Cascades to Rockies
Columbia Highlands

Free Passage
Reestablishing North America's Wildlife Corridors

Russ Manning

The dedicated conservationists and scientists working to restore and preserve a Cascades to Rockies corridor know this region and the enormous effort involved much more directly and intimately. We all owe them our hope for the future.

Cover Photograph: Canada Lynx (*Lynx canadensis*)
Colin Canterbury/US Fish and Wildlife Service

The Colville and other tribes with support from Conservation Northwest are reintroducing lynx in the Kettle Range portion of the Columbia Highlands.

References by section number can be found at the end.

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1

Descending east from Washington Pass in the Cascades, I drop into the valley of the Methow River. The Methow tribe, a small, detached band of *Okanagan*-speaking people, the *spaƛmulaxʷəxʷ*, lived along the river that also bears their name. Then east through a section of Okanogan National Forest and Loup Loup State Forest, the highway enters the sagebrush flats and ranchlands of the Okanogan Valley surrounded by rolling hills. A dramatic change from sharp mountain peaks of the Cascades to more gentle landscape along the Okanogan River.

In the *Okanagan* language, a dialect of the Interior Salish, the indigenous name of these people, *sʔukʷnaʔqín*, means "seeing over the top" or "bringing something to the mountain top." The Okanagans, also known as the *Nsyilxcn* or just *Syilx*, were central to east-west trade over the mountains.

Both the Methow and the Okanogan rivers reach confluence with the Columbia River to the south. East of these valleys lie the Okanogan Highlands and, beyond, the mountains forming the western foothills of the Rocky Mountains.

Conservation Northwest, in addition to its efforts in the North Cascades as well as its advocacy of a Cascades to Olympics corridor, has worked to reestablish and preserve a wildlife corridor between the Cascades of the Pacific Wildway and the Rockies of the Western Wildway. This Cascades to Rockies corridor will provide connectivity for the West's iconic species—mule deer (*Odocoileus hemionus*), elk (*Cervus canadensis*), moose (*Alces alces*), bighorn sheep (*Ovis canadensis*), mountain goat (*Oreamnos americanus*), wolverine (*Gulo gulo*), Canada lynx (*Lynx canadensis*), wolf (*Canis lupus*), mountain lion (*Puma concolor*), black bear (*Ursus americanus*), and grizzly (*Ursus arctos horribilis*). With a protected wildlife corridor across the highlands and foothills, these native species will be able to travel east to the Rockies or west to the Cascades in search of favorable habitat, new territory, and potential mates. A multitude of smaller creatures in the ecosystem will follow in their wake but may move only short distances in seasonal passage to maintain their populations. The mountain forests and flatland sagebrush inhabiting this corridor provide the necessary shelter and resources for the survival of this assemblage.

Much of this Cascades to Rockies connection in the U.S. and Canada is preserved in national forests and tribal lands, as well as state, province, and local preserves. Consequently, this landscape serves as the primary east-west migration route for wildlife between the two great north-south mountain systems in the North American West.

2

A geologic depression called the Rocky Mountain Trench runs north-northwest from Flathead Lake in Montana, through British Columbia, to the headwaters of the Yukon River near the border of BC with Yukon Territory. Large enough to be seen from the International Space Station, the Trench formed after the collision of tectonic plates that pushed up mountains millions of years ago. Following the buildup, the land stretched, causing pieces of the lithosphere to rupture and collapse relative to the mountains on either side. These "normal faults" resulted in a separation of the Rocky Mountains on the east with the Columbia Mountains on the west,

which are thought to be somewhat older than the Rockies given that mountain building occurred southwest to northeast.

Four major subranges make up the Columbia Mountains Natural Region: the Cariboos at the northern extent in British Columbia plus the Purcells, Selkirks, and Monashees that run parallel from BC across the international boundary into the U.S. These ranges lie north-south, at right angles to the mountain-building force pushing from the west that rumpled the land surface.

Apple maps

The present names of these mountains originated with early European exploration of the region. “Monashee,” the name for a mine staked in the mountains in the 1880s by a Scotsman, Donald McIntyre, originates from a Gaelic term meaning “mountain of peace.” The label “Selkirk” was given in 1821 for Thomas Douglas, part owner of the Hudson’s Bay Company and the 5th Earl of Selkirk. James Hector applied the name “Purcell” to the mountain range for Goodwin Purcell; the two served together on a committee to select members for the Palliser Expedition, a British Royal Geographic Society exploration of western Canada 1857 to 1860.

In the U.S., the Purcells range on the border of Montana with the Idaho Panhandle, while the Selkirks occupy the Panhandle’s northwest border and the adjacent corner of the state of Washington. The Monashees lie west of the Selkirks in northeast Washington.

The Columbia Mountains are named for the Columbia River that flows north from Columbia Lake lying in the Rocky Mountain Trench. Passing the northern end of the Purcells, the river later rounds to the west, where the Canoe River joins, and then south to outline the northern end

of the Selkirks. Beyond that turning, the Fraser River has emerged from the Rockies to continue the flow of water northwest in the Trench before rounding the end of the Cariboo Mountains to also head south.

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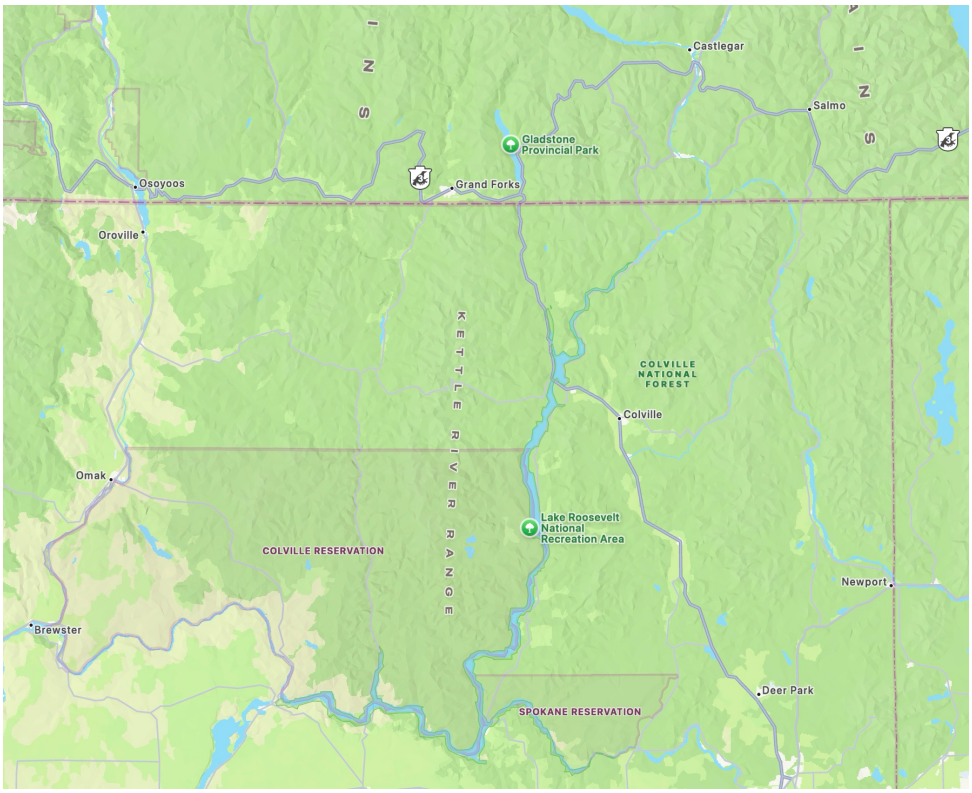
The Columbia, having turned south, passes between the Selkirks on the east and the Monashees on the west. These geologically distinct foothills of the Rockies are collectively referred to as the "Columbia Highlands," taking its name from the river and mountain range.

The southernmost subrange of the Monashees, where they enter the U.S. into Washington, is called the "Kettle River Range." The Kettle River rises in the BC Monashee Mountains and flows south and southeast to dip into Washington then turn northeast back into BC where it makes a hairpin turn to the south, outlining the northern reaches of the Kettle River Range. The river then flows back into Washington where it eventually joins the Columbia River. From the Kettle River at its northern end, this mountain subrange extends south, bordered on the west by the Curlew Valley and the San Poil River and on the east by the Columbia River, ending on the south where the big river turns west.



