

President's Report

By Mike Fenger

The Annual AGM is a good opportunity to reflect on our accomplishments and set some goals for the future. We were extremely fortunate this year to have Dr. Tory Stevens, Protected Areas Terrestrial Ecologist, BC Parks provide the FER guest lecture: "Protected Areas, Climate Change and the Path Forward". We feature her presentation to the FER AGM in this issue of the *LOG*.

What is the purpose of Ecological Reserves? The Ecological Reserves legislation protects representative and unique ecosystems of British Columbia and to have these serve as natural benchmarks, research areas, educational resources and repositories of genetic materials and geologic features. The Ecological Reserve system, in concert with other elements of British Columbia's protected areas system and resource management regime supports protection, study and understanding of ecosystems, their resiliency, ecological

processes and natural elements.

The Friends of Ecological Reserves published its first newsletter in 1981 so we are a three-decade old volunteer organization working with Ministry of Environment. Our Mission Statement is "to support the role of Ecological Reserves in furthering understanding of natural processes and human interactions in ecosystems".

The FER strategic plan provides a convenient framework for an annual review and some strategic direction for the year ahead. The FER Board meets monthly so the direction for the up coming year will be debated and refined at these meetings.

FER activities March 2009 to March 2010 and possible directions for 2010-2011.

Goal 1: To support the protection and management of a strong ecological reserve system through a strong warden program, systematic inventory and monitoring,

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Help BC Breeding Bird Atlas Back cover

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The Log

Spring/Summer 2010

The LOG is published 2 times a year by the Friends of Ecological Reserves to promote the establishment, management and maintenance of Ecological Reserves in British Columbia. *The LOG* is distributed to members, volunteer wardens, affiliates, supporters, government, friends and the enquiring public.

The views expressed in this newsletter are not necessarily those of the Friends. Articles for publication are invited. The deadline for submissions for the Autumn/Winter issue of *The LOG* is October, 2010.

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President's Report (Cont'd.)

timely assessment of reserves and an effective government presence, especially where ERs are most at risk.

- › FER has set, as a long term goal, to have a volunteer warden for each of the 147 Ecological Reserves.
- › A summer meeting with Tory Stevens resulted in closer collaboration between FER and MOE on maintaining a current wardens' list. Last year we knew that the FER wardens' list was not up to date. Happily it is in much better condition this year thanks to coordination and communications with area supervisors managed by Judy Millar and Tory Stevens. FER uses the wardens' list to communicate with ER wardens and mail or e-mail this newsletter the LOG. We rely on MOE for information on warden recruitment and changes in wardens.
- › The response to our request for ER-specific information and wardens' reports has improved and these are going to "Wardens' Field Notes" on the FER web site. Information we receive is being posted relatively quickly by Tom Gillespie who has taken on the duties of web master. Regionalization of ER information by MOE as a result of the discontinuation of the ER program, decreased both public access and FER access to information.
- › A request was made to the ER wardens to update information on all ERs. Wardens who found time to supply informa-

tion have shared it with MOE (Tory Stevens) who is in the process of collating ER warden information with that supplied by Area Supervisors.

Possible directions for 2010 -11

- › Eva Durance and Judy Millar have been scoping the possibility of a regional wardens' meeting this year but this will likely not happen in the spring as hoped.
- › We will continue to seek greater involvement from ER wardens and hope to receive ER-specific information that we can share through FER web site.
- › We look forward to the better ER-specific information base being compiled by MOE and will continue to support getting ER-specific information and making it accessible on the web.

Goal 2: To support the study of ecological reserves that builds understanding of ecosystem resiliency, ecological processes and natural elements.

- › Sadly we did not have funds for research to distribute this year. Long-term funding that did flow through FER last year, has not been offered again. As a Non-Government Organization, FER has used its non profit charitable status to provide tax receipts to third parties who make donations to support natural areas research.
- › FER provided bridge funding to the Vicky Husband Scholarship as it transitioned to an endowment fund. This

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Battling Broom on Trial Island ER

By Matt Fairbarns

Trial Island is an ecological gem and hosts a great number of rare species and ecosystems. The upland meadows, maintained free of native trees and shrubs by a combination of summer drought and winter winds, support many endangered species including Golden Paintbrush, Seaside Bird's-foot Lotus, Bear's-foot Sanicle, Coastal Scouler's Catchfly, Dense-flowered Lupine and California Buttercup. Unfortunately, the meadow environments also seem to provide a fine home for many alien invasive species, including Scotch Broom, Gorse, Spurge-laurel (*Daphne*) and English Ivy. Over the years, many groups have done their best to combat these invasive shrubs with varying success.

One of the first attempts to control Scotch Broom, was a spectacular failure. Loppers were used to shear off the shoots just above the roots. At first, the cleared meadow looked spectacular. Unfortunately, by the following spring, the cut stubs had swollen with scar tissue and had produced abundant new branches. Instead of controlling Scotch Broom, the work crew had just produced an astonishing example of "deep topiary". Attention wandered, and the Scotch Broom infestation on Trial Island appeared to have been forgotten.

In 2003, while I was studying rare plants on Trial Island, I decided to take a shot at the Scotch Broom on my own.



A volunteer crew ready to head home after a tiring day on Trial Island

Using secateurs and loppers, I started to clear plants from a small meadow area in the communications lease adjacent to the Ecological Reserve. I was careful to cut the broom plants just below the root crown checking the cuttings to make sure that there were at least a few root hairs at the bottom to confirm that all of the stem material had been removed. After several days, I had managed to remove every broom plant I could find through a small, but heavily infested area of about 500 square metres.

That autumn, Shane Ford and I cleared Scotch broom from another small area using a weed wrench, but I was unhappy with the damage the weed wrench did to the soil and decided to stick with secateurs and loppers. We also removed a single large gorse

plant but that required a shovel, saw and mattock. Over the next couple of years we slowly chipped away at the problem, but made little headway.

In 2005, Todd Kohler and I prepared a plan to control invasive shrubs on Trial Island, using the Decision Support Tool produced by the Garry Oak Ecosystem Recovery Team. We were able to persuade the federal government to commit some funds from the Habitat Stewardship Program to start implementing the plan in 2006.

A crew, led by Todd, was hired through the BC Conservation Corps and BC Parks provided boat access to Trial Island for an intensive two-week period of broom bashing in the Ecological Reserve and adjacent communications lease. Canada Coast

Continued on page 4

Guard joined in the fray, supplying a boat to carry a volunteer crew of twelve over for a major broom attack that autumn.

