Proposal for the Protection of the Rainbow - Jordan Wilderness



Submission to the Governments of British Columbia and Canada

To secure the remaining intact ancient inland temperate rainforest for the long-term preservation of some of the Earth's most biodiverse systems.

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Executive Summary

This is a proposal to protect the most intact remaining inland temperate rainforest that has been discovered in British Columbia's Monashee Mountain Range.

The 8,408-hectare proposed protected area includes parts of three valleys, comprising a stretch of unroaded wilderness of diverse habitats including ancient inland temperate rainforest (ITR) and rare wetland ecosystems. This wilderness should be preserved as a class-A provincial park for the long-term viability of B.C.'s forest ecosystems and their value to global climate regulation.

North of Revelstoke, the Rainbow-Jordan Wilderness includes parts of the Frisby Valley, Jordan Valley, and



Botanist Curtis Björk with an ancient Western redcedar in the proposed wilderness park. [Photo: Amber Peters]

an unnamed valley just north of the two that was christened "Rainbow Valley" by lichenologist Dr. Toby Spribille. Since its discovery in 2017 this pristine wilderness is being recognized as the fouth known biodiversity hotspot of the inland temperate rainforest ecosystem.

Of the four inland rainforest hotspots, only part of the Robson Valley has been protected. The three remaining biodiversity hotspots must all be protected to enhance biological resiliency amid the impending landscape changes that scientists project to increase due to global warming.



The first discovery in 13 years of an inland temperate rainforest hotspot was made in 2017.

Since the discovery of the famous Incomappleux Valley, no other ITR ecosystem was thought to still exist with such intactness and extraordinary biodiversity.

The completely intact Frisby Valley includes significant remaining low elevation tracts of ancient Interior Cedar-Hemlock forest (ICH). The full proposal covers low and middle elevation slopes including 4467.8-ha of federally designated critical habitat for the Frisby-Boulder herd of mountain caribou. Though their presence has not been confirmed in recent years due in part to inconsistent censusing, this wilderness was historically frequented by mountain caribou.



The mouth of the expansive Frisby Valley. The light green in the center of the photo is one of multiple wetland ecosystems. [Photo: Douglas Noblet]



The unnamed valley at the north end of the proposal christened Rainbow Valley by the research team. [Photo: Douglas Noblet]

2473-ha of the proposal area is already provincially designated no-logging Ungulate Winter Range for mountain caribou. Along the Jordan River in the southern part of the proposal are vast, intact Engelmann Spruce-Subalpine Fir (ESSF) forests on gentle slopes that could make valuable recovery habitat.

The eastern side of the proposal borders the Frisby Ridge recreation area. Extensive nearby logging, as well as motorized and non-motorized recreation on Frisby Ridge demand equivalent, adjacent refugia for sensitive ecosystems and wildlife of the region.

Mountain caribou are especially in need of unroaded refugia for their survival and recovery (Apps et al. 2006; Courbin et al. 2009).



1992-2003 government of BC mountain caribou telemetry data.

Tourism - Discovery - Cultural Legacy

The Rainbow-Jordan Wilderness offers a unique opportunity for B.C. tourism.

Visitors can venture into the proposed park from multiple access points that lead to unique scenic wonders of an ancient world.

Travelling along established wildlife trails, visitors can experience rare ecosystems never altered by human beings. The ancient cathedral forests surrounded by towering mountain peaks create a feeling of true wildness, of solitude, or of a time in the distant past.



Old growth forests that are treasured by explorers are also vital to the survival of local biodiversity. [Photo: Douglas Noblet]



Stunning waterfalls are just one of many notable landscape features within the proposed park. [Photo: Douglas Noblet]



As places like this become increasingly rare, their value to the human psyche and human health are more widely recognized. [Photo: D. Noblet]

These ancient remnant ecosystems are libraries of information with huge benefit to human health and medicine, clues to advancement in technology and engineering, and keys to uncovering the secrets of life itself.



Antoine Simon

Douglas Noblet

The proposal also lies within the area of a traditional village and fishing site of a large band of Sinixt peoples. Much of their cultural heritage has been lost through overdevelopment and resource extraction from similar ecosystems that have since disappeared.