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West of the Kettle River Range, the mountains settle into the landscape of the Okanogan Highlands, part of the Interior Plateau of British Columbia that extends into Washington. (In the U.S., the designation Okanogan Highlands often includes the Columbia Highlands, which at other times are simply indicated as part of the Rocky Mountains.) Then beyond the Okanogan and Methow River Valleys, rise the Cascades that reach into British Columbia for about a hundred miles to Lytton Mountain and the Thompson River. BC's Interior Plateau lies north of the Thompson. The Fraser River flowing south separates the BC Cascades from the Coast Mountains on the west before turning to empty into the Pacific.

All of this serves to outline the area from the Northern Cascades to the Rocky Mountains to in British Columbia and Washington for east-west habitat connectivity.

3

East from the Cascades, connectivity begins with Loomis State Forest in the foothills where Conservation Northwest helped preserve 25,000 acres within the state forest. CNW formed a coalition that raised the necessary $16.5 million to acquire school trust inholdings that are now permanently protected as the Loomis Natural Resources Conservation Area. This NRCA along with surrounding state forest lands is prime habitat for Canada lynx and their prey, snowshoe hare (*Lepus americanus*). East of Loomis lies the Okanogan Valley.

Joining US 97, I turn north along the Okanogan River, with the Colville Reservation on the east. The Confederated Tribes that live on the reservation consist of the Lakes, Colville, Okanogan, Moses-Columbia, Wenatchi, Entiat, Chelan, Methow, Nespelem, Sanpoil, Palus, and the Chief Joseph Band of Nez Perce, who together originally occupied 39 million acres in eastern Washington and portions of British Columbia, Oregon, and Idaho. While the reservation to

which they were confined originally covered several million acres in Washington, the maneuverings of the U.S. government, spurred by the discovery of gold in the northern half, managed to reduce the size to its current 1.4 million acres. The reservation's name originates with either Andrew Colvile or his son, Eden, both officials of the Hudson's Bay Company, which established Fort Colvile in 1825 as a fur-trading post near the waterfall on the Kettle River. A Columbia River tributary to the south of the fort was also given the name "Colville," as it came to be spelled. The indigenous people living near Kettle Falls and along the Colville River, the *sx̌ʷýʔłp*, took on "Colville" as their English name.

While north-south US 97 is considered a scenic byway in this less-developed region of Washington, it does pose a barrier for east-west wildlife movement between the Cascades and the Kettle River Range. The Okanogan Valley hosts the largest mule deer migration in the state. Along a 13-mile stretch of US 97 south from Janis Bridge that spans the Okanogan River, around 350 deer are killed annually by vehicles. Conservation Northwest and the Washinton chapters of the Mule Deer Foundation initiated a Safe Passage 97 project to address the death toll as well as the safety of vehicles traveling the highway. As a first step, the project engaged local partners and donors to raise $260,000 for wildlife passage improvements under Janis Bridge that consisted of removing brush and grading a path on the south side under the bridge. Fencing was added along the highway to funnel wildlife to the underpass. Since then, the Washington State Department of Transportation has documented a 90% reduction in vehicle-deer collisions at that location. Wildlife cameras have documented mule deer, mountain lion, coyote (*Canis latrans*), and bobcat (*Lynx rufus*) using the underpass, along with other wildlife.

The overall project will include several more underpasses, associated fencing, and cattle grates at side roads to keep wildlife off the highway. The Washington legislature has allocated a total of $3.7 million to the Washington State Department of Transportation as the state's cost-sharing requirements to elicit federal funds for the next phase of the project. CNW Executive Director Mitch Friedman tells me, "Through WSDOT, we've applied for federal Wildlife Crossing Pilot Program grant funding in '23 and '24, falling just short. We plan to apply again this year ('25), as there's still about $85M left in the fund and the word is that there will be a grant process. But the Federal Highway Administration has yet to put out the notice. The state funds are to match the federal, so that remains our plan. We hope to fund two underpasses and fencing."

Eventually, a total of six crossings will be provided. In the meantime, CNW has partnered with Okanogan Land Trust to establish conservation easements along this section of US 97 to preserve opportunities for connectivity across the highway. These easements supplement the 2,240-acre Carter Mountain Wildlife Area to the west of Janis Bridge that is an important steppingstone in the Cascades to Rockies corridor. The Washington Department of Fish and Wildlife along with conservation partners, including CNW, raised federal and state funds to purchase this property and prevent residential development that would have blocked this migration route.

While the expense of such work as the US 97 crossings can be easily justified based on concerns for human safety and the cost of vehicle damage from collisions with wildlife, migrating animals possess some rights as well, including being able to make it to the other side of the road. As Andreas Seiler and Manisha Bhardwaj remind us in their paper, *Wildlife and Traffic: An Inevitable but Not Unsolvable Problem*, "it is not the deer that crosses the road but the road that crosses the forest."

To preserve connectivity across the Okanogan Valley, as well as the Okanogan Highlands, an Okanogan Working for Wildlife Initiative was formed to protect habitat as well as working lands. Funded by the National Fish and Wildlife Foundation and coordinated by Conservation Northwest, the Initiative worked to secure conservation easements and to restore public and private lands. One such effort resulted in CNW purchasing 9,243 acres in 2021 in the Tunk Valley, just northwest of the Colville Reservation, that had been a family cattle ranch since 1904. The last family member to run the ranch, Ernie Figlenski, wanted to preserve the land as a legacy of his family's four generations who had lived there. Since this was originally part of the Colville Reservation, Figlenski wanted the land to go back to the Confederated Tribes, which was the stipulation in selling it to CNW. The Tribes agreed to accept the acreage with covenants for its protection, restrictions that were in keeping with the Tribes' values anyway.

The nearby 727-acre McLoughlin Falls Ranch also received protection when the Western Rivers Conservancy acquired the property with funding from several sources, including CNW. In 2023, WRC transferred the northern portion to the Colville tribes and the southern portion to the Washington Department of Fish and Wildlife to provide public access for fishing and boating on the Okanogan River and non-motorized access on land.

These protected areas not only help make the connection east to the Kettle River Range, but also provide north-south connectivity from Columbia Basin sagelands in central Washington north to British Columbia's Interior Plateau grasslands. This habitat helps to preserve shrub-steppe species, such as the state-endangered Columbian sharp-tailed grouse (*Tympanuchus phasianellus columbianus*).

To further aid that effort, Conservation Northwest established its Sagebrush Heritage Program with several partners, including the Arid Lands Initiative, a collaboration of public agencies and conservation organizations that formed in 2009 with the aim of protecting eastern Washington's arid lands. The goal of the Sagebrush Heritage Program is to connect and restore the historic shrub-steppe landscapes from British Columbia's Okanagan Valley south into Washington's Columbia Plateau where the Arid Lands Initiative focuses its work.

The basalt province of the Columbia Plateau, lying mostly south of the Columbia River, resulted from repeated molten outpourings of lava that flowed across the land and covered about 100,000 square miles between the Rockies and the Cascades. The flowing lava likely pushed a segment of the ancient Columbia River northwest and, along with glacier advance, created the C-shaped curve of the river in central Washington called the "Big Bend." While warping and faulting have given the plateau some variation in elevation, the Plateau is still a semiarid region with mostly shrub and grass vegetation.

The term "shrub-steppe" refers to the assemblage of plants in this arid region that lies in the rain shadow of the Cascades. Sagebrush (*Artemisia tridentata***)** is the dominant shrub, while "steppe," derived from the Russian "степь" meaning "grassland" or "prairie," refers to the grasses and forbs of this ecosystem.

In 2020, wildfires swept across 600,000 acres of Washington's shrub-steppe region that devastated the plant and animal communities as well as rangeland pastures. In response, the Washington Department of Fish and Wildlife established the Washington Shrubsteppe Restoration and Resiliency Initiative with operating funds from the state legislature for restoration and to establish a collaborative group for developing a long-term strategy for shrub-steppe conservation and fire preparedness.

Capital funds were also provided for wildlife friendly fences. Phasing out barbed-wire eases wildlife movement. One innovation, a smooth bottom strand at least eighteen inches off the ground, allows pronghorn (*Antilocapra americana*) to safely slip underneath. Pronghorn roamed Washington's shrub-steppe prior to 1900. In recent years, reintroduction by the Colville Confederated Tribes, the Yakama Nation to the south, and conservation groups have brought the population back to a few hundred, primarily on the Columbia Plateau.