The Habitat Stewardship Fund has continued to support the project in 2006-2009 and BC Parks has provided the work crew with boat access to the island each year. Canada Coast Guard provided boat access for volunteers in 2006-2008. By the end of 2008, it was hard to find a single flowering broom plant anywhere on Trial Island. We have also removed a number of other invasive shrubs including Gorse (there were only a handful of mature plants but they were very difficult to control) and Spurge-laurel (which is increasing rapidly throughout nearby areas of Oak Bay and Victoria). English Ivy has been very difficult to control, but we have eradicated isolated "colonies" throughout the meadow areas and pushed back the edges of the major infestations. Occasionally we run into oddities such as non-native yews, cotoneasters and privet.

In a place like Trial Island, which is strewn with rare plants, we must take great care to ensure that "broom-bashing" doesn't turn into "endangered species-bashing". I have helped the crews by marking out no-go areas where invasive shrubs had to be removed by specialists familiar with the rare plants that occur there. Crew chiefs including Todd Kohler and Chris Barrett have kept a close eye on the crews to make sure that they worked around endangered plants.

What's the prognosis? Scotch Broom is a tough customer – it produces enormous volumes of seeds, which can remain viable in soil for up to 30 years. The soil seed bank is gradually depleted as some seeds germinate and others die. There is very little information on how quickly the soil seed bank diminishes. Perhaps with a modest effort we will be able to keep Trial Island free of flowering broom for years to come. In a few more years the number of germinating plants may begin to decline and the worst of the work will be over. In the meantime, we will have to keep attacking the problem twice a year – in the spring when flowering plants are easily spotted and removed, and in the late summer or autumn when large numbers of juvenile plants can be removed with minimal risk to rare species.

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fund now provides a scholarship awarded annually to a student entering third or fourth year in the major program in the School of Environmental Studies at the University of Victoria. Students are selected based on their record of outstanding contributions to the volunteer sector of environmental work and scholarships are in the \$1,000.00 range.

- › Letters of support were written on behalf of researchers seeking funds from other sources.
- › Concerns raised over the complexity and delays for

CALENDAR

June 19 & June 20

Victoria Butterfly Count

Always looking for keen-eyed volunteers. Please call James Miskelly at 250-477-0490

Victoria Natural History Society has many field trips planned for the month of June. For information, please see their website:

vicnhs.bc.ca/calendar.html

FER Field Trip to Race Rocks

Because of the weather uncertainty in the fall, FER's Field Trip to Race Rocks was postponed until this spring (see story on page 15). Next trip will be Spring 2011. Please check FER website or Autumn/Winter LOG for details.

research permits were addressed by a letter of clarification of the permitting process but no change to complexity nor shortening of research approvals was achieved.

Possible directions for 2010 -11

- › Continue to seek funding to support research in ERs and to advocate academic institutions and students focus on ERs in order to build up the knowledge base.

Goal 3: To support the development of a resilient and enduring science-based ecological reserve system.

- › Support from area residents, guide outfitters and FER

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meant that a potential new ER proposal was recommended to the Parks regional manager in Skeena. The proposal, however, did not move forward as First Nations withheld support because of concerns over potential restrictions to commercial opportunities that an ER may pose.

- › The process to establish a new Marine Protected Area for Race Rocks was restarted by Department of Fisheries and Oceans (DFO). FER joined the Public Advisory Group. Four meetings were planned and two have been held and the third is scheduled in May at Pearson College. Garry Fletcher, the long-standing Race Rocks ER warden, has contributed significant time and knowledge to this DFO-sponsored advisory.
- › A new Marine Wildlife Protected Area process has also been restarted by the Canadian Wildlife Service (CWS) to establish a Marine Wildlife Protected Area for the marine waters linked to seabird colonies using the Scott Islands. Three of the five Islands in the Scott group are ecological reserves.

Possible directions for 2010 -11

- › Continue to participate in both the DFO and CWS-lead processes.
- › Advocate for a coordinated Marine Protected Areas network that will build on the existing marine based ERs in order to provide protection for the water column and marine ecosystems.

Goal 4: To raise *awareness*



Some of the attendees at the FER Annual General Meeting

of the value of ecological reserves among targeted groups, including: local and provincial elected officials; public servants; neighbours of ecological reserves; and the conservation community.

- › FER's presence is promoted when its board members actively participate with other conservation groups; for example the Victoria Natural History Society (VNHS) where Tom Gillespie volunteers, and the Canadian Parks and Wilderness Society (CPAWS) and Elder Council where Mike Fenger volunteers. FER will continue to work closely with BC Federation of Naturalists assisted by Eva Durance and an ER warden. Being involved with other like-minded organizations on protection and management of natural areas is seen as a real boost to this small organization with no paid staff.

- › FER was contacted and interviewed, as part of an audit of Ministry of Environment Parks and Protected Areas being done by the BC Auditor General's office. We came to their attention because of the "State of the Ecological Reserves Report" on our web site.
- › Potential expansion of Big White Ski Resort was brought to the attention of FER and a letter seeking information was sent to Minister Penner and Minister Kruger. A summary of this issue and their response starts on page 17.

Possible directions for 2010 -11

- › Continue to participate with other conservation organizations for mutual benefit.

Goal 5: To sustain a nurturing and effective *organization* that supports the maintenance and development of ecological reserves and the concepts underpinning them.

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Protected Areas, Climate Change & The Path Forward

By Tory Stevens, with assistance from Doug Biffard and Trevor Murdock

Speaking notes transcribed by Mike Fenger with permission

(Photos by Bill Munt, Gail Ross, Boomer Jerritt, Greg Betz & BC Parks)

Introduction

This is a summary of a public presentation organized by Friends of Ecological Reserves for the 2010 Annual General meeting. The speaking notes were provided to FER by Tory and edited by Mike Fenger to form this LOG article. Only a few of the many graphics were included in the article but the powerpoint presentation appears on the FER web site (www.ecoreserves.bc.ca).

Recently, I (Tory Stevens) read a few reports that bemoan the loss of focus on biodiversity because of our obsession with climate change. As an ecologist for a protected areas system, I see the problems as essentially one and the same. The reason why we are so concerned with climate change is because of its affect on biodiversity and facilities and agriculture and water.

A couple of examples to begin with of actual data (or proxies) of global climate to illustrate that the climate changes are real. These examples show the benefits that we gain from monitoring data.

The outline of the presentation begins with a global context, then some of the recorded effects of climate change on species and processes in BC. This is followed by a short history of the current protected areas system and finally a discussion of the path forward from the provincial parks perspective.



Dr. Tory Stevens begins her presentation at FER's Annual General Meeting

The last section deals with how the protected areas system can effectively contribute to the conservation of biodiversity in this new era of climate change and from the point of view of protected area managers; what can Park managers do in their area to adapt to climate change?

