Restoration of Fire-maintained Ecosystems at Risk: British Columbia Parks and Protected Areas

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Key Words: restoration, fire-maintained ecosystems, parks, protected areas, tree removal, prescribed fire, British Columbia

Extended Abstract: British Columbia's (B.C.) parks and protected areas system maintains representative examples of ecosystems throughout the province; however, fire-maintained ecosystems are underrepresented in the system (Table 1). This is particularly true for ponderosa pine and interior Douglas-fir forested ecosystems. Fire-maintained ecosystems require frequent fires to maintain their ecological characteristics, but protection of the human interface around these heavily fragmented landscapes calls for aggressive fire suppression. As a result, fire suppression over the last several decades has caused changes in these ecosystems.

Table 1. Representation of fire-maintained ecosystems (biogeoclimatic zones) in British Columbia's parks and protected areas system (from Protected Areas System Overview application).

Biogeoclimatic zone	*No. of hectares in the province*	*No. of hectares in parks and protected areas*	*% protected*
Bunchgrass	284,866	28,837	10.12
Ponderosa Pine	316,632	14,048	4.44
Interior Douglas-fir	4,222,567	191,733	4.54

The most direct changes that have occurred in fire-maintained ecosystems are forest encroachment and ingrowth. These two processes result in a loss of grassland and other open ecosystems. This can affect species such as the grasshopper sparrow (*Ammodramus savannarum*), sage thrasher (*Oreoscoptes montanus*), long-billed curlew (*Numenius americanus*), and bighorn sheep (*Ovis canadensis*), that depend on these ecosystems for food or shelter. Indirect changes can also occur due to unnatural fuel buildup which results in high intensity fires that can sterilize the soil, kill native climax grass species, and create opportunities for exotic weed invasions.

The British Columbia Conservation Data Centre lists many ecosystems at risk within the three biogeoclimatic zones that are considered to be fire-maintained (i.e., Bunchgrass, Ponderosa Pine, and Interior Douglas-fir) (Table 2). Ecosystems at risk are identified by site series mapping, although this has not been completed for the entire province.

Table 2. Examples of fire-maintained ecosystems listed by the British Columbia Conservation Data Centre.

Scientific name	*English name*	*Provincial rank*	*B.C. status*
Festuca campestris - Pseudoroegneria spicata	rough fescue - bluebunch wheatgrass	S2	Red-listed
Festuca idahoensis - Pseudoroegneria spicata	Idaho fescue - bluebunch wheatgrass	S2	Red-listed
Pinus ponderosa / Pseudoroegneria spicata - Lupinus sericeus	ponderosa pine / bluebunch wheatgrass - silky lupine	S2	Red-listed
Pinus ponderosa / Rhus glabra	ponderosa pine / smooth sumac	S2	Red-listed
Pinus ponderosa / Symphoricarpos albus / Poa pratensis[1]	ponderosa pine / common snowberry / Kentucky bluegrass	S2	Red-listed
Pseudoroegneria spicata - Koeleria macrantha	bluebunch wheatgrass - junegrass	S2	Red-listed
Pseudotsuga menziesii / Symphoricarpos albus / Balsamorhiza sagittata	Douglas-fir / common snowberry / arrowleaf balsamroot	S2	Red-listed
Quercus garryana / Bromus carinatus	Garry oak / California brome	S1	Red-listed
Quercus garryana / Holodiscus discolor	Garry oak / oceanspray	S1	Red-listed

In an effort to maintain underrepresented ecosystems (at the zonal level), the Parks and Protected Areas Branch of the B.C. Ministry of Water, Land and Air Protection has actively been restoring parts of the parks and protected areas system where fire was historically an important process but has been suppressed in the last several decades. Thirteen restoration projects are either planned or underway in the four Ministry of Water, Land and Air Protection regions in the province that include fire-maintained ecosystems (Table 3, Fig. 1). For the purposes of this presentation, each of the restoration projects described is considered to have the potential to be in an ecosystem at risk, although only some of the areas have been mapped in detail. Restoration techniques include tree removal, prescribed fire, or a combination of these (Figs. 2, 3, 4). Many species at risk will benefit from these restoration efforts.

[1]The BC Species and Ecosystems Explorer (September 2004) now lists this community as *Pinus ponderosa* / *Symphoricarpos albus* / *Poa* spp. and ponderosa pine / common snowberry / bluegrasses.