The group tasked with developing the long-term strategy for shrub-steppe conservation issued the plan in March 2024:

> WSRRI … is committed to preserving and revitalizing the unique shrubsteppe landscape of Washington State for the wildlife and human communities that call this unique landscape home. … By balancing strategic wildlife habitat protection and restoration with sustainable working lands management and engaging a broad range of shrubsteppe communities, stakeholders and Tribes, the initiative seeks to foster a wildfire resilient and thriving landscape.

The shrub-steppe of British Columbia and Washington forms the northernmost reach of the "Sagebrush Sea" that once occupied 500,000 square miles across thirteen states in the U.S. But the "sea" is vanishing; half already gone. The Nature Conservancy reports that 14 million acres have been lost since 1998. The shrub-steppe supports 350 rare, threatened, and endangered species, including the greater sage-grouse (*Centrocercus urophasianus*), burrowing owl (*Athene cunicularia*), and pygmy rabbit (*Brachylagus idahoensis*). TNC's Sagebrush Sea Program works across seven states to protect and restore these lands.

Recognizing the importance of this ecosystem, the BC government has proposed a South Okanagan-Similkameen National Park just north of the international border. The park will consist of 270 square kilometers (67,500 acres). Part of this area is already set aside in the South Okanogan Grasslands Protected Area. These are the traditional lands of the Syilx Okanagan. In 2019, the Canadian and BC governments signed a Memorandum of Understanding with the Syilx to work together to establish the national park in the Okanagan and Similkameen river valleys, the latter a tributary that joins the Okanogan River in Washington. Conservation Northwest, The Nature Conservancy of Canada, and other conservation groups support establishment of the park.

5

Migrating wildlife have an easier route once they encounter the less-developed Colville Reservation and the 1.5 million-acre Colville National Forest north of the reservation. A significant portion of the forest was once part of the reservation, referred to as the "North Half." This area hosts numerous white-tailed deer (*Odocoileus virginianus*), mule deer, elk, moose, bighorn sheep, mountain goat, wolverine, wolf, grizzly, and black bear, species that may travel east to the Rockies or west to the Cascades. This connection is vital for maintaining genetic diversity across populations. In his book, *What Evolution Is*, Ernst Mayr explains the risk of an isolated gene pool:

> A given species population can tolerate only a limited amount of variation. In the case of any drastic change of the environment, whether a climatic deterioration or the appearance of a new predator or competitor, the kind of genes needed for an appropriate immediate response to this new selection pressure may not be present in the gene pool of the population.

However, with connectivity across populations and consequent gene flow through the mating of individuals from different populations, the overall gene pool is strengthened by being more diverse. There's a greater chance that connected populations will possess the necessary genes for adaptation to a new selection pressure, such as climate change. As Mayr says,

> Surely when a population suddenly encounters an extremely adverse situation, the more genetically diverse it is, the greater is the chance that it contains genotypes that can better cope with the environmental demands …

While the Colville Reservation serves as a relatively cohesive area across the Okanogan Highlands to the Kettle River Range, Colville National Forest on the north is not circumscribed by a single boundary. The separate units of the forest appear on a map as a partially completed jigsaw puzzle. A strip of the Colville separates Loomis State Forest from Okanogan National Forest in the Cascades. Then on the other side of the Okanogan River several units lie north of the reservation. Still, these national forest patches with their limited protections provide stepping-stone refuges for connectivity across the landscape.

Structural connectivity, the degree to which a corridor is physically intact, is but one measure of the usefulness of a landscape for wildlife movement. As Jodi Hilty and others stress in *Corridor Ecology*, functional connectivity is at least, if not more important than structural connectivity. Functional connectivity, that is meeting the needs of the species involved,

> … may not require a continuous connection of relatively intact natural habitat but could involve stepping-stones of habitat or protected areas that are not physically connected but that can facilitate dispersal or migration movements. …If a species has some ability to cross matrix habitat, clusters of small patches may be an alternative to continuous corridors.

Moving in either direction, wildlife can use the Colville Reservation or the stepping-stone units of the national forest that are fortunately large enough to provide refuge for extended stopovers as well as the home of many species. Farther to the east lies a more intact north-south portion of Colville National Forest that encompasses the northern half of the Kettle River Range, with the southern half within the Colville Reservation.

The Kettle Range consists of a single long mountain ridge with side ridges sloping to the east and west. The ridgeline is appropriately called the "Kettle Crest." Within the national forest section of the range, the 44-mile Kettle Crest Trail follows the ridgeline, including over Copper Butte, the highest peak of the Kettles at 7,140 feet. The trail is also part of the Pacific Northwest National Scenic Trail that travels 1,200 miles from the Continental Divide in the U.S. Glacier National Park to Olympic National Park on the Pacific Coast.

Within this portion of the Kettle Range, 100,000 acres have been identified as existing or proposed roadless areas deserving of wilderness protection, including areas of old-growth forest. However, despite longtime efforts, no wilderness has been designated in the Kettles. While the Washington State Wilderness Act of 1984 designated an additional million acres of wilderness in national forests across the state, the Colville's Kettle River Range was excluded. Without wilderness protection, the Kettle Range remains open to resource extraction, especially logging. The 1984 Act voices this danger:

> …areas in the State of Washington reviewed …and not designated as wilderness upon enactment of this Act … shall be managed for multiple use in accordance with land management plans …such areas need not be

> managed for the purpose of protecting their suitability for wilderness designation …

Any further consideration of wilderness across the state, the Act says, must be permitted by the U.S. Congress.

> …unless expressly authorized by Congress, the Department of Agriculture shall not conduct any further statewide roadless area review and evaluation of National Forest system lands in the State of Washington for the purpose of determining their suitability for inclusion in the National Wilderness Preservation System.

The language refers to the Roadless Area Review and Evaluation (RARE) process conducted in the 1960s-70s to identify potential wilderness areas in our National Forests and National Grasslands. Using restrictive criteria, RARE-I primarily identified areas in the West, while RARE-II used revised criteria to identify additional areas east of the Mississippi River. These studies have largely been superseded by the Roadless Area Conservation Rule issued by the U.S. Forest Service under President Bill Clinton in 2001 that limits road construction and logging in 58.5 million acres of inventoried roadless areas. In 2025, federal efforts have emerged to rescind the Roadless Rule, posing a threat to our old-growth forests.

Specifically, lack of protection in the Kettle River Range threatens the long-term viability of the Cascades to Rockies corridor. CNW's Director Mitch Friedman has stated, "You can't link together populations of lynx or wolverine between those large mountain ranges without permanently protecting the Kettle Crest. The more permanent, the more legislated our protections, the more likely they'll be here for generations."

In the interim, the Northeast Washington Forest Coalition formed to help in preservation of these forested lands. The coalition includes representatives from the timber and recreational industries, U.S. Forest Service, Washington Department of Natural Resources, and conservation groups, including Conservation Northwest and The Lands Council, that works to preserve the inland forest of the Northwest. Vaagen Brothers Lumber plays a critical role in the coalition. Avista Utilities, also a member of the coalition, operates the Kettle Falls Generating Station using wood waste from surrounding sawmills to produce electricity. The mission of the NEW Forest Coalition is to bring interested parties together to work with Colville National Forest personnel to promote ecological health of the forest as well as provide for recreational opportunities and for economic stability of the surrounding communities that depend on the forest.

As outlined in their Strategic Vision, the coalition views the forest as two zones. In the Community Restoration Zone, management activities help restore the forest while also supporting local businesses through timber production. The U.S. Forest Service's Wildfire Crisis Strategy helps in this effort. Recognizing the wildfire danger to our national forests after decades of fire suppression and a warming climate, the Service is implementing a strategy to protect communities and make the forests more resilient with funding primarily from the 2021 Bipartisan Infrastructure Law and the 2022 Inflation Reduction Act. In 2023, Colville National Forest was added to the project so that 2,000 acres will be treated annually for ten years. The strategies include relying on the local wood products industry to support fuel reduction through processing understory biomass (modern technology enables fabrication of wood products from smaller trees), thereby encouraging the growth of large, fire-resistant trees. Tribal, state, and

local governments help implement contracts and supplement the workforce to assist in forest maintenance.