Climate Change Monitoring Information

Because of climate records (monitoring) it is possible to look back 160 years to the beginning of the industrial revolution in 1850 and review the changes in global air temperature. The data over the last 160 years shows a strong trend and a sharp increase since the mid 1950s. To provide a

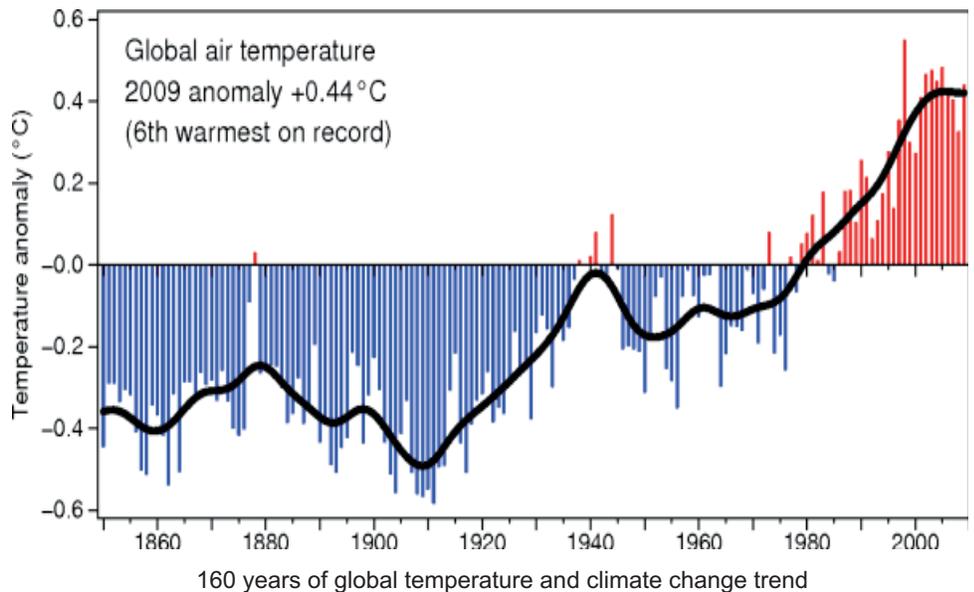
point of reference a 30-year average from 1960 to 1990 shows that all but two years since 1980 are above this average (www.cru.uea.ac.uk/cru/info/warming/).

This 160 years of climate records when put into a global perspective extending back over the last millennium includes a lot of variability such as the period between 1600 and 1850 known as the "little ice age". Global climate reconstruction before climate records is based on ice cores, tree rings and other proxies. The data shows, even by conservative measures, that we are leaving a millennium-long period of relative stability.

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Closer to home in BC, it is useful to look at provincial temperature records. To illustrate change in BC, it is helpful to consider the rates of changes of minimum temperatures between 1970 and 2000. Records show the north is changing faster than the south and the coast is changing the slowest (but it is still changing). It is important when thinking about ecosystems and species, however, to understand the difference between absolute rate of change and relative rate of change. In Victoria there is very little variability (7 degrees in February for instance) but in Quesnel for the same month, there is 17 degrees of variability. We understand species in the Quesnel climate can tolerate greater extremes than an organism on southern Vancouver Island. So while the absolute temperature change in Victoria is smaller than Quesnel, relative to the range of variability it is much larger. The conclusion is that just because coastal regions have lower overall average changes in temperature, this does not necessarily mean species on the coast are less vulnerable. Coastal species are experiencing changes outside their accustomed range.

Along with increased temperature (especially temperature minimums in winter), other environmental variables have measured changes such as: precipitation (regional variation), decreased snow pack, earlier spring runoff and ice break-up, warmer river temperatures, change in plant phenology such as earlier flowering or bud break, changes in the timing of migrations,



more intense insect outbreaks and longer fire seasons. The fire season has been more intense as a result of drought and higher temperatures. This translates into greater area burned. There is a significant amount of information already available to tell us that there are changes underway. Where we have monitoring information there is evidence of change.

These variables affect species as individuals respond to changes in their environments. Species have always been moving. Communities are always changing. Climate change favours species that are small (efficient), fecund (reproduce quickly), and plastic (flexible in their life requisite needs). We can expect major changes will occur when thresholds are crossed.

This focus on climate change has been good for the conservation community in that there is now greater understanding about the importance of protected area design and links to evolutionary processes. In the absence of climate change and

solely due to the magnitude of human disturbances to landscapes, what we see now was going to happen to species and ecosystems anyway. Climate change has simply accelerated our progress down this road and it is now apparent to others outside the conservation community that BC's biodiversity is on a perilous trajectory.

Examples of Species Responses to Climates

Biological changes have already occurred in BC. To illustrate, here are some examples of responses of insects, birds, fish, trees, marine plants and sea birds that have already shifted in response to climate change. Species are already responding to change. All we need to do is monitor to understand what they are signalling.

What does small, fecund and plastic make you think of? The mountain pine beetle epidemic is the most obvious and so far the most costly result of climate change in BC. Mountain pine beetle is a native species that has

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probably been present in BC's forests as long as pine trees. The current epidemic stems in part from the lack of suitably low temperatures in the winter to kill a significant number of overwintering larvae. A threshold was passed that has resulted in the increase in the range of the beetle. By 2006, effects of climate change had expanded suitable mountain pine beetle habitat by 75 percent.

There are observable changes apparent in yellow cedar forests, too. The leading hypothesis for yellow cedar die-offs on the north coast of BC and Alaska are a result of less snow cover in the spring. Since yellow cedar roots are susceptible to freezing and no longer protected by late snow pack, mature trees are dying. Dead yellow cedar stands are most easily identified in areas with a high component of yellow cedar (above 300 m elevation), but low enough in elevation to be subject to the effects of low snow pack (below 400 m) (Hennon, P. E., D.V. D'Amore, S. Zeglen and M. Grainger, 2005. Yellow-cedar decline in the north coast forest district of BC. USDA Forest Service. PNW Research Station. Research Note PNW-RN-549).

Bunnell, Squires and others, analyzed bird species records available with data going back more than 100 years (Bunnell, F. K. Squires, M. Preston and W. Campbell, 2007 "Towards a general model of avian response to climate change in implications of climate change in BC's southern interior forests". Workshop, April 26-27, 2005, Revelstoke, BC, Columbia Mountains Institute of Applied



Effects of mountain pine beetle epidemic

Ecology. Pp. 59-70). The researchers chose to review records of eight bird species over the last century. Birds with different life history strategies such as: residents, short distance migrants, long distance migrants, etc. were chosen. They hypothesized that if they could establish patterns in the response of birds with similar life histories, it would be possible to predict the behavior of other species with these same life history patterns. The common loon was used as an example of a partial migrant. It migrates between the coast and the interior of BC. Over the last century it has changed its coastal departure date and now arrives 2.5 months earlier. The common loon appears to have picked up clues from the environment and adapted.

