Species at Risk Act
Management Plan Series

Management Plan for the Collared Pika (*Ochotona collaris*) in Canada

Collared Pika

2023

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For copies of the management plan, or for additional information on species at risk, including the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) Status Reports, residence descriptions, action plans, and other related recovery documents, please visit the Species at Risk (SAR) Public Registry[1].

Cover illustration: Photo : Sonny Parker

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[1] www.canada.ca/en/environment-climate-change/services/species-risk-public-registry.html

Preface

The federal, provincial, and territorial government signatories under the Accord for the Protection of Species at Risk (1996)[2] agreed to establish complementary legislation and programs that provide for effective protection of species at risk throughout Canada. Under the *Species at Risk Act* (S.C. 2002, c.29; SARA), the federal competent ministers are responsible for the preparation of management plans for listed species of Special Concern and are required to report on progress within five years after the publication of the final document on the SAR Public Registry.

The Minister of Environment and Climate Change (ECCC) and Minister responsible for the Parks Canada Agency (PCA) is the competent minister under SARA for Collared Pika and has prepared this management plan, as per section 65 of SARA. To the extent possible, it has been prepared in cooperation with: British Columbia (Ministry of Forests, Lands, Natural Resource Operations and Rural Development), Yukon (Department of Environment), Northwest Territories (Department of Environment and Natural Resources), Parks Canada Agency, Wildlife Management Boards, species experts and Indigenous organizations as per section 66(1) of SARA.

Success in the recovery of this species depends on the commitment and cooperation of many different constituencies that will be involved in implementing the directions set out in this plan and will not be achieved by Environment and Climate Change Canada, Parks Canada Agency, or any other jurisdiction alone. All Canadians are invited to join in supporting and implementing this plan for the benefit of the Collared Pika and Canadian society as a whole.

Implementation of this management plan is subject to appropriations, priorities, and budgetary constraints of the participating jurisdictions and organizations.

[2] www.canada.ca/en/environment-climate-change/services/species-risk-act-accord-funding.html#2

Acknowledgments

The management plan was written by Shannon Stotyn (ECCC-CWS-Northern Region), Shawn Morrison (Golder Associates), Thomas Jung, Julie Thomas, and Piia Kukka (Government of Yukon), Joanna Wilson (Government of Northwest Territories), David Hik (Simon Fraser University), Leigh Anne Isaac (Government of British Columbia) and Kaytlin Cooper (Gwich'in Renewable Resources Board). All Indigenous, territorial, federal and provincial governments within the range of Collared Pika, as well as species experts, were invited to participate in the working group to develop the management plan.

Initial species background sections were written by Leah Andresen and Shannon Stotyn. Species location data was assembled by Shannon Stotyn (Environment and Climate Change Canada) based on the data generously shared by the Alaska Center for Conservation Science (University of Alaska Anchorage), the Northwest Territories Conservation Data Centre, the Yukon Conservation Data Center, Nahanni National Park Reserve, Royal BC Museum and NorZinc (formerly Canadian Zinc). Using this information, Suzanne Carrière, Bonnie Fournier (Government of Northwest Territories) and Shannon Stotyn created maps to illustrate the range of Collared Pika. Traditional Knowledge on Collared Pika was incorporated from existing documents and is identified as a knowledge gap within the plan.

Comments were received from Leah de Forest, Carmen Wong, Kathryn Walpole, Jeffery Peter, Colleen Murchison (PCA), Megan Harrison, Eric Gross (British Columbia and ECCC – Pacific Region), Alice McCulley (Tr'ondëk Hwëch'in), J. Ward (Acho Dene Koe First Nation), Tyler Kuhn (Yukon Government), Katherine Christie (Alaska Department of Fish and Game) and Government of Northwest Territories during two jurisdictional reviews.

Thanks to the many experts on North American pika species (*Ochotona collaris* and *Ochotona princeps*) who took the time to complete the online survey that helped us identify knowledge gaps, conservation priorities and threats faced by Collared Pika. Your input was critical in informing the management plan.