Controlled burning is another tool for "fuel reduction." Prescribed fire mimics natural fire that long helped preserve the ecosystem prior to the government policy of extinguishing all fires. For example, in the lynx-snowshoe hare ecozones, too little fire reduces hare habitat and of course the number of hares then declines, resulting in lynx leaving that area. Too many large fires increase hare habitat and abundance but removes protective habitat and breeding sites for lynx. A mix of habitats, created by a natural fire regime, results in the Goldilocks Principle: "neither too hot nor too cold, but just right …"

The second zone in the Kettle Range, the Wildlands, includes inventoried roadless areas, recommended wilderness areas in the Forest Management Plan, and other wildlands and old growth that need permanent protection through legislation, including the Kettle Crest. The NEW Forest Coalition states, "The cornerstone of NEWFC's success is indelible support for permanent protection of wildlands on the CNF." The coalition has since formed a new partnership, NEW Heritage, to work on legislation that provides assurance for forest dependent industries, reaffirms tribal connections to their traditional lands, and protects significant areas through designations that include wilderness and recreation.

The Colville and other tribes with support from Conservation Northwest began a lynx reintroduction program in the Kettle Range in 2021, with a goal of introducing 50 over a five-year period. The distinct population segment of lynx in the contiguous U.S. is considered threatened under the Endangered Species Act, which necessitates protecting habitat. Canadian trappers capture the lynx in British Columbia and turn them over to tribal biologists in Canada, who in turn hand them over to tribal members in the U.S. who deliver them to the Kettles. This effort is part of an overall project to reintroduce missing or nearly depleted species to the Colville Reservation, including sharp-tailed grouse, pronghorn, and bighorn sheep.

The involvement of indigenous communities is ensured with the USFS Tribal Action Plan, issued in February 2023 in response to Pres. Biden's 2021 "Memorandum on Tribal Consultation and Strengthening Nation-to-Nation Relationships." The Action Plan outlines Forest Service responsibilities for co-stewardship of public lands that were once indigenous lands and are still seen as part of their natural heritage. While incorporating indigenous knowledge, the plan also calls for honoring treaty obligations and supporting tribal self-determination. Various projects receive funds for operations, such as expansion of tribal native-plant nurseries for habitat restoration on the Colville, Spokane, and Kalispel reservations and forest lands.

This NEWFC collaboration has brought an end to the conflicts and protests that came to be called the "Timber Wars," when timbering interests vied with preservation interests. Since then, the timbering economy has stabilized and even increased alongside forest restoration, old-growth preservation, and roadless area protections. This follows CNW's idea "to protect all ancient forests while having logging focused on second-growth" and fits with what Mitch Friedman calls "situational conservation."

The NEW Forest Coalition has become a model for the collaboration of differing interests in the health and future of a national forest.

6

At the Kettle River's confluence with the Columbia, Kettle Falls on the larger river was once a famed salmon fishery for indigenous peoples. Salish speakers called the falls where they gathered to fish *Shonitkwu* (or *Sx̌^{w}nitk^{w}*), meaning "roaring" or "noisy" waters because of the sound from the fifty-foot drop of cataracts that could be heard a mile or more away. Explorer

David Thompson, leading a mapping expedition from Montreal, arrived at the falls in 1811. According to Craig Romano in his book *Columbia Highlands, Exploring Washington's Last Frontier*, those French-Canadian voyagers called the noisy falls, *La Chaudière*, which translates to "boiler" or perhaps "cauldron." Also, as quoted in Cassandra Tate's essay on Kettle Falls, Canadian artist Paul Kane saw the falls in 1847 and recounted, "These boulders, being caught in the inequalities of rocks below the falls, are constantly driven round by the tremendous force of the current, and wear out holes as perfectly round and smooth as in the inner surface of a cast-iron kettle." And so the name.

The kettle sound is heard no more because construction of Grand Coulee Dam created Lake Roosevelt (named for Franklin), which submerged the falls as well as Native American homes and sacred sites. The lake was designated a national recreation area in 1946. The dam, completed downstream on the Columbia River in 1941 with a labor force of 8,000, was the largest masonry structure in the world at the time.

Needing public support for such projects, the federal government hired Woody Guthrie to promote hydroelectric dams on the Columbia. Guthrie wrote the lyrics for "Grand Coulee Dam" to the tune of the folksong "Wabash Cannon Ball." The dam is named for nearby Grand Coulee in central Washington, a channel created when the ice dam of ancient Glacial Lake Missoula collapsed. The mass of rushing water scoured out Grand Coulee, now a National Natural Landmark. A French-Canadian term, "coulée" is derived from the French *couler*, meaning "to flow."

The salmon are also gone from Kettle Falls. Since no fish ladders were included in construction of Grand Coulee Dam to enable fish to migrate upstream, the upper Columbia was cut off from the salmon runs that occurred spring through fall. Hundreds of thousands of salmon, Chinook (*Oncorhynchus tshawytscha*), sockeye (*Oncorhynchus nerka*), and coho (*Oncorhynchus kisutch*) as well as steelhead trout (*Oncorhynchus mykiss irideus*)—also anadromous, i.e., reproducing in inland waters but living in the ocean as adults—once moved upriver to spawn. With construction of dams, there were no salmon or steelhead in the upper river for many decades (except for small populations of salmon that managed to adapt to confinement in lakes, returning to natal streams to spawn; steelhead that live their entire lives in fresh water are rainbow trout). However, indigenous tribes of the Columbia River watershed have begun a project to reintroduce salmon to the upper Columbia River. They catch salmon in the river below Chief Joseph Dam, downstream from Grand Coulee. (Fish passage from the Pacific ends at Chief Joseph because it also has no fish passage, while all dams farther downstream have ways for fish to continue upstream.) Females are transferred to hatcheries where the fry are born. The fry are then reintroduced into the river above Lake Roosevelt in British Columbia.

While use of hatcheries reduces the salmon's adaptability through loss of genetic variation and connection to natal habitat, it's a necessary stopgap to species extinction until the river can be restored to something resembling the original flow. The importance of the salmon to the ecology has been well documented, not just in the river but for the surrounding lands. Marine nitrogen has been found far inland from the sea, in algae and insects in tributary streams as well as the surrounding plants and trees in what has been termed the Salmon Forest. Bears and other predators drag salmon carcasses into the forest where scraps decay and deposit nitrogen in the soil. As Eileen Delehanty Pearkes says in *Big River*, "Gravity carries water downhill to the sea, but only fish can carry the ocean's goodness back up to benefit the landscape."

The indigenous-led reintroduction of salmon in the upper Columbia is named the "Columbia River Salmon Reintroduction Initiative." This collaboration of the Syilx Okanagan, Secwépemc,

and Ktunaxa Nations with the governments of British Columbia and Canada combines indigenous knowledge with western science to accomplish the goal of "Bringing the Salmon Home." As reported in the Initiative's Annual Report for 2023-24, tagged salmon fry released in the upper Columbia made it downriver through all the dams. After reaching maturity at sea, several returned as adults to the lower Columbia in 2023. In a collaborative monitoring project, some adult salmon released by Colville Confederated Tribes in the upper Columbia returned to Canadian waters and exhibited spawning behavior. This excerpt from the Initiative's Indigenous Knowledge Statement explains:

> From our tribal perspectives of "all living things," our Indigenous Stories, Worldviews, and Laws uphold as sacred the water, animals, plants, lands, and People of the Columbia River.
>
> The health and well-being of all things depends on how we carry out these sacred responsibilities to protect all species – which are interconnected and linked to that of other animals, to the waters, to the forest, and to the ocean.
>
> One species we are focusing on is Salmon, who truly live in reciprocity for the next generation by providing life to the waters and lands where they spawn. … Our world views can guide the scope and focus of this Initiative beyond salmon as they have done for thousands of years for the best chance of survival for all.

Chief Joseph Dam on the U.S. portion of the Columbia was called "Foster Creek Dam" when first authorized, but the proposed name was changed to "Chief Joseph" to give it more prestige than the nearby creek. The name memorializes Chief Joseph of the Nez Perce, who outmaneuvered the U.S. Army for months in 1877 until he famously said, "I will fight no more forever." Heinmot Tooyalakekt, as he was known to his people, spent his last years on the nearby Colville Reservation after being denied his repeated requests to return to his homeland in Oregon. He likely would not have felt honored by the dam's name.