In addition to the changes in behaviour of resident bird species there are 25 birds found in BC in 2006 that were not on the original list of birds for the province put together by Ian McTaggart Cown in 1947 (Quayle, J.F., L.R.Ramsay and D.F. Fraser. 2007. *Trend in the Status of Breeding Bird Fauna in British Columbia, Canada, Based on the IUCN Red List Index Method*. Conservation Biology 21(5) 1241-1247.) Climate changes are drying habitats to the south and creating warmer winters in the north. The new species may also be those well adapted to human modified landscapes. The new species in BC today are: yellow rail, northern fulmar, Forster's tern, Brandt's cormorant, American avocet, canyon wren,

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broad-winged hawk, gray flycatcher, California gull, Caspian tern, green heron, white-throated swift, black-chinned hummingbird, ring-billed gull, blue jay, Anna's hummingbird, Baltimore oriole, rose-breasted grosbeak, American pipit, white-winged crossbill, boreal chickadee, and common grackle

The sockeye salmon that spawn in Stuart Lake and other lakes nearby, have the longest migration of any salmon population in BC – 1,200 km. As is probably the case with many species in a complex system, more than one factor is affecting their success. Records show that migration time has shifted about 8 days, most likely due to warmer sea surface temperatures (Macdonald, J.S., Williams, I.V. and Woodey, J.C. 2000. The effects of in-river conditions on migrating sockeye salmon (*Oncorhynchus nerka*). In J.S. Macdonald (ed.) Mortality during the migration of Fraser River sockeye salmon (*Oncorhynchus nerka*): a study of the effect of ocean and river environmental conditions in 1997. Can. Tech. Rep. Fish. Aquat. Sci. 2315. pp. 39-57.) This brings the salmon to the Fraser earlier when the seasonal maximum river flow is occurring. By the time the flow recedes, the river water temperature can rise to stressful levels.

An example of species changes in the marine realm comes from monitoring macroalgae (kelp). *Dictyoneuropsis reticulata*, a species common in California was known to be absent in 1991

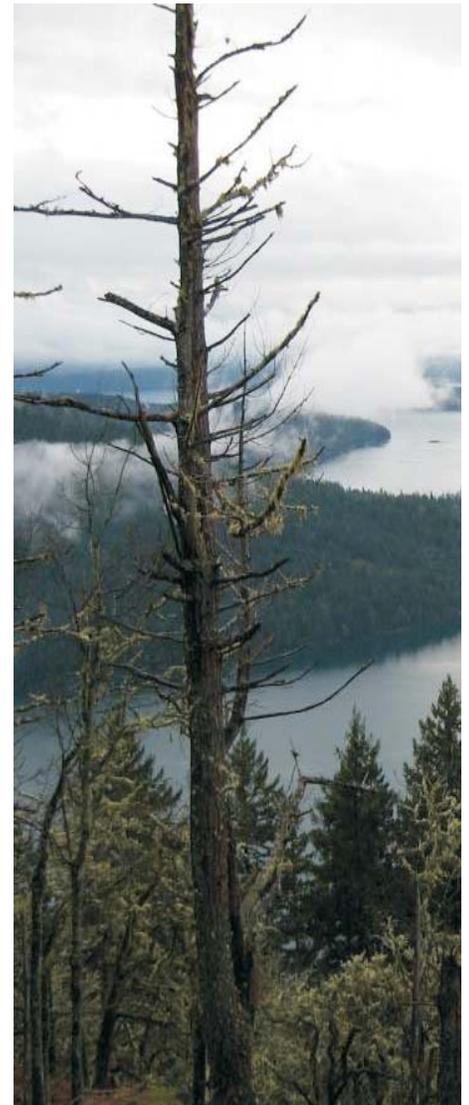
in the Goslings study area in BC. Due to monitoring of the marine systems by Jane Watson, this kelp was first reported in 1994. In 2007 it had become the most abundant kelp. A second kelp, *Eisenia arborea* also considered a more southern species was absent in 1991; and by 2007 made up approximately 20% of stalked kelps in the same area.

The largest colony of Cassin's Auklet in the world (1.1 million birds) is located on Triangle Island, an ecological reserve at the north end of Vancouver Island. Researchers from Simon Fraser University noticed that the population declined dramatically during the 1990s. They discovered that this was due to the uncoupling of timing between the chick's need for food and the availability of copepods (main food). The copepods require cool waters and when sea surface temperatures become too warm, they descend to deeper cooler water and are out of reach of Cassin Auklet parents. Lack of food for chicks caused starvation and therefore the population declined.

What to Expect for Species and Ecosystems in the Future?

Looking at fossil records may provide clues as to what our world may resemble if we warm significantly because it was 2-3 degrees higher 6-10,000 years ago. During this warmer period, grassland and steppes were more extensive, bogs less common, there were no modern forests equivalents, fires were more common, tree lines higher, and there were fewer small lakes.

The fossil record likely represents a different evolutionary



trajectory than what we can expect. Modeling can help indicate what to expect from here forward. Recent work by Bunnell et al. (Bunnell, Fred, Ralph Wells, and Arnold Moy. 2010. Vulnerability of wetlands to climate change in the Southern Interior Ecoprovince: a preliminary assessment. BC Forest Sciences Program Y102120, Ducks Unlimited Canada and Environment Canada), assessed relative vulnerability to climate change for about 35,000 ha of wetlands in the Southern Interior Ecoprovince. These researchers

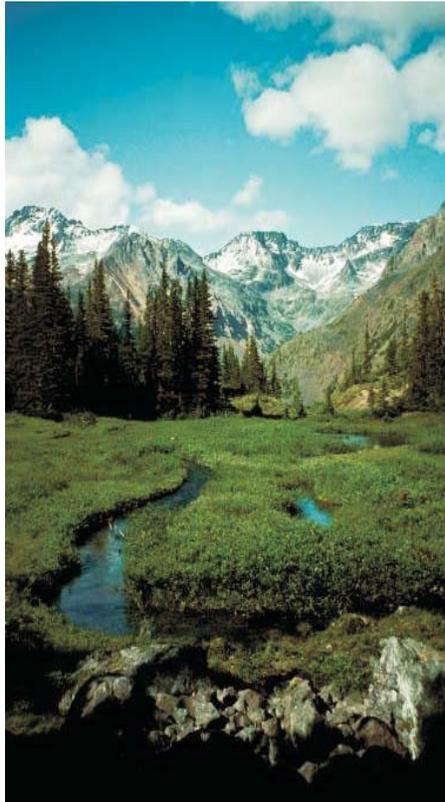
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used an index of the risk of drying based on snowpack and the summer heat moisture index. Over all, their conclusion is that there will be a decline in interior wetlands. Their report states:

"... the smallest wetlands are the most vulnerable and these comprise 67.7% of current wetlands. At least two species at risk, Great Basin Spadefoot and Tiger Salamander, exploit small, shallow wetlands. More broadly, about 80 bird species rely on wetlands as their primary breeding habitat. The simple projection employed permits refinements that would be useful in guiding conservation efforts."

