



## Supplementary Materials for

### **Braiding Indigenous Rights and Endangered Species Law for Meaningful Species Recovery**

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**Supplementary Material 1:** Examples of discrepancies between endangered species laws or criteria and culturally-meaningful recovery

#### Canada

The Species at Risk Act of Canada (SARA) (1) states that “nothing in this Act shall be construed so as to abrogate or derogate from the protection provided for existing aboriginal or treaty rights of the aboriginal peoples of Canada.” Nevertheless, neither the Act itself nor the 2020 “Policy on Survival and Recovery” (2) include traditional Indigenous use specifically in the definition of recovery or the criteria used to determine whether a species is recovered. In the Policy document, recovery is defined to be a “return to a state in which the risk of extinction or extirpation is within the normal range of variability for the species, as indicated in part by its population and distribution characteristics. This is informed by the species’ natural condition in Canada, which is defined as its condition prior to the significant impact of human activities that

led to the species being listed as Endangered, Threatened, or Extirpated under SARA.” Taking post-colonial human activities to be those threatening the species, a return to the conditions prior to these activities could be seen to be consistent with defining recovery when a population is able again to support Indigenous Traditional use and sustain Indigenous ways of life. Yet, none of the Recovery Strategies analyzed by (3) aimed to restore populations to historic levels (explicitly stated). Instead, to date, the focus of SARA with respect to Indigenous peoples has been on consultation with Indigenous communities and incorporation of Traditional Knowledge, rather than aiming for recovery that ensures Indigenous Traditional use (4).

### United States

The US Endangered Species Act (ESA) (5) recognizes the importance of Indigenous peoples' use of and connections with wildlife and requires federal agencies to consider the potential impacts of ESA actions on tribal lands, resources, and cultures. Recovery plans developed under the ESA can include measures that support sustainable Indigenous use of a species while still achieving the species' recovery objectives.

Regarding species abundance targets under recovery plans, the ESA requires that recovery plans include "objective, measurable criteria which, when met, would result in a determination, in accordance with the provisions of this section, that the species be removed from the list" of endangered or threatened species (16 U.S.C. § 1533(f)(1)). The criteria for delisting a species must be based on the “best available scientific and commercial data”.

The ESA does not specifically require that species abundance targets under recovery plans consider restoring abundance to pre-colonial levels that would fully support Indigenous ways of life. In practice, this translates to recovery objectives that are consistently below historic

levels (3). The ESA does require that recovery plans be developed "with the cooperation, to the maximum extent practicable, of all Federal and State agencies and all persons interested in participating in the development and implementation of such plans, including Native Americans" (16 U.S.C. § 1533(f)). This provision recognizes the important role that Indigenous peoples can play in species conservation and recovery and provides opportunities for their input into recovery plans. However, in practice, this duty to consult with all stakeholders and rightsholders—Indigenous peoples, private land owners, industries, etc.—often results in recovery targets that may be more modest than pre-colonial abundances (3) and what might be required to sustain practices such as harvest and exercising of food security.

## IUCN

The IUCN acknowledges “Indigenous peoples' rights to the lands, territories and natural resources they have traditionally owned, occupied and used, and the need to ensure the full and effective participation of Indigenous peoples in all conservation initiatives and policy developments that affect them”. Nevertheless, the ability of a population to sustain these rights are not incorporated in the definition of a species’ conservation status under the IUCN red list (6). Consequently, a species that was traditionally an important food source could be defined as recovered (e.g., passing from vulnerable to near threatened), even though Indigenous harvest and cultural connections may still be prevented or hindered. Higher standards of recovery would be needed to ensure such access.

## **Supplementary Material 2: Caribou harvest calculations**

We approximated the number of caribou that could be sustainably harvested each year from the

2021 Klinse-Za subpopulation and future potential population sizes. These calculations are meant to contextualize the link between population size, annual harvest, and food sovereignty. These calculations were done through a Western lens and do not necessarily reflect the harvest views or plans of West Moberly First Nations or Saluteau First Nations.

There were 114 caribou in the Klinse-Za subpopulation in 2021. The subpopulation has been increasing at ~12-14% per year since 2013 (7). An annual harvest rate of 3-4% was deemed sustainable (bull only) for increasing caribou subpopulations in British Columbia (8). Using the conservative end of the harvest spectrum (3%), we estimated that 3 bull caribou could be sustainably harvested each year.

We then estimated the number of meals that these caribou could provide. A bull caribou provides about 100 lbs of meat (9). Assuming a standard meat portion size of 6oz (0.38 lbs), and accounting for the 1,270 people that compose Sauteau First Nations and 366 that compose West Moberly First Nations, one meal for everyone would require 621 lbs of meat. Thus, approximately six bull caribou would need to be harvested to provide a single meal for each community member.