Table 3. Restoration projects in fire-maintained ecosystems in British Columbia's parks and protected areas.

Park	*Biogeo-climatic zone*[a]	*Current status*	*Project area (ha)*	*Treatment*	*Ecological measurement/ indicators of success*	*Overall restoration objective*
Kootenay Region						
Kikomun Creek	IDF PP	Active restoration	440	Mechanical spacing and commercial thinning—100 ha have received harvesting and stand-tending treatment Prescribed burn—34 ha (April 2002)	Established monitoring plots for baseline and post-treatment areas	Protect rare and endangered flora, fauna and ecosystems Reintroduce prescribed fire to the landscape
Syringa Creek	IDF	Background studies	917	Prescribed burns before park was established: Grey Wolf #1–5 ha; Grey Wolf #2–5 ha; Tulip Creek #1–40 ha; Tulip Creek #2–5 ha; Tulip Creek #3–5 ha; Tulip Creek #4–5 ha	Increased winter range habitat Six identified red- and blue-listed species in the park are used as indicators of ecosystem restoration and ecosystem health	Reduce stocking of juvenile and understory trees Improve habitat for wildlife Increase available soil nutrients Improve forest health Reduce risk of high impact fire through the reduction of all fuel loading and available ladder fuels
Wasa Lake	PP	Active restoration	60	Commercial thinning in January 2003 Prescribed burning planned	Establishment of native grasses Photo monitoring Elimination of noxious weeds	Protect rare and endangered flora, fauna, and ecosystems Reintroduce prescribed fire to the landscape
Cariboo Region						
Churn Creek	BG IDF	Active restoration	Not available	Encroachment knockdown Prescribed burn—400 ha (to date), 500 ha (proposed)	Comparing predicted and actual fire behavior Permanent plots within each major vegetation type Pre- and post-monitoring of wildlife and their use of critical habitat	Reduce encroachment and ingrowth Maintain and enhance red- and blue-listed species' habitat Control noxious weeds Maintain cattle grazing to approved Animal Unit Month levels

Table 3. Restoration projects in fire-maintained ecosystems in British Columbia's parks and protected areas (cont'd).

Park	*Biogeo-climatic zone*[a]	*Current status*	*Project area (ha)*	*Treatment*	*Ecological measurement/ indicators of success*	*Overall restoration objective*
Junction Sheep Range	IDF BG	Active restoration	1000	Mechanical encroachment knockdown Prescribed burning	Comparing predicted and actual fire behavior Permanent plots within each major vegetation type Pre- and post-monitoring of wildlife and their use of critical habitat	Reduce encroachment and ingrowth Maintain and enhance red- and blue-listed species' habitat Control noxious weeds
Thompson Region						
Tranquille Ecological Reserve	IDF BG PP	Active restoration	235	Prescribed burn (~ 40 ha to date)	Not available	Protect representative PP and IDF ecosystems
Okanagan Region						
Fintry-Shorts Canyon	IDF	Active restoration	250	Mechanical thinning Prescribed burn Impact assessments	Monitoring plots to measure forage production for sheep and ensure that it meets their food requirement Reduction of shrubs	Improve habitat for bighorn sheep (blue-listed)
Kalamalka Lake	IDF	Active restoration	85	Mechanical thinning Prescribed burn Impact assessment	Monitoring plots to study grass species health, vigor, and increased forage production	Reduce fire hazard Improve vegetation conditions (reduce encroachment and ingrowth) Maintain grassland to protect associated species, particularly rattlesnakes
Vaseux Protected Area	PP	Not available	100	Mechanical thinning Prescribed burn Impact assessment	Monitoring plots Open forest structure with snags for white-headed woodpecker habitat Increased forage production	Improve habitat for white-headed woodpecker (red-listed) and bighorn sheep (blue-listed) Reduce fuel loads Reduce encroachment and ingrowth

Table 3. Restoration projects in fire-maintained ecosystems in British Columbia's parks and protected areas (cont'd).