It is expected that grasslands and dry forests will expand in the interior and temperate rainforests on the coast and interior will expand upslope. This will squeeze the subalpine forests and the alpine ecosystems up and possibly off the tops of the mountains. Expansion of temperate rainforest and boreal forests upslope will also mean a loss of subalpine forests and a decline of alpine ecosystems. Loss of glaciers affects changes to stream flow patterns, temperature and ground water. There will be a reduction of coastal wetlands and in the lower mainland, coastal wetlands will be squeezed between dykes and rising seas.

These few examples do not tell the whole story of species response to a changing climate. We have to remember that each of these organisms interacts with others. It is the sum of these interactions that make up ecosystems. When the salmon don't



make it to Stuart Lake what are the cascading effects? Species are only part of the story as other interactions are affected. As ecosystem functions are disrupted, ecosystems shift and reconfigure and structures are altered, so will the species assemblages be rejigged.

Climate change is certain but the specific species and ecosystem responses are unknown. Regional variation, new evolutionary pressures and the appearance of ecosystems with no contemporary analogues are to be expected. Declines in species (even crashes) do not necessarily lead to extinction. There could be gradual or sudden expansion or decline of species or ecosystems might cross some threshold as a result of an extreme event.

The fossil record shows that some species migrated much faster than predicted. It is difficult

to predict the speed of ongoing adaptive evolution that will occur in response to changes. Species responses can be direct such as changes in flowering time, breeding time, and migration patterns or indirect, such as changes to food resources or competition. There are many more possibilities because of complex interactions – most of which we do not know or understand.

Our Protected Area System a Review

The Protected Areas System makes up 14 % of the area of BC. The objectives of the system are conservation and recreation. The Protected Areas System is the cornerstone of biodiversity conservation in the province.

In this presentation so far, I have provided indicators of the magnitude of the changes that we are already experiencing using a few examples supported by monitoring data. What are we expecting and how can our static protected areas system play its role as the cornerstone of biodiversity conservation for the province?

The system currently includes about 13,000,000 ha in the provincial system, 600,000 ha in the federal system and 250,000 ha in other conservation lands and also regional parks and municipal parks.

To understand the system requires a brief history review. The first several parks were large and iconic. Some were at the end of new rail lines to encourage rail travel. Bc's first park, Strathcona Park, was linked to the rail-based recreation and was established in 1911. We are

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coming up on a 100th birthday celebration of the BC Parks system.

As the park system reached middle age in the post-war era, there was a demand for a system of parks along highways that could meet the needs of people looking for recreation, day use areas and car camping.

In 1987, Gro Brundtland wrote a report for the international community called *Our Common Future*. In the report she sets a goal of 12% for protection of the land across the globe. This was not a goal based on science. It was a number that was considered way out there compared to where most countries currently were, and it was something to strive for. BC took its place at the front of the world stage and passed legislation that set 12% as the protected area target for 2000. According to the conservation tenets of the day, some forward thinking people in government took the opportunity to create guidance that would help us develop a system that represented all the ecological variation in the province. This was called the Protected Areas Strategy (PAS). The conservation goals in the system were to achieve representation across the breadth of the province and the policy was not affected by knowledge of climate change.

The basis of the representation strategy were two classification systems. One system, the Ecoregional Classification System, is hierarchical and based on broad similarities in geography and climate. In the province there are three levels that are commonly used: 1)



Every species has the ability to move in some way and at some speed

ecoprovinces, 2) ecoregions and 3) ecosections. The PAS focuses on ecosections. There are about 130 ecosections. The Ecoregional Classification System tends to push representation to all corners of the province. The other system is the Biogeoclimatic Ecosystem Classification (BEC) system. It is also hierarchical and based on moisture and temperature. The hierarchy goes from zone to subzone, to subzone variant and finally site series. The PAS aims to represent each variant in the province. There are 218 variants. The BEC system tends to push representation to all elevations.

The guidance provided when planning park expansion, resulted in the levels of representation in the PAS we have today. We did not achieve equal representation with BEC in every zone. Three zones are clearly under-represented and these are the BEC zones with the highest conservation concern (M. Austin et al. (ed.) 2008. *Taking Nature's Pulse*. Biodiversity BC.). These zones are the Coastal Douglas Fir Zone (CDF), Interior Douglas Fir Zone (IDF) and Ponderosa Pine zone (PP) which all have < 5 percent representation. The Bunchgrass zone (BG) is also

under-represented at 10 percent.

Predicted Changes in BEC Zones 1980 - 2080

The BEC system is moving with climate change. The current BEC classification was initially developed in the late 20th century. Using climate models, it is possible to forecast where the climate envelopes will migrate. Note that this does not mean that the ecosystems we understand today will follow the climate envelope. Ecosystems are based on much more than climate. The Peace area, in this model, is predicted to be appropriate for Ponderosa Pine. Will the area be covered by Ponderosa Pine and all the ecosystem components that are anticipated by that ecosystem? This is doubtful but it does give an indication of how fluid the underlying ecosystems can be. Since ecosystems will always reflect topographic and latitudinal variability, the current protected areas system will continue to be representative of the underlying ecosystems no matter how they move around and refigure. Refiguring takes place at the species, level so it is

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hard to predict which species will move and on what schedule. In the future, with the current protected areas design, we get a similar variability of representation, but the zones that are over-represented and those that are under-represented may change.

According to the climate envelope model, the future potential area for Coastal Douglas-fir BEC zone will be increasing by a factor of about six. Using the same protected area boundaries that gave us less than 2 percent of representation currently, we will have over 10 percent in the future. Using representation as a guideline, the CDF is one of the winners.

The Alpine Tundra (AT) is currently one of our most extensive zones, but also one that is over-represented at over 20 percent. This zone is anticipated to be significantly reduced over the course of this century going from 135,000 sq. km to around 3,000. In spite of that reduction, the protected areas system is positioned to continue to over-represent AT in the future. It will be a much smaller component of the system, but a large percentage of the total alpine in the province. There is evidence that small trees are getting a foothold in a mountain pass where persistent snow has kept areas treeless for centuries.