The Rainbow-Jordan Wilderness is one example of such few remaining biodiversity hotspots in the interior of BC that its protection could provide a significant increase in the refuge for certain rare species in the southern Interior Wetbelt region, and could lead to the discovery of species new to science.

Exploratory research in the proposal area has led to the discovery of overwhelming levels of biodiversity.

Lichen, plant, and macrofungi surveys were completed by leading scientists in each field. Though extensive lists of species were documented, researchers have only scratched the surface of what is to be discovered in this vast wilderness.

The Inland Temperate Rainforest

The proposed Rainbow-Jordan Wilderness Park is a unique mosaic of habitat types interspersed between significant tracts of ancient inland temperate rainforest.



Lichenologist Dr. Toby Spribille documents lichen diversity in the Rainbow Valley. [Photo: Douglas Noblet]



Only the wettest Interior Cedar-Hemlock forests

(biogeoclimatic zone variants ICHwk and vk) are considered true rainforest. The intact, ancient remnants of these forests are incredibly rare. They also harbour an assemblage of rare species, including old-growth dependent and coastal rainforest species that can remarkably survive inland due to the consistent moisture in these ancient, low elevation forests.



Center: A fern growing high in a crevice of an ancient cedar indicates a very wet ecosystem. [Photo: Craig Pettitt]

The ancient forests of the Rainbow-Jordan Wilderness have survived through many centuries of landscape disturbances.

Some of the ancient rainforest in the proposal has survived wildfires. It is likely that it has also withstood pests, disease, climate variation and roaring winds.

In the midst of a mass extinction event and rapid climate warming, safeguarding this resilient haven of biodiversity should be an absolute priority for British Columbia.



- The Inland Temperate Rainforest —

Old growth forests are now considered a non-renewable resource.



If this forest was given the chance to rejuvenate from logging, it would not produce trees of this stature again until at least the year 3000. [Photo: Douglas Noblet]

- Lichens -

Lichens are an indicator of ecosystem health. They are sensitive to pollution and to moisture loss caused by forest fragmentation. If they are logged, these forests under the pressure of climate change will never return to what they once were, even if they are allowed to grow past an 80-year harvest cycle.

Forests of the Rainbow-Jordan are lush with life. Ideal growing conditions have produced thriving plant and lichen communities including ancient mosses and some lichen species found in larger colonies than previously recorded inland. Researchers have also documented unusually gigantic plants including 10-foot tall groves of devil's club – an important First Nations medicinal plant.



Antione Simon

Curtis Björk

The diversity of lichens found in the

proposal rivals that of the most biodiverse inland rainforests yet found. All but one of the rare species found in the Incomappleux have been found in the Rainbow-Jordan Wilderness, plus a discovery that has never been found in the Incomappleux.



A significant finding: The federally listed Smoker's Lung Lichen, Lobaria retigera, is a "flagship" species for other rare lichens and bryophytes. [Photo: Douglas Noblet]

Lichens fix nitrogen in the soil and provide nesting materials to small animals. As a primary food source to mountain caribou and other animals, lichens play a fundamental role in the inland rainforest ecosystem.

The rapid loss of the ancient inland rainforest threatens the survival of species that rely directly on old growth-dependent lichens, and of species that are inextricably supported by their ecosystem function.

It was widely believed that northern conifer forests were low in biodiversity. Today these forests are being recognized worldwide for their remarkable species

diversity that exists most abundantly in small forms such as lichens, fungi, and bryophytes. These smaller organisms form the basis of the entire food chain.

Of the lichen samples identified to date, three Blue and one Red-listed species were documented as well as one species that had never been found in B.C.



A significant finding: The Methuselah's beard lichen, Usnea longissima, was found in large colonies in the proposal area. Only small fragments of this lichen had previously been discovered inland at two widely different locations. [Photo: Antoine Simon]

Plants, Insects & Ecosystem Services

In three days of research, botanist Curtis Björk identified a total of **368** plant species. This diversity creates an ecosystem resilience unparallelled by less intact systems.

Right: a colony of Antitrichia curtipendula, a coralroot orchid, Corallorhiza mertensiana, and wild ginger, Asarum caudatum. [Photos: Curtis B., Amber P.]