Executive Summary

Collared Pikas (*Ochotona collaris*) are asocial alpine-dwelling lagomorphs that occupy suitable talus slopes adjacent to alpine meadows. Pikas are behaviourally restricted to talus slopes for rearing young, escaping from predators, storing collected forage, and sheltering from weather. Collared Pikas typically remain within 10 metres of the talus edge when foraging in meadows.

Collared Pikas were designated as Special Concern by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) in November 2011 and listed as a species of Special Concern under Schedule 1 of the *Species at Risk Act* (SARA) in February 2017. The species is found primarily in Alaska and Yukon, with smaller portions of their range in northern British Columbia and western Northwest Territories. Over half of of the species' range is within Canada. The number of mature individuals in Canada is unknown, but likely exceeds 10,000 mature individuals.

The principal threat to long-term persistence of the species is climate change, which is occurring more rapidly in their range than most of the rest of North America. Collared Pika survival is greatest in cool, dry environments, and they are ill-adapted to a warmer, wetter climate. The most likely climate-mediated risks to their persistence are associated with changes in precipitation, temperature or other weather conditions that affect thermoregulation, dispersal, or loss of access to meadow forage due to icing or habitat changes. Loss of suitable alpine habitat may occur through a) temperature or precipitation conditions becoming physically intolerable, b) a direct loss of habitat due to treeline advance (i.e. shrubification), or c) changes in the species composition of alpine vegetation communities upon which Collared Pikas depend for forage. A loss of alpine habitat would increase distances between suitable patches, possibly reducing gene flow, rescue effects, and regional persistence.

The magnitude of these impacts to Collared Pika is potentially high over the long-term but uncertainty remains due to a lack of information on both baseline abundance and distribution, and population-level responses to projected changes in climate conditions. The naturally fragmented nature of Collared Pika habitat and their poor dispersal ability are characteristics that heighten the vulnerability of this species to a changing climate.

The management objective is:

To maintain sufficient suitable habitat in Canada to allow Collared Pika to persist and be resilient to environmental change.

Broad strategies and conservation measures to help achieve this management objective are outlined in Section 6.2 and 6.3 of this document.

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1. COSEWIC* Species Assessment Information

Assessment Summary – November 2011

Common name
Collared Pika

Scientific name
Ochotona collaris

Status
Special Concern

Reason for designation
This small rabbit-relative is a Beringian relict that is restricted to talus slopes in alpine areas in northern west British Columbia, Yukon, and Northwest Territories. This region comprises over half the global range of this species, and is witnessing climate-driven shifts in habitat, temperature, and precipitation at faster rates than elsewhere in Canada. A demonstrated sensitivity to climate variability, coupled with poor dispersal ability and the naturally fragmented nature of its populations, heightens the vulnerability of this small mammal to climate change. The species is well-studied in a very limited portion of its range, but baseline information on population trends at the range level, and a clear understanding of the extent and severity of climate impacts to this species and its habitat in the coming decades is limited. However, the best available information suggests that this species may be particularly sensitive to a changing climate, including concomitant increases in precipitation variability, leading to reductions in habitat availability. The potential of negative impacts of climate change to the persistence of this species over the long term is substantial.

Occurrence
British Columbia, Yukon, Northwest Territories

Status history
Designated Special Concern in November 2011.

* COSEWIC (Committee on the Status of Endangered Wildlife in Canada)

2. Species Status Information

In Canada, Collared Pika (*Ochotona collaris*) is listed as Special Concern[3] on Schedule 1 of the federal *Species at Risk Act* (SARA). Collared Pika was assessed by the Alaska Species Ranking System as being a high conservation priority (Droghini et al. 2022). The International Union for the Conservation of Nature (IUCN) lists the Collared Pika as “lower risk/least concern” (Lanier and Hik 2016). The conservation status of Collared Pika through its range in North America is described in Table 1. It is estimated that

[3] A wildlife species that may become a threatened or an endangered species, because of a combination of biological charactertics and identified threats.