So now we are sitting on a protected area system that is relatively well represented and likely to remain so into the future in spite of the movement of ecosystems. If we can assume that we have representation, are we ok?

The biggest challenge – and

this is a challenge when climate is changing slowly as we were used to, or quickly as we are getting used to – the biggest challenge is maintaining the ability of species to move and evolve with the changing climate.

The Path Forward

This next section will consider the role of the PA system in the provincial context and the ability of species to move. This can be thought of as a review of representation and a shift towards a landscape strategy to enhance species ability to adapt and move in a changing climate. Then there is the adaptation to climate change in park management. The approaches can be thought of as: 1) looking outside our protected areas boundaries; and 2) looking inside the protected areas.

Looking Outside Our Protected Area Boundaries

First the big picture and how the protected area system can serve the province in its efforts to conserve biodiversity. Park agencies across the globe have been struggling with the shift from focussing on representation as a way to ensure the survival of species and ecosystems, to recognizing that the constantly shifting nature of the natural world makes a bigger landscape view of paramount importance.

Adaptive Capacity

The most important thing we have to do is to maintain the ability of the natural world to choose its own path to cope with climate change – to evolve genetically, behaviourally and in



space. This has been called maintaining adaptive capacity. There are two basic parts of adaptive capacity. The first is genetic diversity. The more genes in the gene pool, the more possible solutions are available along an evolutionary pathway. The second is the ability of species to move. If they can, organisms will adjust their location to optimize outcomes. Every species has the ability to move in some way and at some speed.

We have a good start with large parks and complexes that are at least 270,000 ha. That size

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is based on science and comes from a publication in Conservation Biology by Brent Gurds, Tom Nudds and Don Rivard (2001). As early as the 1980s, William Newmark noted that smaller parks were losing species.

This map includes areas that are adjacent to protected areas in other jurisdictions that bring the entire complex to an area over 270,000. These are indicated by the red lines (not accurate...hand drawn). These 11 areas represent more than 2/3 of our system.

A quote from E.O. Wilson in his book *The Creation*, 2006 states the importance of natural areas.

There is no solution available, I assure you, to save Earth's biodiversity other than the preservation of natural environments in reserves large enough to maintain wild populations



sustainably. Only nature can serve as the planetary ark.

Landscape Strategies need to protect large areas and contain well represented areas geographically, with the full range of

elevation, aspect, and include whole watersheds. A landscape strategy also needs to identify and protect refugia such as north aspects, toe slopes, complex

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"AGM".....continued from page 5

- › Field Trips are a means to reconnect board members with ERs and ER wardens, as well as offer an opportunity for others to go to ERs in the company of knowledgeable individuals.
- › The Race Rocks Field Trip for 2009 did not occur due to logistics, boats and weather. This is an annually planned trip and was rescheduled for spring 2010. See page 15 for a report on this trip. Trial Island field trip did occur in Spring 2009 and this is also an annually planned field trip subject to boat and weather. The Trial Island field trip planned for

2010 could not be completed due to uncertainty related to insurance and FER liability.

Possible directions for 2010 -11

- › Clarity on FER liabilities, insurance and field trips will be sought and discussed with MOE.

FER is a small organization and though we have had discussions about getting staff and joining the ranks of CPAWs, Sierra Club and Nature Conservancy, we have resisted this. We continue to see our role as a catalyst for change and management of ERs without building infrastructure that we believe rightly belongs in government.

Changes on the Board

Briefly we had the pleasure of Eva Durance joining Board meetings by phone from the B.C. interior. We thank Eva for her participation and sadly report that she has had to withdraw due to other priorities. Eva will continue in her role as an ER warden and in assisting with ER warden gatherings and coordination with BC Federation of Naturalists. Thank you Eva. Otherwise there were no changes to the board and existing members agreed to stand for another year in their current capacities.

topographies, terrestrial habitats and streams associated with large glaciers and ice fields and areas that acted as refuges during past climate change.

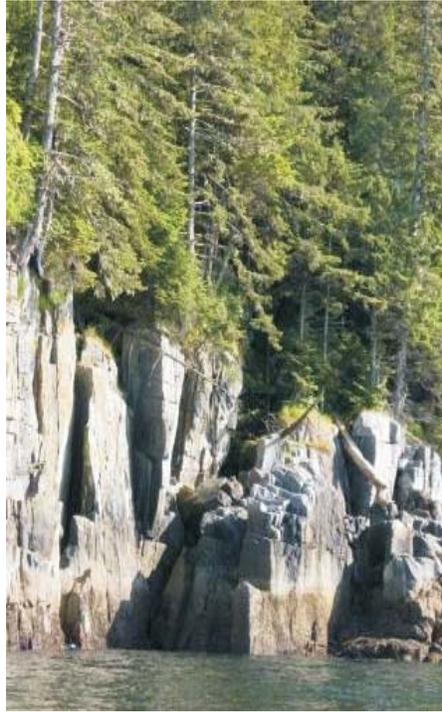
Other elements of a landscape strategy are to augment the connectivity that is inherent in the large complexes by identifying continent scale corridors. Choose some indicator species to monitor actual changes against predicted changes so that it is possible to calibrate our expectations. Choosing species for monitoring means monitoring some that are predicted to change slowly or not at all and others that are predicted to change rapidly or be extirpated (e.g. pika).

In BC we have a great start with the current protected areas system as an anchor for a larger landscape strategy. We need to do some work to identify refugia and a monitoring system that helps calibrate our expectations would be useful for managers.

Australia has just announced the Trans Australia Eco-Link which is a swath of land 3,500 km long covering 1.4 million sq. km. It is anchored by their protected areas, but includes other public land and private land.

Jim Pojar has recently released a report called "*A New Climate for Conservation*" in which he advocates 50 percent of the landbase dedicated to conservation. He is not suggesting that it is all protected land, but it should be managed to be wild enough to allow all kinds of organisms to move through and inhabit it.

One of the projects we are currently engaged in is a very



high level of landscape analysis that could be used to identify opportunities and vulnerabilities at this broad scale. This assessment shows two important things about each third order watershed – the current level of disturbance and the vulnerability to future disturbance. The colour scheme that results from this analysis points out places where there are opportunities to protect and places where restoration is necessary. So far we have 5 areas (ecoregions) mapped. Ultimately we would like to have every ecoregion in the province completed. For now we are using the five areas that are completed to promote the usefulness of this level of mapping.

Looking Inside the PAS

How is BC Parks managing within our boundaries to make a difference? In the last couple of months, the province has released a climate change adaptation strategy, so I can fit

what we are doing into these general categories.

Provincial Climate Change Adaptation Strategy set out three goals:

1. Build a Strong Foundation of Knowledge;
2. Make Adaptation Part of Government's Business; and
3. Assess Risks and Implement Priority Adaptation Actions.

