes the purchase of molecular equipment as well as the development of GIS, molecular genetics and physiology labs, which will significantly expand the research potential at OUC in the area of conservation biology. The centre will support OUC faculty from five different departments as well as numerous partners throughout the valley, including CMI. The main emphasis of the centre will be to integrate information (using GIS and modelling approaches) from different ecological levels (ranging from the molecular to the landscape levels) of various populations in the Southern Interior.

7. Midge Fossils as Indicators of Past Climate Change in Southern British Columbia

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Over the past decade, a series of midge palaeoecological studies have been conducted in southern British Columbia. Surface sample surveys of the modern fauna reveal that aquatic midges (principally Chironomidae) are potentially sensitive indicators of both lake water salinity and summer temperature. Altitudinal transects indicate that species turnover is especially high near alpine tree-line; thus, alpine and upper subalpine lakes provide potentially sensitive sites for the assessment of past climatic change.

The palaeotemperature reconstructions from alpine/subalpine sites in the southern interior of British Columbia indicate a rapid climatic amelioration ca. 9500 BC, reaching peak summer temperatures (about 3°C warmer than present) ca. 9000 to 5000 BC, during the postglacial summer solar insolation maximum. Summer temperatures subsequently declined, reaching near modern values ca. 3000 to 1000 BC. Similar analyses are currently underway elsewhere in the Cordilleran region.

Low-elevation saline lakes are also regarded as climatically sensitive sites. Palaeosalinity records from three lakes have been completed. Comparisons with diatom records indicate an excellent correspondence between diatom and midge inferred salinities. Regional comparisons of palaeosalinity records, however, reveal a lack of correspondence among sites. The effects of local hydrological changes seem to dominate, preventing good assessments of postglacial regional trends in evaporation/precipitation balance.

8. Mechanisms for Producing High Precipitation and Runoff Events in Southern BC

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The precipitation patterns in southern BC are examined with focus on extreme events. These events may trigger hazardous conditions in the mountain regions such as glacial outburst floods, avalanches or trigger floods and debris torrents that damage roads, rails and fisheries and may create a serious hazard to the public, if not adequately forecast and taken seriously. In the winter high snowfall events create conditions where travel by animals such as Caribou may be hindered and limit their survivability through the winter. The most important weather patterns producing high precipitation events are discussed and examples of impacts are provided. Current methods used to improve forecasting such rainfall and snowfall events are summarized, such as new Doppler radars, satellite-based microwave sensors, lightning, wind sensors and computer modeling. The use on the forecast desk of pattern recognition to improve short term warnings for high precipitation events is identified. Recent trends and fluctuations of precipitation, temperature, and runoff are compared to local glacial balance to understand impacts in the mountains on a basin-wide scale. Causative factors are examined with the aim to better understand yearly or decadal patterns which may control atmospheric blocking patterns over Southern British Columbia. Finally, longer term impacts on precipitation are reviewed for global warming expected from increasing greenhouse gas concentration in the atmosphere.

9. Deer and Elk Habitat Use in the Temperate Interior Mountains of North America

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Little research on ungulate habitat use has been conducted in temperate mountainous areas of the interior. We described deer (*Odocoileus* spp.) and elk (*Cervus elaphus*) seasonal movements and habitat use in the temperate mountains of southern British Columbia to define winter range and, compare its extent with other seasons. We measured habitat selection during the late winter deep snow period, because this season probably limits deer and elk density in interior areas. Radio-collared mule deer (*O. hemionus*) and elk used summer/fall ranges that were 1,000–1,400 m higher than late winter ranges. Movement distance between summer and winter ranges varied from 3–50 km for deer and 16–63 km for elk. Twenty-six to 34% of deer locations occurred in areas of open vegetation cover each season except for late winter (19%), with remaining use in mid to late seral forest. Sixty-six to 83% of elk locations were in open stands in each season. Snow track transects conducted during late winter suggested that deer selected Douglas-fir (*Pseudotsuga menziesii*), cedar (*Thuja plicata*) - hemlock (*Tsuga heterophylla*), and deciduous – leading stands over pine (*Pinus* spp) and larch (*Larix* spp) – leading stands, and elk selected all forested stand types over larch. Deer avoided areas with >40 cm of snow, and elk areas with >50 cm, and we suggest snow depth limited the extent of late winter range use due to the increased costs of mobility in deeper snow. Late winter snow depth was positively related to elevation and negatively related to slope and solar radiation (hours/day), all of which can be obtained from existing databases and used to map mid-winter snow depth. The snow depth model can be used to map potential winter range regardless of current vegetation cover. During late winter in forested sites, deer selected older forests and stands with greater amounts of Douglas-fir in the overstory. Elk showed less selection for greater amounts of Douglas-fir and selection for younger stands. Older stands are probably selected because they have lower snow depths while mature Douglas-fir trees offer more litterfall forage than other trees. Both deer and elk also used areas with little canopy during late winter, likely to acquire browse. We suggest it is important to consider both forage production and snow interception in habitat management during because winter energy budgets are a balance between nutrient intake and the cost of locomotion.

10. A Framework for Monitoring Biological Diversity Using Three Scales of Indicators.

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Two years ago at the CMI Annual Researcher's Meeting I presented a method of monitoring biodiversity using the Arrow Forest District as a case study. There were 3 levels of analysis: 1) ecological representation - that is, quantifying the proportion of each ecosystem type that is not subject to forest management. Representing a portion of each ecosystem type in an "unmanaged" state is an important conservation strategy because it helps to maintain the many species that are too poorly known to manage individually, while acting as a safeguard against mistakes in managing for species that are well-known. Unmanaged land also provides areas for some unsalvaged natural disturbances and their many associated species; 2) the second level was to compare habitat attributes (e.g., snags and downed wood) between managed and unmanaged areas, to help ensure that unmanaged areas truly contain similar attributes relative to managed

areas; 3) the finest scale was to measure indicator organisms, to help test whether the 2 coarser levels were meeting their intended objective. However, when I presented two years ago, no data were presented for this third level. I will briefly review the results of the first 2 levels of analysis, and present new results from the third, finest scale.