Canada harbours 60% of the species' global range (COSEWIC 2011). NatureServe global and national status rankings were last reviewed in 2016 and 2017 respectively.

Table 1. List and description of various conservation status ranks for the Collared Pika (CESCC 2016, NatureServe Canada 2019).

	Global (G) Rank	**National (N) Rank**	**Sub-national (S) Rank**	**COSEWIC Status**
Collared Pika (*Ochotona collaris)*	G5 (secure)	Canada (N3) (apparently secure/ demonstrably widespread, abundant, and secure / breeding) United States (N5; vulnerable)	Yukon (S3S4) British Columbia (S3S4) Northwest Territories (S3)	SC (Special Concern)

S1: Critically Imperiled; S2: Imperiled; S3: Vulnerable; S4: Apparently Secure; S5: Secure

3. Species Information

3.1 Species Description

The Collared Pika is a small (~160 g), asocial, alpine-dwelling lagomorph[4] (COSEWIC 2011). It is one of two pika species in North America, the other being the closely related American Pika (*Ochotona princeps*). Their common name is derived from the pale grey patches on their napes and shoulders, which form a partial collar around the neck. Unlike rabbits and hares, pika hind limbs are only slightly larger than their front limbs, their tails are inconspicuous, and their ears are relatively small and round (Figure 1; MacDonald and Jones 1987). They do not hibernate during the winter but remain active within the talus[5] patches under the snow and survive on dried vegetation collected during summer and stored under large rocks in 'haypiles'. These haypiles contain a wide range of species depending on what is locally available and nutritional value. Foraging in adjacent meadows during winter may occur but is not well documented. Upon emergence from the natal nests located within talus, juveniles leave their natal territories from birth and disperse to establish their own territory. Adult Collared Pikas are highly philopatric[6] and rarely move among patches.

Collared Pikas are known locally in some Yukon communities as 'rock rabbits' or 'coneys', and 'little chief hares' in Alaska. They are well known to, and easily recognized by many Indigenous People, recreationalists, outfitters and tourism operators that spend

[4] A lagomorph is a plant-eating mammal characterized by a short tail and two pairs of upper incisors specialized for gnawing. Members of Order Lagomorpha include hares, rabbits and pikas.
[5] Talus slopes result from accumulated masses of medium-size rock fragments piled up at the bases of cliffs.
[6] Philopatric relates to the tendency of an animal or species to return to or remain near a particular site or area.

time hunting and travelling in alpine habitats within the species' range. They are valued by Indigenous People, in part, because they are traditionally hunted for food during excursions above treeline, where few other sources of meat are available.

Figure 1. Photograph of an adult Collared Pika in central Yukon, Canada.[7]

3.2 Species Population and Distribution

Distribution

Collared Pikas inhabit the mountains of northwestern North America. The Canadian range of the Collared Pika is located in the mountainous regions of Yukon, the northern Coast Mountains of British Columbia (Nagorsen 2005), and the Mackenzie and Richardson Mountains of the Northwest Territories (Figure 2; MacDonald and Jones 1987, Gwich'in Social and Cultural Institute 2013). Collared Pika also occur in the mountains of east-central and south-central Alaska (MacDonald and Cook 2009). The global range of Collared Pika covers an area of approximately 928,464 km^2 (34% in Alaska, 48% in Yukon, 15% in Northwest Territories, and 3% in British Columbia; Figure 3).

[7] Photo by Sonny Parker, used with permission. This photo may not be reproduced separately from this document without permission of the photographer.