As part of the first goal, BC Parks is partnering with UNBC to create a long-term monitoring plan that can be carried out across a region using existing staff and/or community groups. BC Parks will also continue to update and maintain a database on conservation values and threats in each protected area.

As part of the second goal of the adaptation strategy, BC Parks is reviewing the Conservation Program Plan Policies and the Impact Assessment Procedure to bring climate change considerations into the purview of decision makers. A review and update of the Ecological Reserve Guide with a new section on climate change is also underway. Success can be measured by how much climate change and consideration of future conditions becomes part of the culture of decision making at all levels.

As part of the third goal BC Parks has done some provincial-wide analyses to help planners and managers understand the risks of climate change. Two of these are the identification of glacially dominated watersheds and a sensitivity analysis of marine shorelines and sea level rise.

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Race Rocks Re-Visited

By Louise Beinhauer

The old adage 'Third Time Lucky' seems to hold true... at least when it comes to scheduling and re-scheduling the field trip to Race Rocks ER.

The original field trip planned for last September was postponed due to boat problems. The re-scheduled date for October was a 'no go' due to high winds, so it was decided to forego the trip until this spring.

The May 9th date dawned sunny and even more importantly, calm. A small, but enthusiastic group set out from the dock at Pearson College, with Garry Fletcher, the ER Warden for Race Rocks, leading the trip and Chris Blondeau driving the boat.

The first thing I noticed that was different about this spring trip was the fact that there were no northern sea lions and elephant seals on Great Race Rock. Instead, a contingent of both species were noisily making their presence known from a smaller island to the northwest. Apparently three elephant seal pups had been born in the spring, but unfortunately all three have since died. It was believed that the high tides and storm surges washed two of the pups out to sea and the third pup was attacked and killed by his father.

The second big difference was the presence of springtime flowers and nesting birds, but Garry reiterated that unfortunately there were no pelagic cormorants nesting on a



Black oystercatcher nest containing two eggs

previously used site. Ryan Murphy, the new young eco-guardian who lives on Race Rocks, drew our attention to a Black oystercatcher nest containing two eggs. We also saw many flocks of Pigeon guillemots feeding some 100 yards offshore.

We happily spent a large portion of our morning touring the island and looking at various plant colonies. We were treated to a few *Romanzoffia tracyi* or Tracy's Mistmaiden in bloom. These rare plants are Blue-listed. They only grow on ocean bluffs where they may come in contact with salt sprays. They grow to a maximum height of 10 cm.

We also found, just east of the tower, *Triteleia hyacinthina*, white brodiaea or fool's onion

which is a native of the Pacific west coast of North America.

The presence of many whale watching boats in the vicinity, prompted me to ask Ryan whether or not problems were still occurring with boats coming too close to the sea lions or causing other problems. He regaled us with the story of a fisherman who ventured into the Rockfish Conservation Area. The fisherman was advised of this and blithely answered "Oh, I'm just fishing for Ling cod!" Garry did point out that the whale watching boats, for the most part, are observing the 100 meter viewing distance.

It was great to see that the restoration work on the

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We know that sea level rise will not affect all shorelines equally. Currently Parks staff are working on a guide for park planners in coastal regions to help them make decisions about how to guide management in coastal areas. As a background for that guide, parks staff are working with an advanced GIS student from University of Victoria to provide a classification of the shoreline from both the marine side and the shore side. Estuaries such as Goldstream Park will be affected very differently than steep sloped parks with rocky shores like Gowlland Tod.

Climate change is going to change the face of the province as we know it. But organisms have proven to be remarkably adaptable. Biodiversity will not



disappear, but stands a good chance of being diminished. Our job is to do everything we

can to maintain adaptive capacity so the most diverse province can continue to be just that.

lighthouse tower was complete with the scaffolding having come down last October. It looked fantastic – a big, much needed improvement. We were running short of time, however, and decided not to climb the tower – next time!

We did visit the 'science house' and the control room housing the tidal power generating equipment and a large array of batteries. The tidal power project was originally initiated as a pilot by Clean Current Power Systems Inc. The company's focus has shifted to the Bay of Fundy so the equipment at Race Rocks is not operational at this time. The solar panels that were installed in 2007, provide a portion of the



Calendula and wall flowers

power needs for the island.

As we made our way back along the path to the dock, we thanked Garry for being our field trip host. We loaded back onto the boat and left Race Rocks for the return trip to Pearson College. Apparently a short time after we left, Ryan's girlfriend Raisa Mirza, spotted *Calidris canutus* or Red knots.

This is the first time photographs have been taken of Red Knots at Race Rocks. These shorebirds migrate 20,000 miles. They nest in the Canadian arctic and use both the Atlantic and Pacific flyways. Great photos like these can be viewed on the Race Rocks website at www.racerocks.com.



Red Knots (photo by Raisa Mirza)

Big White Ski Resort Expansion Concerns FER

By Louise Beinhauer

Friends of Ecological Reserves received an email on December 30, 2009 from Randy Schellenberg of the Citizen's Coalition to Save Silver Star Provincial Park advising us that some information had come to his attention; namely a report on a proposed expansion to Big White Ski Resort near Kelowna. This report indicated that the resort was planning an expansion that would cause the resort to "effectively double in size" becoming a "major world class destination resort."

President of FER, Mike Fenger wrote a letter on behalf of Friends dated Feb. 24, 2010, to both the Minister of Environment, Barry Penner and Minister of Tourism, Culture and the Arts, Kevin Krueger. Mike expressed concern over what we understand is a proposed expansion of Big White Resort that "would include facilities within the boundary of the Big White Ecological Reserve." He then went on to quote from BC Parks' Ecological Reserves website that ERs "are not created for outdoor recreation and should not be confused with parks or other recreational areas." He also stated, "ERs are places with special features and attributes; with few exceptions other lands cannot be substituted nor ER boundaries reduced or shifted without serious damage to the values for which these protected areas were set aside.. It is disturbing that the Big White Ski Resort hasn't acknowledged the existence of the Big White ER in any



Big White Ski Resort Master Plan with Big White Mountain ER boundaries which were drawn for purposes of FER's letter to MoE and MTCA and may have some slight differences

of its plans, even though it is immediately adjacent to their operations. None of their maps show the ER and there is no reference to it in any text, yet it is a provincially significant benchmark area."