More than sixty dams impede the Columbia and its tributaries. In the 1960s, the Columbia River Treaty between the U.S. and Canada resulted in four hydroelectric/flood-storage dams—two on the Columbia in BC and one on the Duncan River also in BC and one on the Kootenay River in the U.S., with each country sharing in the power benefits. These dams collectively flooded more than 270,000 acres (110,000 hectares). While the treaty has no expiration date, the current agreement for operations lasted for 60 years, ending in September 2024. The Upper Columbia United Tribes argued in *The Value of Natural Capital in the Columbia River Basin: A Comprehensive Analysis* that a revised treaty should include the river ecology alongside other resources in the evaluation and operations planning. The report suggested a new scenario for increasing reservoir storage during the fall and winter that could be released in spring and summer to more mimic the natural river flow. The analysis showed the improved ecology actually increases the economic value of the Upper Columbia. Also, the Columbia River Inter-Tribal Fish Commission, an alliance of tribes on the lower Columbia, took the position that the treaty needs to be modernized, especially to improve fish passage at the river system's dams.

In July 2024, President Biden and Prime Minister Trudeau announced an agreement in principle between the two countries on the terms for modernization of the Treaty, including managing stream flows and fish passage to benefit salmon and other fish that migrate through the rivers. With a change in Administrations in both countries, negotiations have stalled.

Similarly, four dams on the Snake River, a main tributary of the Columbia, have long impeded salmon recovery. Litigation was put on hold in 2021 during negotiations that resulted in the Resilient Columbia Basin Agreement between indigenous groups, the states, conservationists, and the federal government. In exchange for staying all lawsuits, federal resources will be brought to bear in analyzing alternatives to the services the dams provide with a goal of eventually removing the dams. Funding is included for salmon habitat and tribal energy projects coupled with changes in dam operations to benefit runs of fish. In June 2025, the current Administration withdrew from the agreement. Tribal and state leaders criticized the decision. While regional, state, and tribal efforts continue toward protecting salmon habitat and runs, much of the funding for those efforts are now gone. Litigation will likely reemerge as a last-ditch strategy to save endangered species.

7

The Columbia River separates the long crest of the Kettle River Range from the Selkirk Range that's characterized by several ridgelines. While the Selkirks reach lofty heights in British Columbia, they are more muted on the south as they cross the international border. Only two peaks in the Washington Selkirks reach over 7,000 feet—Gypsy Peak (7,323 ft.) and Abercrombie Mountain (7,312 ft.), both higher than Copper Butte in the Kettles. Author Rich Lander says, when commenting on *Columbia Highlands* by Romano, "The Columbia Highlands are special precisely because they are neither too high nor too low, but rather just right for habitation for a long list of remarkable species."

And for the east-west migration of those species. Romano says, "A transition zone between the wet Cascades and the drier Rocky Mountains, the highlands act as a land bridge for wildlife populations from these greater ecosystems."

Columbia Highlands

The in-between state of this east-west linkage means the Highlands host myriad animal species from both mountain ranges amid mountain forests of western red cedar (*Thuja plicata*) and western hemlock (*Tsuga heterophylla*) in the valleys; Englemann spruce (*Picea engelmannii*) and subalpine fir (*Abies lasiocarpa*) on slopes and in cool, moist locations; in drier areas and where the land has been disturbed, including areas of fire succession, Douglas fir (*Pseudotsuga menziesii*), western white pine (*Pinus monticola*), western larch (*Larix occidentalis*), lodgepole pine (*Pinus contorta*), grand fir (*Abies grandis*), and ponderosa pine (*Pinus ponderosa*). Deciduous trees play a secondary role in the ecosystem.

With grizzly recovery planned for the Northern Cascades, the hope is they will travel east and mix with the Selkirk population and the Rockies beyond. Then the entire grizzly population in the Northwest would be connected geographically and genetically, contributing to the resilience of the species.

The U.S. Selkirks lie within two national forests, the easternmost unit of the Coville and the Kaniksu National Forest that straddles the border of Washington with Idaho and is managed as part of the Idaho Panhandle National Forests. While Canada's larger portion of the Selkirks contains many protected areas, including their Glacier National Park, Mount Revelstoke National Park, and numerous provincial parks, the U.S. portion of the Selkirk Range contains the only permanently preserved area, a wilderness, in Washington's portion of the Columbia Highlands.

Wanting to see this lone wilderness area, I head out of Metaline Falls. The waterfall on the Pend Oreille River for which the town is named was inundated by the reservoir behind the Boundary Dam on the river. The name "Metaline," meaning "metallic," has its origin in the lead and zinc ores that were mined in the region in addition to limestone for cement production. Following Romano's directions in *Columbia Highlands*, east from Sullivan Lake following Forest Service Roads, I ascend Salmo Mountain to road's end at the Salmo Mountain Lookout at 6,828 feet.

Salmo Mountain Lookout

The 41,335-acre Salmo-Priest Wilderness, established by the 1984 Washington State Wilderness Act, tucks up against the British Columbia-Idaho corner of Washington. From there it spreads southwest, separating at Salmo Mountain to run along two long ridges of the Selkirks. The name of the wilderness comes from BC's Salmo River and Idaho's Priest River, both tributaries of the Pend Oreille that flows out of Idaho northwest into the Selkirks to join the Columbia River in BC. "Salmo" is Latin for "salmon," while "Priest" seems to have descended from the Kalispel "kaniksu," meaning "black robe," which they called the missionary priests who arrived to convert them. "Pend Oreille," or "Pend d'Oreille," French for "hangs from ear," was the name French Canadian voyageurs gave to the Kalispel who wore earrings of shell or bone.

From the mountain summit, I view the surrounding mountain ridges of the wilderness, north toward Canada and southwest to Gypsy Peak, the tallest mountain in eastern Washington. The old lookout stands on the Salmo summit, staffed from construction completion in 1964 until 1976 when such fire lookouts were no longer needed. The square, white, flat-roofed structure poses prominently, rising on stilts above nearby trees. Stairs rise from the ground to a promenade encircling the lookout that once offered fire watchers a 360-degree view.

The fight for wilderness in the Columbia Highlands has been one of success and heartbreak. Perhaps the two persons most involved in organizing for wilderness were Ray Kresek and Dick Slagel. Recognizing the Selkirks in Washington needed a greater degree of protection than national forest designation, Kresek managed to gather support for wilderness that included eighteen organizations, from horse riders to hikers and birders. That backing led to designation of the Salmo-Priest Wilderness.

In a similar effort, Slagel founded the Kettle Range Conservation Group to advocate for wilderness in the Kettles. "In the seventies," he says in the video *Columbia Highlands, Washington's Last Wilderness Frontier*, "I began to realize that this nice country here that I've always appreciated, why, it was not to stay that way unless there was some protection for it. Wilderness was the only option to protect this country." But the group's efforts failed to convince the Colville Forest Supervisor at the time, and the 1984 Act did not include any wilderness for roadless areas of the Kettle Crest. Slagel passed away at 101 without realizing the goal for which he had worked so long.

Current Executive Director of the Kettle Range Conservation Group, Tim Coleman, tells me, "KRCG completed a partial merger with Northwest Ecosystem Alliance in 2004 (that became Conservation Northwest in 2005). Despite that, Kettle Range CG retained its name and board of directors. Our work today consists of state wildlife management oversight, advocacy for protection of large carnivores, and preservation of wild forests, wildlife and fish."

In 2023, KRCG along with The Lands Council and the Western Watershed Project forced the Fish and Wildlife Service to initiate a new analysis of the impacts on endangered species of livestock grazing in Colville National Forest, specifically the impact on grizzly bear and bull trout (*Salvelinus confluentus*), as well as threatened whitebark pine (*Pinus albicaulis*).

Coville National Forest in all its units contains more than 230,000 acres of lands that qualify for wilderness consisting of 26 proposed and inventoried roadless areas. Despite input from the conservation groups for an update to the 10-Year Forest Land Management Plan, implemented in 2019, far less acreage was recommended for wilderness designation. The LMP recommends just 61,630 acres of new wilderness for three roadless areas: Abercrombie-Hooknose, Bald Snow, and adjacent to Salmo-Priest. Designation of those three recommended areas as wilderness still requires an act of Congress. Despite disappointment in the amount of recommended wilderness,

the plan improves management of the forest through planned restoration of front country and non-wilderness lands, including use of natural fire and controlled burning to reduce fuel loads.

The Kettle Range Conservation Group along with Conservation Northwest, the NEW Forest Coalition, and other conservation groups carry on the advocacy for wilderness.