Park	*Biogeo-climatic zone*[a]	*Current status*	*Project area (ha)*	*Treatment*	*Ecological measurement/ indicators of success*	*Overall restoration objective*
Snowy Protected Area	BG IDF PP	Active restoration	3	Mechanical thinning Prescribed burn Impact assessments	Monitoring plots for forage production for a healthy grassland Stems per hectare	Protect bighorn sheep habitat Grassland restoration
Gilpin Grasslands Proposed PA-Goal 2 area	PP IDF	Planning	Not available	Mechanical thinning Prescribed burn Impact assessment	Monitoring plots for forage production for a healthy grassland	Restore habitat for bighorn sheep and other species at risk Restore open forest to NDT4[b] as initiated in the B.C. Ministry of Forests and the Kootenay Boundary Land Use Plans
White Lake Grassland	BG PP	Planning	Adjacent to Canadian Wildlife Service project	Mechanical thinning Prescribed burn Impact assessment	Part of the Canadian Wildlife Service's West Vaseux project for the white-headed woodpecker and bighorn sheep	Same as above
Kekuli Bay	IDF	Not available	4	Prescribed burn Grass seeding	Weed control Inventory	Reduce invasive plant species on site Maintain grassland

[1]BB: Bunchgrass; IDF: Interior Douglas-fir; PP: Ponderosa Pine
[2]Refers to natural disturbance type 4, or ecosystems that have historically had frequent (4–50 year) stand-maintaining fires.

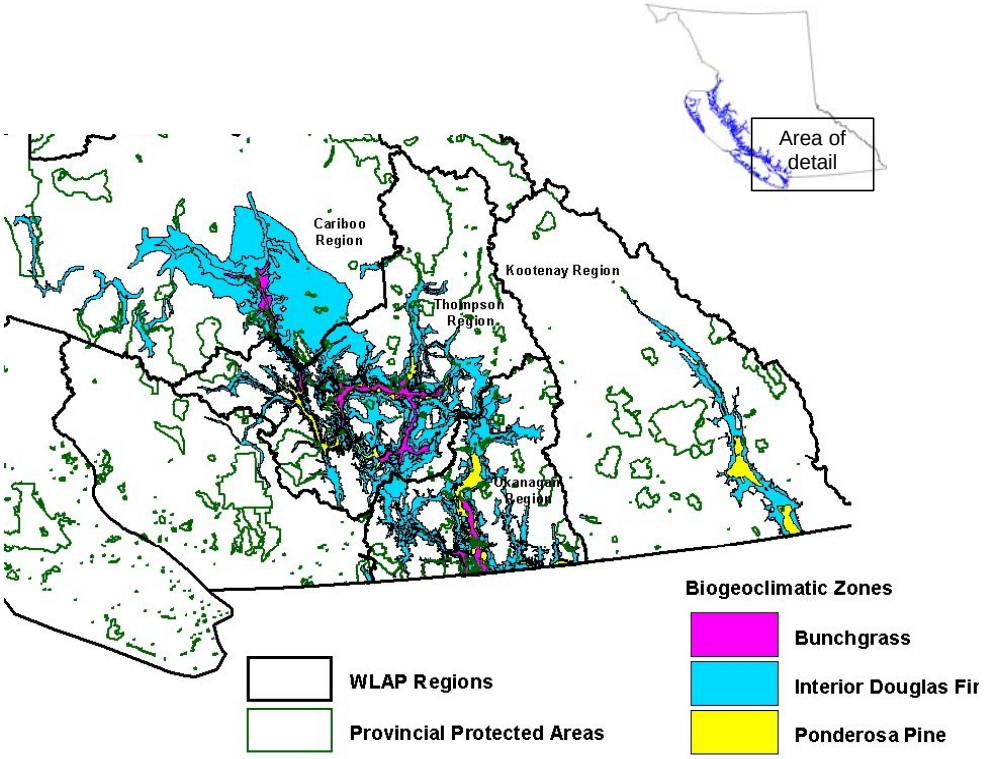

Figure 1. Location of the four Ministry of Water, Land and Air Protection (WLAP) regions in British Columbia that include fire-maintained ecosystems.

Figure 2. Use of prescribed fire in Kalamalka Lake Provincial Park to restore a grassland ecosystem (photo: Judy Millar).

Polygon 9 - Pre-Treatment- T5+25 m. - T5+30 m. - 010°

Polygon 9 - Post-treatment - T5+25 m. - T5+30 m. - 010°

Figure 3. This endangered antelope-brush / bluebunch wheatgrass ecosystem is being restored in Kikomun Creek Provincial Park. Fuel was removed before a prescribed burn to reduce fire intensity (photos: Tim Ross).

Figure 4. Use of prescribed fire in Vaseux Protected Area to maintain open forest ecosystems that are threatened by fire suppression (photo: Judy Millar).