A single meal of caribou for all community members would likely be a strongly symbolic and joyous celebration. But a single meal would not provide a meaningful contribution to food security nor reconnection to harvesting practices by the community due to only 3 animals available for harvest each year. We are not able to prescribe, at this time, what an optimal harvest to satisfy all cultural needs would be, but we can approximate the meals, hunting opportunity and caribou needed to facilitate more. The “sea of caribou” that were once present in Klinse-Za cannot be directly translated into a number to satisfy most western ways of thought, but we can translate this number into a minimum number of caribou that might garner such a description. A

few thousand caribou across the ~6,500 km<sup>2</sup> herd area, that moved in congregated herds, would likely begin to appear like a “sea of caribou”, and would be consistent with historical records for mountain caribou in British Columbia (10). We redid the harvest calculations above to estimate the hunting, cultural, and sustenance opportunities provided by this larger caribou abundance. Using ~3,000 caribou as the projected abundance, we estimate that ~90 caribou could be harvested annually, providing hunting opportunities for many more Indigenous community members (i.e., creating and sustaining cultural knowledge) and ~9,000 lbs of meat. This meat would provide ~24,000 meals or ~15 meals for each community member annually. This is not necessarily the prescriptive target from the community perspective, but the increased abundance of caribou provides increased hunting opportunity, more meat, and more meals. Collectively, increases in culturally-important species can support more community gathering, connectedness, and rekindling of important cultural practices such as caribou hunting.

**Supplementary Material 3:** Data and citations for Fig 2.

**Table S1.** Species abundance estimates, ranges, and citations for Figure 2. In cases where no error was given for the population estimate, we used +/-15% for the plot in Figure 2.

SPECIES	REGION	YEAR	N	LOWER	UPPER	CITATI ON	COMMENT
AMERICAN BISON	Range-wide (North America)	1700	45000000	30000000	60000000	(11)	
AMERICAN BISON	Range-wide (North America)	1890	200			(12)	

AMERICAN BISON	Range-wide (North America)	2022	30000			(12)	
CARIBOU (KLINSE-ZA)	Klinse-Za	1700	3500	1000	6000	(13)	translated "sea of caribou" into a number (thousands) with uncertainty
CARIBOU (KLINSE-ZA)	Klinse-Za	2013	38			(7)	
CARIBOU (KLINSE-ZA)	Klinse-Za	2022	114			(7)	
PACIFIC SALMON (COLUMBIA RIVER)	Columbia River	1700	12000000	7500000	16000000	(14)	
PACIFIC SALMON (COLUMBIA RIVER)	Columbia River	1938	1500000			(14)	
PACIFIC SALMON (COLUMBIA RIVER)	Columbia River	2022	2300000			(14)	

## References

1. Government of Canada, *Species at Risk Act* (2002).
2. ECCC, "Species at Risk Act Policies: Policy on Recovery and Survival" (Canada, 2020), p. 9.
3. K. A. Pawluk, C. H. Fox, C. N. Service, E. H. Stredulinsky, H. M. Bryan, *PLoS ONE*. **14**, e0224021 (2019).
4. A. Turcotte *et al.*, *FACETS*. **6**, 1474–1494 (2021).
5. United States, *The Endangered Species Act as amended by Public Law 97-304 (the Endangered Species Act amendments of 1982)* (Washington : U.S. G.P.O., 1983., 1983; <https://search.library.wisc.edu/catalog/999606103702121>).

6. IUCN SSC, “IUCN Red List Categories and Criteria” (Version 3.1 Second Edition, Switzerland, 2000).
7. R. S. McNay *et al.*, *Ecological Applications* (2022).
8. I. W. Hatter, “A Review of Northern Caribou Harvest Management and Science” (B.C. Ministry of Forests, Lands, Natural Resource Operations and Rural Development, 2019), p. 36.
9. Caribou Hunting Information, Alaska Department of Fish and Game, (available at <https://www.adfg.alaska.gov/index.cfm%3Fadfg=caribouhunting.main>).
10. B. Mclellan, “An Historic Perspective of Mountain Caribou Distribution and Abundance” (Ministry of Forests, 2013), p. 22.
11. D. Flores, *The Journal of American History*. **78**, 465 (1991).
12. Bison | The Canadian Encyclopedia, (available at <https://www.thecanadianencyclopedia.ca/en/article/bison>).
13. West Moberly First Nations, “Population and Distribution Objectives and Identification of Critical Habitat for Seven Herds of Woodland Caribou in the South Peace Area of British Columbia” (Moberly Lake, BC, 2014), p. 32.
14. C. L. Smith, “Salmon Abundance and Diversity in Oregon Are We Making Progress?” (M/A-21, Oregon State University, Oregon, USA, 2014), p. 16.