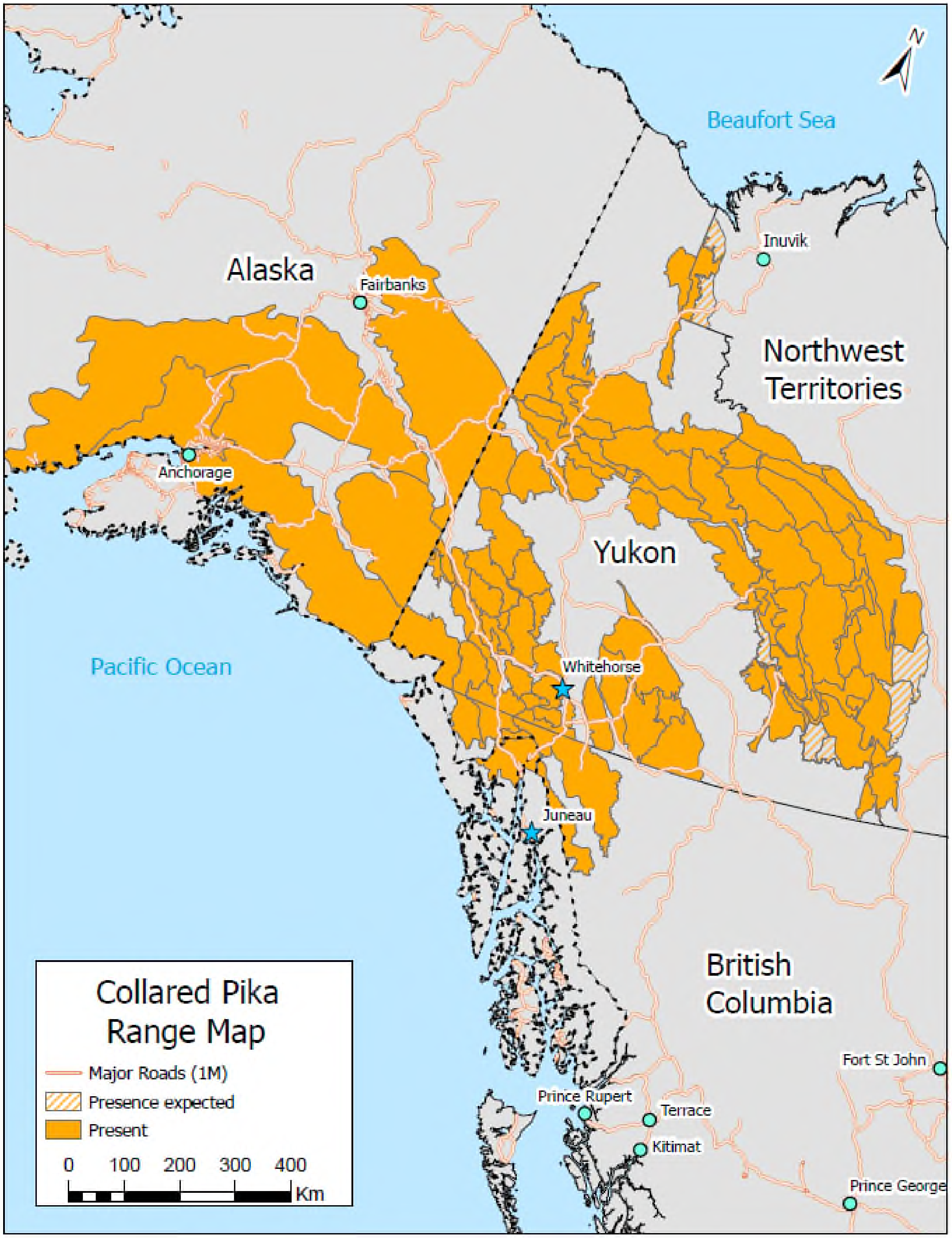

Figure 2. Current range of Collared Pika (2019) as depicted by NatureServe Canada's Ecosystem-based Automated Range Maps. Solid and hatched areas represent ecoregions where Collared Pika are present and expected respectively.