8

With wife Sondra, I traveled west from the Montana Rockies into Idaho, wanting to find the Columbia Highlands "inland temperate rainforest" I had read about. But first, I want my dedicated rockhound to have a day of searching for garnets at the Emerald Creek Garnet Area in St. Joe National Forest, another of the forests of the Idaho Panhandle National Forests. To prevent folks from digging in the area's stream, the Forest Service brings a pile of ore to the public access at a gravel road. There we grab our pails and shovels and go to work along with several other visitors. We're looking for star garnets whose crystal structure reflects a four- or six-pointed star, subtle until they are cut and polished. They are found in only two known places in the world: here in Idaho and in India.

After filling our pails, we carry them to one of the sluice boxes to flush the soil away and search for the dark red to purple garnets amid the remaining gravel. We collect a small handful of tiny gems and finally we find a large one—half an inch in diameter. Holding the dark rough marble against my phone's flashlight, brilliant purple colors appear around the edges where it's thin enough for light to pass through. (I still have the garnet displayed in a caliper holder on my desk at home.) I'm long hounded out while Sondra keeps digging. I help sluice her last pail, and we're off.

North into the panhandle, we penetrate the Purcell Trench in the Idaho Panhandle. This smaller version of the Rocky Mountain Trench partially separates the Selkirks from the Purcells. We stop at the Bonners Ferry Ranger District Office near the Kootenay River. The Kootenay rises in the BC Rockies and flows south into Montana before turning west and northwest into Idaho, forming the southern boundary of the Purcell Range. Much of the U.S. portion of the Purcells has limited protection in the 1.6-million-acre Kootenai National Forest that spreads east into Montana. At Bonners Ferry, the Kootenay turns north into the Trench. After reentering BC, the river makes its way west through the Selkirks to join the Columbia River.

At the Ranger District Office, the forest ranger looks perplexed. "What rainforest?"

I explain we'd scanned the forests for fern and moss-draped trees but have not had much luck finding anything like the rainforests I've seen in Costa Rica, or even along the Oregon coast and more inland in the Cascades. Perhaps the problem was the definition of "inland temperate." "Inland" is easy enough; we're perhaps a straight 300 miles from the Pacific. Maybe the problem is just with "temperate"—the term referring to places between polar regions and the tropics that experience seasons of both cold and warmth.

With the ranger staring at me when I ask for directions, it becomes obvious the problem is with the term "rainforest." At its simplest definition, it's a forest with lots of rain, at least 60 inches a year, usually more. But in a temperate rainforest that experiences moderate temperatures, the number of tree species is far less than in a tropical rainforest, and usually with just a couple of dominant species, in this case, western red cedar and western hemlock. So a temperate rainforest is not as obvious as a tropical one.

"How about old growth?" I ask.

The ranger then gives us a satisfied look and provides directions to Roosevelt Grove of Ancient Cedars, a scenic area in the Washington portion of the Selkirks within the Kaniksu National Forest. The Idaho Panhandle National Forests serves as a single administrative unit for

the Kaniksu, Coeur d'Alene, and St. Joe National Forests that total 2.5 million acres. IPNF stores 850,000 acres of inventoried roadless areas. Unfortunately, there are no wilderness areas, except the small piece of Salmo-Priest where the Kaniksu reaches into Washington.

At Roosevelt Grove, named for Theodore, we wander among an old-growth stand of western red cedars, which has attributes of a rainforest. Ferns grow on the forest floor below the vast tree canopy, forming skirts at the base of trees. Lichens drape the branches like Spanish moss hanging from live oaks in the U.S. southeast. Such old-growth stands grow on lower elevations in moist valleys throughout the Columbia Highlands wherever they have not been disturbed by fire or logging.

For a long time, lichens were thought to be a symbiotic relationship between two species, a fungus and a photosynthesizing partner, usually a green alga. The algal cells embedded in the fungus contain chlorophyll and produce food for the host, which in turn provides structure for the algae, which lack stems, roots, leaves, and vascular tissue. Research in the last ten years has uncovered a third participant in most lichens, a yeast. Unicellular fungi, the yeast helps with the lichen structure and function, the phenotype.

While wildfires are rare in a rainforest, a 1926 fire burned nearly 75% of this old grove, leaving just two small remnants. We wander the Lower Grove of four acres, and then follow an old logging road to the Upper Grove of about 20 acres along the North Fork of Granite Creek with its upper and lower falls. The average age of the trees is 800 years, with a few estimated to be as much as 2,000 years old. Sondra stands next to one of the giants towering 150 feet, several feet in diameter. She smiles back at me, sharing an affinity for old-growth forest.

At 500 miles long, the Columbia Highlands hosts the largest inland temperate rainforest in the world. While about 98% of the world's temperate rainforests occurs on coasts, the remaining 2% lies inland, most of it in British Columbia and the U.S. Northwest. This unique forest began its growth at the end of the last ice age, about 10,000 years ago, and became a rainforest due to moisture moving east from the Pacific Ocean.

The Columbia Mountains stand at the farthest extent of influence from the Pacific. As moisture moves eastward from the ocean, it waters the coastal temperate rainforest. Then passing over the Cascades and BC's Coast Mountains, the clouds drop more moisture as both rain and snow. Still, there's adequate moisture in the clouds when they get to the Columbia Highlands to produce enough rain and snow on the western flanks of the mountains to meet wet conditions for scattered pockets of this inland temperate rainforest that is farther from an ocean than anywhere else in the world. David Moskowitz calls this the "Caribou Rainforest" in his book, *Caribou Rainforest, from Heartbreak to Hope*, for this is the home of the mountain caribou, perhaps the most endangered large mammal in North America.

9

Although amused at signs along roads in southern British Columbia warning about caribou trying to cross the highway, I eagerly hope to see one. However, the signs may be superfluous now, as mountain caribou have become so few.

Called "reindeer" in some other parts of the world, caribou in North America are of three ecotypes based on habits adopted for the ecosystems in which they live. Barren-ground caribou (*Rangifer tarandus arcticus*) range in massive herds across northern Canada's open country. The more sedentary woodland caribou (*Rangifer tarandus caribou*) live in smaller groups within the flat-terrain boreal forests, usually for their entire lives, although with short seasonal movements. Mountain caribou (*Rangifer tarandus montanus*) inhabit the Columbia Mountains, as well as other ranges to the north, and move up and down the mountains each year in what Moskowitz

calls “a unique double migration.” To escape predators, he says, “mountain caribou adopted a diet of arboreal lichens that only grow in abundance in forests close to a century old or older,” a measure for old growth.

Male Caribou

File ID 155914859 | © Evgeniia Ozerkina | Dreamstime.com

While mountain caribou eat a variety of vegetation, in winter they rely almost exclusively on lichen that grow on old-growth trees, especially black tree lichens (*Bryoria*) of which there are several species, horsehair lichen (*Bryoria fremontii*) seemingly the most common. Because these lichens cannot survive when covered with snow for extended periods, they only grow on trees at a height above the winter snowpack that can be as much as ten feet in the mountains. The large hooves of the mountain caribou allow them to negotiate the snow and reach lichens in the depths of winter, protected from the cold by their dense body hair. Separated from moose and deer that stay at lower elevations, they are mostly safe from predators (wolf, cougar, bear) that patrol the more abundant prey habitat below.

Arboreal Lichen

Come spring, mountain caribou begin their seasonal migrations by descending the mountains to take advantage of newly emerging plants as snow melts at lower elevations. They also feed on arboreal lichens that have fallen from trees during the winter as well as terrestrial lichens that grow on rocks and the ground. Living in groups of fewer numbers than the other ecotypes, they disperse across the landscape, which helps to avoid detection by predators.

As the high-elevation snowpack melts, the mountains call again. Pregnant caribou cows ascend in late spring to search out isolated locations to have their calves. Summer is then spent feeding in high-elevation forests and alpine meadows. In autumn as the snows begin to fall, they may first use their hooves and antlers to brush the snow away and access forage. Both males and females possess antlers, although some females have none. Caribou are the only members of the deer family in which a female can have spikes, much smaller than a male's massive antlers.

Eventually, as the snow builds, but they cannot yet reach lichen high in the trees, they descend the mountain to feed on shrubs and fallen lichens, waiting for the snowpack to build up once more. When the snowpack has hardened enough, they reascend the mountains and spend the winter snowshoeing on their spreading hooves from tree to tree to access their favorite food.