Rainbow-Jordan Wilderness: A Biological Safehold



Beyond parts of the scenic landscape that are reasonably accessible, this biodiversity hotspot is a safehold from human disturbance. Abundant ecosystem services provided by pristine remaining habitats such as the Rainbow-Jordan Wilderness are necessary to sustaining life on Earth. Some of these services include carbon sequestration, fresh water and oxygen production, and pollination.



Abundant insect life has been observed in the proposal area. Complete entomological surveys are expected to yeild interesting results. [Photos: Amber Peters, Curtis Björk] Like other small organisms of the inland rainforest, insects are foundations of the food chain. The pristine, moisture-rich inland temperate rainforest and wetlands of the Jordan-Rainbow wilderness breed diverse insect life that sustains the whole ecosystem. Unfortunately, leading biodiversity experts warn that this basis of the food chain is where ecosystems are most at risk of collapse.

40% of the earth's insect species may go extinct over the next few decades as a result of habitat loss, pollution, climate change and biological changes that include invasive species and disease. Securing ancient refugia that are resilient to climate and biological change is crucial to human survival (Sánchez-Bayo et al. 2019).

Mushrooms -

The abundance of macrofungi (mushrooms) in the proposal is so overwhelming that nowhere near complete surveys have been conducted so far. Biologists are amazed by the diversity.

Biologist Tyson Ehlers recorded **112** taxonomic classifications in only five hours in just a small part of Frisby Valley.



Fungi play an important role in old-growth forests where they feed many different wildlife and insect species and store the majority of the forests carbon in underground networks.

In Ehlers' survey of the Frisby Valley, 71% of species were documented in the old-growth forest, with 15% from mixed age forest, 9% from young forest, and 5% from a riparian area near a small pond. Rich old-growth mushroom diveristy suggests a complexity of underground mycelial networks that contribute greatly to the health and stability of the ecosystem. (Simard, 2009.)

Right: A significant finding: Hypocrea leucopus - a rare, old-growth dependent species. [Photo: Antoine Simon][bottom: Amber P.]





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Habitats and Wildlife Values

The Rainbow-Jordan Wilderness is a unique interweave of habitats, including rare and previously undocumented ecosystem types.

Biodiversity loss is what scientists consider to be the other major threat facing humankind next to climate change.

Pressures from high-density recreation, logging and development in adjacent areas leave wildlife struggling to find refuge.

In the Rainbow-Jordan Wilderness, life can flourish in a resilient and undisturbed system of diverse habitats.

Shaped by numerous natural disturbances including wildfires, huge rockfalls, debris torrents and avalanches, this wilderness is a mosaic of connected habitats including:

- Extensive young forest created by fire.
- Very old forest, with many trees around two to three metres diameter with some trees measuring 3.5 m.
- Elfin hemlock forest composed of old, gnarled, trees stunted in size due to rocky growing sites.
- Many cottonwoods along Frisby Creek and a cottonwood forest that has not yet been surveyed, but is expected to be alive with birds, bats, fishers and many other animals.
- Old Western Red Cedar trees with hollow bases for potential black bear dens.
- Riparian areas including lakeshore, creeks and wetlands.
- An alder swamp with alder trees hung lavishly with large growths of lichen.



One of multiple wetland ecosystems in the proposal. Wetlands adjacent to forested habitats are incredibly valuable to migrating amphibian species. [Photo: Amber Peters]



Deeply-rutted wildlife trails may have been formed by large numbers of mountian caribou. [Photo: Douglas Noblet]

 A Balch rockside in Frisby Valley — a slope of huge boulders the size of houses where trapped snow and cold air has created a unique growing environment for lush colonies of mosses and lichens.

Biologist Curtis Björk acknowledged that one wetland houses a unique ecological community that is not documented in the wetland classification (MacKenzie et al. 2004) or in the BC Species and Ecosystems Explorer (BC Conservation Data Centre 2018).



Researchers found a juvenile Pacific chorus frog and an adult western toad in the vicinity of a wetland, suggesting a locally important breeding area for amphibians.

Biologist Wayne McCrory reports: "Loss of numerous valley-bottom wetlands and old redcedar forests from the flooding for Revelstoke dam reservoir makes these wetlands significant from a rainforest biodiversity perspective, confirming the value of the study area as a potential provincial park."