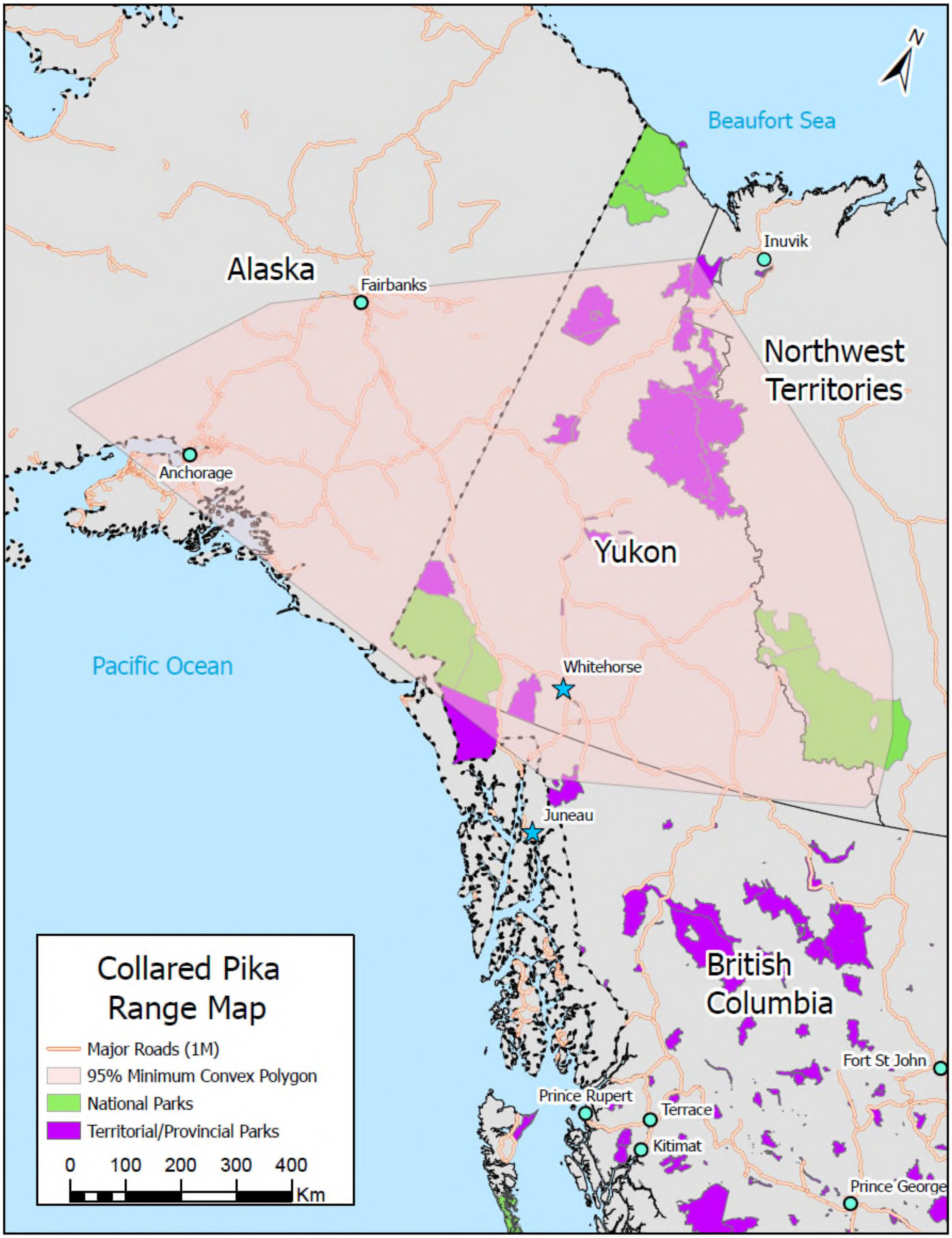

Figure 3. The estimated extent of occurrence of Collared Pika (2020) as depicted by a 95% Minimum Convex Polygon overlaid with provincial and territorial parks and habitat protection areas in Canada.