Having evolved together, mountain caribou and old-growth rainforest once coincided throughout the Columbia Mountains. While they are virtually the same as the woodland caribou, mountain caribou have adapted to the rigors of mountain living and, by definition, are fewer in number. Loss of habitat and rapid climate change may prove to be too much for the smaller populations to survive.

In 2007, the government of British Columbia issued a Mountain Caribou Recovery Implementation Plan to return the southern mountain caribou population to the pre-1995 level of 2,500 animals. The plan called for several management actions to reach that goal within 20 years, including a target of protecting 2.2 million hectares (5.4 million acres) of mountain caribou range from logging and road building. With implementation in the intervening years, some herds have benefited from increased forest cover, but many have seen a decrease in habitat due to wildfires and continued logging.

The range of the mountain caribou once included the Selkirks and the Purcell Range, reaching well into the Idaho Panhandle and the northwest corner of Montana. While the U.S. Fish and Wildlife Service currently lists the Southern Mountain Caribou as an endangered DPS (distinct population segment), there are no known caribou in the U.S. portion of the Columbia Highlands. Tellingly, for the heading "Where Listed," rather than give a state or mountain range, the Service simply says, "Wherever Found."

In 2009, this southernmost herd of mountain caribou numbered about 50 individuals on both sides of the international border in the Selkirks, out of 1,500 – 2,000 in Canada. However, inadequate management of the rainforest in the U.S. and BC that allowed logging, road building, mineral extraction, and unregulated winter recreation in the form of snowmobiling and heliskiing seriously impacted the forest and the caribou that rely on old growth.

Recognizing that ecosystems do not stop at an international border, the Washington Wildlife Habitat Connectivity Working Group, founded in 2007 by the Departments of Transportation and Fish & Wildlife with the participation of public and private interests, conducted a habitat connectivity analysis, *British Columbia – Washington Transboundary Habitat Connectivity Scoping Report*, released in 2013. Recognizing the importance of the transboundary region of Washington and British Columbian for conservation of many wildlife species, the analysis proposed efforts for the Working Group "that engages transboundary stakeholders to (1) develop and complete a new, operational scale suite of connectivity analyses in the transboundary Okanagan-Kettle subregion that will inform efforts underway on that landscape now and provide lessons to inform future, additional connectivity analyses in the remaining two transboundary subregions; while also (2) interpreting and integrating available climate and climate-connectivity models into these new analyses so that they account for the future movement needs of wildlife." Analysis of the Okanagan-Kettle subregion was issued in 2016, *Okanagan-Kettle Subregion Connectivity Assessment*, which identified Connectivity Focus Areas within the "subregion that are critical to wildlife habitat connectivity at a regional scale, now and under a changing climate."

More recently, the Washington Departments of Fish & Wildlife and Transportation prepared *Washington Habitat Connectivity Action Plan (2025)* recognizing that,

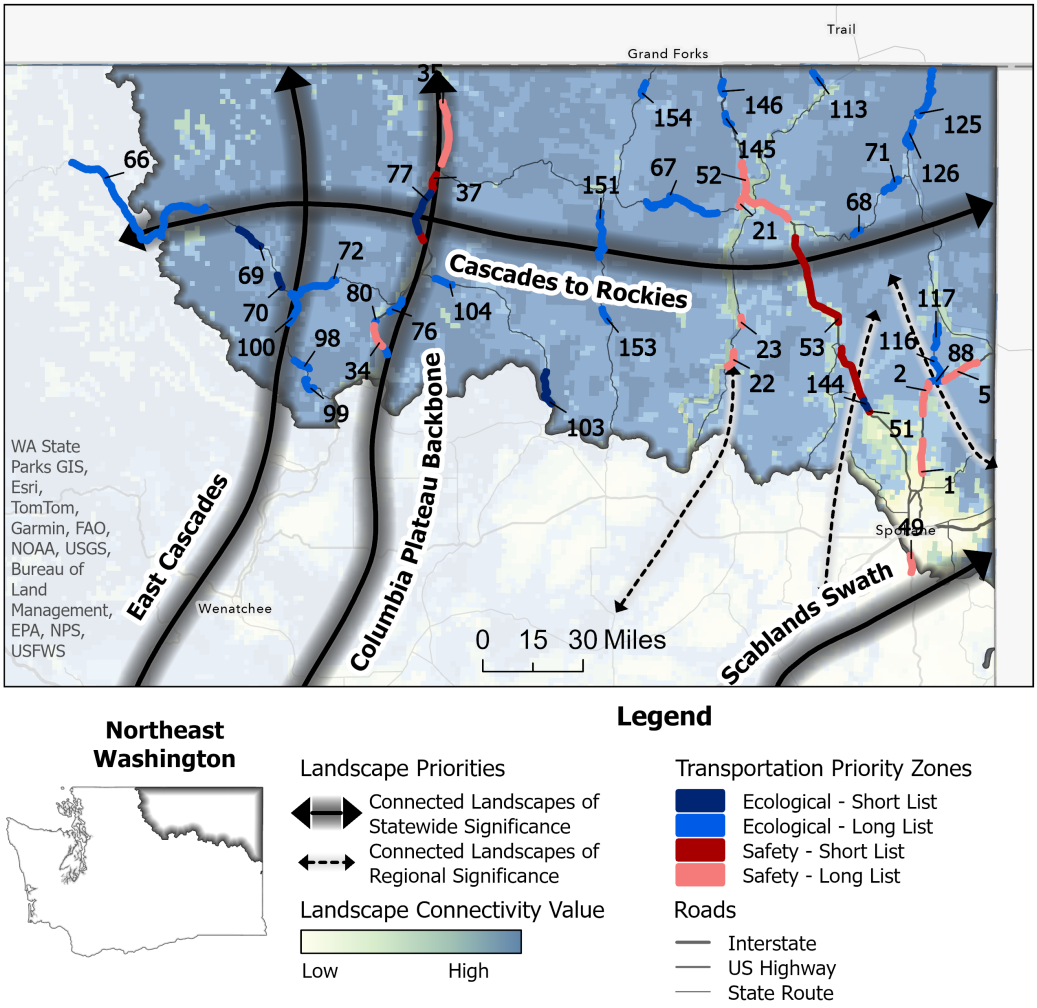
> Terrestrial habitat connectivity is critical to maintaining Washington's biodiversity, ecosystem resilience, and climate adaptation potential. As landscapes become increasingly fragmented due to transportation infrastructure, urban expansion, and other land-use changes, wildlife populations face growing barriers to movement, increasing risks of genetic isolation, habitat loss, population extirpation, and wildlife-vehicle collisions.

Because transportation routes cause the most disconnection on the landscape,

> Our analysis ranked the ecological and safety status of every road mile in the state highway system, called the **Full Highway System Rankings**. From

these rankings, we identified a **Long List** and a more selective **Short List** of transportation Priority Zones for road barrier mitigation to facilitate safe passage for wildlife and reduce wildlife-vehicle collisions. These transportation priorities and the adjacent connected landscapes leading up to and away from these barriers are priority locations for connectivity conservation in Washington.

The thirteen Connected Landscapes of Statewide Significance identified in the Action Plan include the Cascades to Rockies corridor.



Cascades to Rockies Connected Landscape of Statewide Significance
Courtesy of the Washington Department of Fish and Wildlife

10

By 2018, the southern herd that spent part of the year in Washington and Idaho had declined to only three animals and was declared "functionally extinct." In January 2019, those last three animals were captured and moved to a breeding facility near Revelstoke, BC, in one of the last-ditch efforts to save the subspecies.

The Revelstoke Maternity Pen was a pilot project operated by the Revelstoke Caribou Rearing in the Wild Society with the goal of showing that a breeding facility would be successful at increasing calf survival for the central portion of the Southern Mountain Caribou herd. The five-year project ended in 2018, although the pen continued to be used as a temporary holding facility to which the last three U.S. mountain caribou were taken. During the time the pilot project was active, females and calves were brought to the maternity pen where they were fed and protected from predators. The survival rate of calves doubled due to increased body weight. Still, the rate of survival was not as high as expected. The conclusion of the scientific study was that while maternal penning increased survival rates, this site was not ideal in that the pen needed to be at a higher elevation for calving, to which pregnant females are more accustomed.