Habitats and Wildlife Values

Moose, black bears, a marten or fisher, and what was likely a cougar or lynx have been documented through wildlife camera footage in the proposal area. Small mammal dens have also been noted, as well as an



A bull moose swimming offshore of the Rainbow Valley. [Photo: Douglas Noblet]

Endangered Species

abundance of birds and evidence of grizzly bear habitation.

Researchers know that further study will only strengthen the knowledge of the utter importance of this biodiversity refuge.

McCrory was unable to detect evidence of use by mountain caribou, although potential scat was found by other participants. However, the broad, well-worn wildlife trails through much of the proposal indicate that there is much more to learn about wildlife in the Rainbow-Jordan Wilderness.

In addition to an anticipated list of species undocumented or unknown to science, the following endangered species are listed both provincially and federally with known occurrences in biogeoclimatic zones ESSF, ICH, and IMA within the forest district (DCO) of the park proposal (BC Species & Ecosystems Explorer 2018):

Red listed species

Southern Mountain Caribou (*Rangifer tarandus*) Western Grebe (*Aechmophorus occidentalis*) Haller's apple moss (Bartramia halleriana) Northern Leopard Frog (Lithobates pipiens) Limber pine (*Pinus flexilis*) Umatilla Dace (*Rhinichthys umatilla*)

Blue-listed species

Vivid Dancer (Argia vivida) Grizzly Bear (Ursus arctos) Short-eared Owl (Asio flammeus) Western Painted Turtle (Chrysemys picta) Wolverine (Gulo gulo luscus)

Long-billed Curlew (*Numenius americanus*) Olive-sided Flycatcher (Contopus cooperi) Black Swift (*Cypseloides niger*) Bobolink (Dolichonyx oryzivorus) Rusty Blackbird (*Euphagus carolinus*) Barn Swallow (*Hirundo rustica*) Magnum Mantleslug (*Magnipelta mycophaga*) Northern Myotis (*Myotis septentrionalis*) Shorthead Sculpin (*Cottus confusus*) Monarch (*Danaus plexippus*) Cutthroat Trout (Oncorhynchus clarkii lewisi) Whitebark Pine (*Pinus albicaulis*) Bull Trout (Salvelinus confluentus)

This list was compiled through the BC Species & Ecosystems Explorer (2018). After discovering multiple rare species that are not stated here, researchers know that the number of endangered species in the proposal is actually far greater.

British Columbia's huge list of endangered and declining species will only continue to grow as the rarest habitats are also imperilled. Protecting this ancient legacy of a globally significant rainforest is fundamental to halting the massive collapse of the unique B.C. inland rainforest ecosystem.



Director Craig Pettitt and Wildlife Biologist Wayne McCrory with a hollow cedar bear den. [Photo: Amber Peters]

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Rainbow-Jordan Wilderness (8404.5 ha)	Age Class	Area (ha)	% of Proposal
Old ICH	9	1470.0	17.5
	8	753.4	9.0
	7	129.6	1.5
Old ICH Total		2353.0	28.0
Total ICH		4691.2	55.8
Old ESSF	9	1486.7	17.7
	8	1215.0	14.5
	7	111.0	1.3
Old ESSF Total		2812.7	33.5
Total ESSF		5527.3	65.8

Forest Breakdown by Biogeoclimatic Zone:

Operable Forest in Proposal Area	Age Class	Area (ha)	% of Proposal
OId ICH	9	719.0	8.6
	8	200.5	2.4
	7	52.3	0.6
Old ESSF	9	191.0	2.3
	8	65.8	0.8
		2134.0	25.4
Reduction of provincial caribou no-harvest UWR from operable		-384.3	-4.6
Reduction of federal critical caribou habitat from operable		-44.4	-0.5
Total Operable Forest		1705.3	20.3

Caribou Density	Туре		
	low	257.4	
	moderate	78.2	

*Total federally designated critical caribou habitat = 428.7 ha. 384.3 ha of this area overlaps with the provincial UWR with a remaining 44.4 ha of federal critical habitat removed from the operable forest base.

Frisby Ridge Rec Area (215,587 ha)	
Old ICH	36.2
Old ESSF	1890.3

Caribou Density	Туре		
	low	661.1	
	moderate	413.5	
	high	71.8	