Mike then asked the Ministers for clarification on a number of questions. "The Ministry of Tourism, Culture and the Arts provides guidance on resort development and lists a number of resorts with approved plans on their website (www.tca.gov.bc.ca/resort_development/resort_plans/approved_resort_plans.htm). Neither the status of the Big White Master Plan nor a possible public review process is present on this site. Has the Master Plan been approved and not yet posted or is it under review? We are not clear on whether a decision has been made and whether government has approved the ski resort plans to expand into the Big White ER. We are also not clear on public review process,

timelines and opportunity for public input to land use decisions and ERs?"

Mike continued his letter with, "we understand that Big White Ski Resort has expressed interest in exchanging land on the eastern side of their area for Ecological Reserve land on the west side adjacent to the resort's Gem Lake lift terminal. We would appreciate knowing if the Resort owners have approached the government about a possible land exchange or boundary change in order for them to expand into the present ER as shown on their 2009 Master Plan. According to the *Ecological Reserves Act*, changes would necessitate a legislated amendment and any exchange of land would require the conservation values of the Ecological Reserve land be matched or improved by the land offered for trade. As well, the overall effect of such an exchange on the values for

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which the Ecological Reserve was created would have to be evaluated. The Primary Role for this ER as stated in the Management Plan is *to protect a small example of the Engelmann spruce-Subalpine Fir and Alpine Tundra zones in the southern interior. The Ecological Reserve protects old growth stands of Engelmann spruce and sub-alpine fir and high elevation wetlands. It is also representative of the only true alpine in the Northern Okanagan Highland Ecoregion with large areas of krummbolz. Known rare species include Engelmann's sedge (Carex engelmannii), Elmer's Indian paintbrush (Castilleja elmeri), alpine Indian paintbrush (C. rhexifolia) and alpine-wintergreen (Gaultheria humifusa).* Aside from the protected status of the ER, this fragile alpine ecosystem would take centuries to recover from any disturbance. FER also has serious concerns about the adequacy of inventory and monitoring of flora and fauna within the ER, information which would be crucial to any discussion about land exchange... We are not aware of any equivalent alpine and subalpine on Big White outside of the ER which could scientifically be judged of equal and equivalent ecological value and therefore worthy of being considered for a land exchange."

Mike summarized with, "As noted earlier, we would appreciate knowing whether Big White Resort and the government have begun discussions on a possible land exchange or boundary

changes to the Big White ER. If discussions are underway, then we would like to know the exchange lands or boundary changes proposed. We would also like to see a government map delineation of the extent to which the Resort's proposed expansion would be within the ER boundary... we ask that a letter from government be sent to the Resort owners and managers, if this has not already been done, making clear the status of Ecological Reserves, the legislated requirements needed for changes to ERs and the legal requirements for government approval of any expansion plans within or outside protected areas. We also seek clarification of the approval process of this Master Plan and the public and FER role in that."

A month later, Friends received responses from both Ministries. Minister Penner responded to our inquiries that are within the purview of the Parks and Protected Areas Division of MoE. He wrote, "To date, the Ministry of Environment has not been formally notified about any proposed expansion of the Big White Ski Resort. Recently, regional planning staff have spoken to staff within the Resort Development Branch (Tourism Division) of the Ministry of Tourism, Culture and the Arts (MTCA). They confirm that the Master Plan project for Big White Ski Resorts Ltd. is conceptual at this stage and no formal application for increased land tenure has been initiated by the resort owners or received by MTCA. The Resort Development Branch of MTCA is fully aware of the Big

White Mountain Ecological Reserve and its close proximity to the existing Crown land tenures that the resort holds.

Ministry of Environment regional planning staff will remain in communication with MTCA's Resort Development Branch to ensure there is continued discussion about any proposed expansion of the existing Big White Ski Resort."

The ADM for the Ministry of Tourism, Culture and Arts, Peter Walters, responded on behalf of his minister. He wrote, "MTCA recognizes the values for which the ER was created. Big White Ski Resort has been advised and is aware that, if any future resort expansion application includes a portion of the Ecological Reserve, a comprehensive review involving other agencies and the public will be required. To date, Big White has not submitted an expansion plan to the Province. Specific to any expansion request, the All Seasons Resort Policy require a public presentation, First Nation consultation and a review period before approval of a major amendment to a ski resort is granted. If an amendment such as an expansion request to a Master Plan is accepted for review, the document will be posted on the internet. As you have noted, the Resort Master Plan for Big White, which was last updated and approved in 1999, does not appear on the MTCA website... we intend to continue posting Master Plans as they are updated and approved."

Friends of Ecological Reserves will continue to monitor this situation.

FRIENDS OF ECOLOGICAL RESERVES MEMBERSHIP FORM

Box 8477 Stn Central, Victoria, BC V8W 3S1

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Can you help....

ER Wardens can help the BC Breeding Bird Atlas in a big way and it's as easy as 1,2,3 (4). With such a big and remote province, even the most common birds may not be recorded in populated areas. People often think, "surely someone else has recorded it" It's especially not the case in remote BC. The BC Atlas will map the distributions and abundances of BC birds between 2008-2012 to create a snapshot in time of the state of our populations that will be used for management planning and conservation for years to come.

How can you help? At the most basic level, carry a notebook and record: 1) location (UTM, including zone (NAD 83) or Lat/longs from a GPS) but even a good description of the area location is useful; 2) date (yr, mo, dd); 3) species list and their behaviour; 4) time spent in area **birding watching** (optional.) Get this simple information to the regional coordinator (RC) or atlas office and that's all you need to do! Or you can try a bit more as described below.

The atlas project records distribution on a 10-km square basis, so you only need one list per square. How do you know what square you are in? Simply call the RC of that area, who will be able to tell you. If you are even slightly computer savvy you may try the free "GoogleEarth" program to zoom in and view the area – download information is here: www.birdatlas.bc.ca/bcdata/topomaps.jsp?lang=en. If you have a GPS unit, you can find the same square by reading the *5th number from the right of the UTM easting and northing values* (NAD83). Example: your GPS reads value "Easting=681345 mE, Northing=6324561 mN", you can immediately determine that you are in square **82** (always read the "E" first.) If that number stays as 82, you only need one list. If it changes to 83, 81, etc. write down the location and make a new list. Now you can make a bird list ANYWHERE in BC!!

You can also help determine species abundance if you know most birds by song and sight to do point counts surveys which record all the birds found in a particular location during a 5-minute period. Contact us for more details.

Here are some of the common breeding behaviours and codes: H – bird observed in nesting habitat (a robin in you back yard!); S – a bird singing in nesting habitat (an owl hooting at night); P – an obvious pair (male and female Wood Duck); D – displaying or courtship (a hummingbird display dive); NB – nest building, FY – fledged young, AE – Adult on nest, CF – carrying food, NY nest with young. All of the codes, RC contacts and much more information can be found on the atlas website www.birdatlas.bc.ca or by calling the atlas office @ 1-877-592-8527.

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