Due to uncertainties around the precise distribution of Collared Pika in Canada, two methods are used to depict their range. Ecosystem-based Automated Range mapping (EBAR) combines biodiversity data with expert knowledge, traditional knowledge and survey data to populate ecoregion shapes with species presence information (Figure 2, NatureServe Canada 2020). Collared Pika are present in 27 different ecoregions and expected to occur in three additional ecoregions that do not currently have documented locations. Approximately 12% of ecoregions with Collared Pika overlap with territorial or federally protected areas. The extent of occurrence is measured by a 95% Minimum Convex Polygon that encompases 95% of all known sites and is used by COSEWIC to assess changes in distribution (Figure 3).

Even within ecoregions not all alpine and rocky habitat is suitable for Collared Pika (COSEWIC 2011) and not all suitable habitat may be occupied (Andresen et al. 2010, Cannings et al. 2019, Kukka et al. 2020). A small-scale study at the northern edge of their range found that most suitable habitat was already occupied, suggesting that the expansion of Collared Pika populations northward may be limited (Kukka et al. 2020). In the absence of survey data the amount of area actually occupied by Collared Pikas remains unknown (COSEWIC 2011).

Population Trends

There are no current data regarding the overall population trends of Collared Pika (Lanier and Hik 2016). Population densities range from 6.4–7.2 individuals per hectare in Alaska (Broadbooks 1965) to <1.0 to 4.0 individuals per hectare in southwestern Yukon (Morrison 2007, Morrison and Hik 2007, Horn 2013). Talus patches were monitored in Tombstone Territorial Park, Yukon to determine the change in patch occupancy over time to establish population-level trends (Andresen et al. 2010, Kukka et al. 2014, Andresen et al. 2018). This population appears stable; however, surveys found evidence for annual fluctuations in local extinction probabilities (Andresen et al. 2016). The survey also indicated that Collared Pika had become locally absent at several mountain areas that had been previously occupied (Andresen et al. 2018). The extrapolation of these population-level estimates to the rest of the range would not provide meaningful estimates as local populations can fluctuate considerably over time and amount of suitable talus habitat varies across the range (Morrison 2007, Morrison and Hik 2007, Horn 2013). Sites at several new locations in Alaska and Yukon have been established to measure the annual variability in site occupancy and identify population trends along a latitudinal gradient that represent the core and trailing and leading edges of their distribution (T. Jung, pers. comm. 2020). Using all available information, COSEWIC (2011) estimates that the number of mature individuals in Canada likely exceeds 10,000 (COSEWIC 2011).

There was limited Traditional Knowledge available to the authors regarding Collared Pika population trends. However, a few First Nation members in the Yukon, indicated local extirpations at some sites traditionally known to be occupied by Collared Pika, including within the Coast Mountains, Tombstone Territorial Park, and the Pelly Mountains (COSEWIC 2011).

Movement or dispersal of individuals from Alaska could theoretically rescue the Canadian population of Collared Pikas. Although Collared Pikas have not been formally assessed in Alaska, they are believed to be widespread and ‘locally common’ (MacDonald and Cook 2009), but subject to decreased range area under future climate warming scenarios (Hope et al. 2015). However, climate factors resulting in a decline in the Canadian population would likely similarly affect the Alaskan population, reducing the likelihood of population rescue by dispersing individuals. The typically low average dispersal distances of Collared Pikas also reduce the likelihood of a rescue effect (COSEWIC 2011).

3.3 Needs of the Collared Pika

Collared Pikas primarily inhabit boulder fields (talus) located above treeline that are adjacent to alpine meadows. However, there have been observations of pika in forested valleys, along the shores of lakes below treeline, and near sea level (Rausch 1961, Youngman 1975). Similar to American Pika (Millar and Westfall 2010), talus habitats are used by Collared Pikas for den sites, escape from predators, and provide microclimate conditions that ameliorate weather extremes, by creating cool refugia in summer months and shelter during winter. Collared Pikas are behaviorally restricted to talus patches and typically remain within 10 metres of the talus edge when foraging in meadows. For Collared Pika to persist on the landscape, talus habitats need to be in suitable locations (e.g., elevation, proximity to forage), in close enough proximity to other talus patches (e.g., dispersal and rescue effects) and have the characteristics (e.g., rock size, patch size and perimeter) to ensure that suitable forage availability and escape habitat exist in perpetuity despite the effects of a changing climate.