In a similar effort, the Arrow Lakes Caribou Society established the Central Selkirk Caribou Maternity Pen near Nakusp, BC. Concerned about the decline of mountain caribou in the Selkirks, the Society looked to lessons learned at Revelstoke in establishing their maternity pen, including siting the pen high in the mountains. With the help of the Kalispel Tribe in the U.S., they constructed a 10-acre enclosure encircled by 16-foot-high geotextile fabric walls and an electric fence to keep the caribou in and predators out. The Kalispel elicited funds from the U.S. Fish & Wildlife Service for rental of helicopters to transport pregnant cows to the pen in March to have their offspring. They were fed lichen collected by volunteers while prepared food was slowly introduced. In spring-summer 2022, the first year of operations, six cows and their calves were released. Four calves survived in the wild, which is about double the usual survival rate. The following year, the project collected ten females and four yearlings; eight of the ten females were pregnant. Come spring, seven calves were released to the mountains.

North of the Columbia Range, the West Moberly and Saulteau First Nations initiated an effort to help sustain the Klinse-Za caribou herd. Partnering with Wildlife Infometrics, they establish a maternity pen, first at Mt. Bickford in 2014 and an additional pen at Mt. Rochfort in 2018. Funding came from several organizations, including the Yellowstone to Yukon Conservation Initiative as well as some of the resource extraction industries working in the area. Indigenous members serve as Guardians protecting and caring for the caribou during penning and release, sometimes keeping watch from guardian towers. To help ensure enough lichen can be gathered for caribou food, detailed maps were created using modeling to predict where lichens can be found. Carmen Richter of the Saulteau First Nation led the effort that began with her master's thesis to create a plan for sustainable lichen collection.

In 2020, the West Moberly and Saulteau reached agreement with the British Columbia government to support recovery of BC caribou herds, including mountain caribou. The agreement includes a proposal for a 206,000-hectare provincial park (509,037 acres) and interim protections on an additional 550,000 hectares (1,359,079 acres) in the mountains east of Mackenzie and west of Hudson's Hope and Chetwynd.

By 2022, the population of the Klinse-Za herd tripled from 38 individuals to 114. The long-term goal is an increase in the thousands that would allow indigenous hunters to take caribou once more. West Moberly Chief, Roland Willson, has said that he does not expect to see such an increase in his lifetime, but perhaps his grandchildren will. In 2024, British Columbia announced an expansion of the Klinse-za/Twin Sisters Provincial Park to 200,000 hectares (494,000 acres), with the two maternal penning sites for caribou now within the park.

The BC Caribou Recovery Program, as it's now called to include all ecotypes, reports some success in the combined Southern, Central, and Northern Groups of the Southern Mountain Caribou with a population estimate of 3,800. Still, the Environment and Climate Change Canada

program with responsibility for recovery of species at risk and their critical habitat is more than a decade late in a commitment to map critical habitat for the Southern Mountain Caribou herd. The current forecast is 2026.

On a larger scale, Canada has made commitments to help preserve the boreal forest. Among the programs, the 2023 Tripartite Framework Agreement on Nature Conservation joins the governments of Canada and British Columbia with First Nation governments to support conservation. Funding commitments approach $1 billion, much of it for indigenous-led work. Additional funding has established 41 new indigenous Guardian programs, bringing the total to 160 such programs across Canada. One goal of the effort is to protect and conserve 30% of land and waters by 2030, including the establishment of a $50 million Old Growth Nature Fund to help preserve mature forests.

While these efforts are significant steps toward caribou conservation, the forest habitat has been degraded already by industrial development. The Caribou Recovery Program states, "Habitat fragmentation and loss resulting from human-caused disturbances (such as cutblocks, roads and seismic lines) and subsequent increases in primary prey and predator populations are the main factors associated with the decline of caribou in British Columbia."

For example, the Trans Mountain Pipeline for shipping crude oil and refined products from Alberta's oil fields through BC to shipping terminals on the west coast was completed in 1953, passing through Jasper National Park and the northern reaches of the Columbia Mountains. Expanded several times, the pipeline was enlarged most recently when the existing pipeline was "twinned" with a parallel second pipeline, increasing the shipping capacity three-fold. Many environmentalists and indigenous peoples opposed the expansion project, concerned with disturbance of the forest and wildlife plus the future danger of oil spills. However, Canada's Supreme Court rejected legal challenges by the groups. The expansion was completed in 2023-24 and operation began in May 2024.

Logging with accompanying road access removes the forest habitat, of course, but timbering also changes prey-predator dynamics. With the forest more open, moose and deer move into caribou habitat, bringing predators with them. Consequently, predator reduction, especially for wolves, has become an unfortunate tactic in the fight to preserve the mountain caribou ecotype as well as woodland caribou. As with the spotted owl controversy in the U.S. Pacific Northwest, the real solution is to preserve enough habitat so all species can live in balance instead of killing one to save another.

In a related dynamic, climate change producing milder winters allows deer to move northward, bringing predators with them that also prey on caribou. A recent study's results, published in *Global Change Biology* in 2024, "Habitat Alteration or Climate: What Drives the Densities of an Invading Ungulate?" estimated densities of white-tailed deer using remote cameras on both sides of the boundary of Alberta and Saskatchewan. The study team observed more deer during milder winters. While human disturbance also encouraged deer to invade, the effect was only half the influence of climate change.

> White-tailed deer…are considered ecosystem disruptors that alter predator–prey dynamics and spread diseases … Specifically, in the boreal forests of western Canada, white-tailed deer are implicated in the decline of woodland caribou … Increasing deer densities affect predator–prey dynamics by shifting the diets of predators and triggering a predator numerical response... Wolves in particular have been shown to have densities an order of magnitude higher when deer are available as prey …if climate is indeed

> favoring the northward expansion of white-tailed deer to a greater degree than habitat alteration, restoring habitat is less likely to be effective on its own as white-tailed deer will continue to support high abundances of wolves …

11

For now, the mountain caribou is extinct in the U.S. and threatened or of special concern in Canada. This caribou ecotype has evolved along with the inland temperate rainforest on the windward side of the Columbia Highlands and other mountains of British Columbia. If these caribou disappear from BC as well, a future reintroduction will almost certainly fail—there's only a slight chance that caribou brought to these mountains from somewhere else can learn the "unique double migration" of the mountain caribou. Moskowitz says, "the possibility of restoring the population with caribou from anywhere else in the world, unaccustomed to the annual dance through the landscape required to survive here, appears thin."

So the only option is to save the remaining animals that have the experience to survive in the mountains and that can teach their young to follow the seasonal migrations. Maternity pens and predator reduction can only make small strides at increasing the number of animals.

The science is clear that declining caribou herds are the result of degraded habitat and climate change. The report of a study published in *Conservation Science and Practice* in 2021 concluded:

> Our findings support the idea that short-term recovery actions such as predator reductions and translocations will likely just delay caribou extinction in the absence of well-considered habitat management. Given the magnitude of ongoing habitat change, it is clear that unless the cumulative impacts of land-uses are effectively addressed through planning and management actions that consider anthropogenic and natural disturbances, we will fail to achieve self-sustaining woodland caribou populations across much of North America.

Only by restoring and preserving old-growth habitat and providing connectivity among old-growth forests for northward movement with a warming climate will the mountain caribou be saved. The old-growth forest they rely on takes 80-150 years to grow enough lichen in the moist internal air of the rainforest to support caribou. There is no replacing this forest in the foreseeable future once it is gone.

As preservationist Randy Villegas relates in a Rewilding Earth Podcast, the desire to save a species from extinction is always there, but usually it's not the focus of conservation work. "It's more of a result than the focus. If you want to harvest water, you don't try to drag over a cloud. You dig retention basins to capture that water when it comes by. So it's about dealing with the whole ecosystem."

You want to save the mountain caribou? Then the focus must be on preservation and restoration of habitat. To adapt the popular line from the movie, *Field of Dreams*, "Build it and *they* will come."

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A significant step in saving old growth in the U.S. began with Executive Order 14072, issued by Pres. Biden in April 2022, requiring the Forest Service, as well as BLM, to inventory mature and old-growth forests on public land and to amend all national forest management plans to include

conserving those old-growth tracts. Termed the "National Old-Growth Amendment," the effort responds to the threat of a changing climate to these forests.

An Environmental Impact Statement for the amendment was to be issued in 2025. However, in a reversal, the Chief of the U.S. Forest Service has withdrawn the notice of intent to prepare the EIS. At this writing, the federal government is proposing to open old-growth forest to logging.

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