Figure 4**.** An adult Collared Pika in talus-meadow habitat above treeline in central Yukon, Canada.[8]

Location

Talus suitable for Collared Pika needs to be located at elevations above tree-line with close access to alpine forage. Elevation was found to be an important factor in predicting if a talus patch was occupied by Collared Pika in Tombstone Territorial Park, YT (1200–1900 m ASL; Andresen et al. 2010). While elevation is probably a corollary for the occurrence of talus in mountainous landscapes, this factor may also be important as tree-line and shrubs move upward in elevation due to the changing climate, leaving refugia habitat for Collared Pika at increasingly higher elevations. More work needs to be done to determine how optimal elevation changes with latitude and what the lower elevation thresholds are for Collared Pika.

Talus patches are more likely to be occupied within close proximity to meadows where foraging can occur (Broadbooks 1965) especially where preferred food sources like *Dryas* spp. and *Carex* spp. are present (Andresen et al. 2010). Morrison and Hik (2007) also found that Collared Pika densities are generally higher on south-facing slopes, likely due to these slopes having higher primary productivity and lower annual snow cover. Talus patches that faced south-west were more likely to be recolonized following local patch-level extinctions, relative to other patches that faced other directions (Franken and Hik 2004).

[8] Photo by Sonny Parker, used with permission. This photo may not be reproduced separately from this document without permission of the photographer.

Connectivity
Juvenile dispersal is a major driver of regional metapopulation persistence and gene flow between patches. To facitilate movement of dispersing juveniles between talus patches, talus patches should be in close proximity to each other. This helps prevent patch extinction and facilitates recolonization, gene flow, and overall population persistence (Franken and Hik 2004). Poor quality and more isolated patches have a higher probability of extinction. For example, sites that had fewer occupied neighbouring patches, with greater exposure (i.e., north-facing slopes) and/or at lower elevations had a greater probability of becoming locally extinct (Andresen et al. 2018). Juveniles can disperse from 300–600 m (Smith 1974; Peacock 1997; Franken 2002) and occasionally 2–3 km from their natal dens (Peacock 1997; Zgurski and Hik, unpublished data). Even with these low dispersal distances only a small number of immigrants are required to maintain genetic variability at the population level (Zgurski and Hik 2014). Connectivity among patches may also be affected by thermal conditions whereby relatively warm valley bottoms may reduce connectivity and act as a ‘thermal barrier’ to movement (COSEWIC 2011).

Talus Characteristics
High quality talus habitat is defined by large areas of predominantly talus, long patch perimeters and medium rock size (30–100 cm; Andresen et al. 2010). Adequate rock size (>30 cm) with fewer smaller rocks mixed in between is a key predictor of whether talus patches were used by Collared Pika — as they live in the interstitial spaces within the talus (Andresen et al. 2010; Cannings et al. 2019). Larger talus allow Collared Pika to behaviourally thermoregulate by remaining below the talus during hot periods, allowing them to persist in regions beyond their typical bioclimatic envelope (MacArthur and Wang 1974; Smith 1974, Rodhouse et al. 2010). Crevices within the talus are also used by Collared Pika to escape from predators (Holmes 1991).

Large talus patch areas with greater perimeters allow for increased access to adjacent forage vegetation (Franken and Hik 2004). Collared Pikas forage in a narrow (<10 m) band of vegetation adjacent to talus patches where they forage on meadow vegetation and store food in haypiles within the talus for winter consumption (McIntire 1999; Morrison et al. 2004).

4. Threats

4.1 Threat Assessment

Experts on North American pika species (i.e., Collared Pika and American Pika) were surveyed with respect to their beliefs regarding pika ecology, knowledge gaps, conservation priorities, and threats faced by Collared Pika (Jung et al. 2022). Responses from 47 experts were obtained, representing 427 person-years of experience with both pika species. The results of this survey were used, in conjunction with those from an updated threat assessment (2020), to describe the threats to Collared Pika.

The Collared Pika threat assessment is based on the IUCN–CMP (World Conservation Union–Conservation Measures Partnership) unified threats classification system. Threats are defined as the proximate activities or processes that have caused, are causing, or may cause in the future the destruction, degradation, and/or impairment of the entity being assessed (population, species, community, or ecosystem) in the area of interest (global, national, or subnational; Salafsky et al. 2008). Limiting factors are not considered during this assessment process. For the purposes of threat assessment, only present and future threats are considered. Historical threats, indirect or cumulative effects of the threats, or any other relevant information that would help understand the nature of the threats are presented in the Description of Threats section. The threat assessment in the COSEWIC (2011) status report was updated by members of the Collared Pika Working group on Novermber 9, 2020.

Table 2. Threat assessment table for Collared Pika. Updated from the COSEWIC (2011) status report in 2020.

Threat No.	Threat description	Impact[a]	Scope[b]	Severity[c]	Timing[d]
3	**Energy production & mining**	Unknown	Small	Unknown	High
3.2	Mining & quarrying	Unknown	Small	Unknown	High
4	**Transportation & service corridors**	Negligible	Small	Negligible	High
4.1	Roads & railroads	Negligible	Small	Negligible	High
4.2	Utility & service lines	Negligible	Negligible	Negligible	High
6	**Human intrusions & disturbance**	Negligible	Large – Small	Negligible	High
6.1	Recreational activities	Negligible	Restricted – Small	Negligible	High
6.3	Work & other activities	Negligible	Large – Small	Negligible	High
7	**Natural system modifications**	Negligible	Pervasive	Negligible	High
7.1	Fire & fire suppression	Negligible	Pervasive	Negligible	High
10	**Geological events**	Negligible	Negligible	Unknown	High
10.3	Avalanches/landslides	Negligible	Negligible	Unknown	High
11	**Climate change & severe weather**	Medium – Low	Pervasive	Moderate – Slight	High
11.1	Habitat shifting & alteration	Medium – Low	Pervasive	Moderate – Slight	High
11.3	Temperature extremes	Medium – Low	Pervasive	Moderate – Slight	High
11.5	Other impacts	Medium – Low	Pervasive	Moderate – Slight	High

[a] **Impact** – The degree to which a species is observed, inferred, or suspected to be directly or indirectly threatened in the area of interest. The impact of each threat is based on Severity and Scope rating and considers only present and future threats. Threat impact reflects a reduction of a species population or decline/degradation of the area of an ecosystem. The median rate of population reduction or area decline for each combination of scope and severity corresponds to the following classes of threat impact: Very High (75% declines), High (40%), Medium (15%), and Low (3%). Unknown: used when impact cannot be determined (e.g., if values for either scope or severity are unknown); Not Calculated: impact not calculated as threat is outside the assessment timeframe (e.g., timing is insignificant/negligible or low as threat is only considered to be in the past); Negligible: when scope or severity is negligible; Not a Threat: when severity is scored as neutral or potential benefit.

[b] **Scope** – Proportion of the species that can reasonably be expected to be affected by the threat within 10 years. Usually measured as a proportion of the species' population in the area of interest. (Pervasive = 71–100%; Large = 31–70%; Restricted = 11–30%; Small = 1–10%; Negligible < 1%).

[c] **Severity** – Within the scope, the level of damage to the species from the threat that can reasonably be expected to be affected by the threat within a 10-year or three-generation timeframe. Usually measured as the degree of reduction of the species' population. (Extreme = 71–100%; Serious = 31–70%; Moderate = 11–30%; Slight = 1–10%; Negligible < 1%; Neutral or Potential Benefit ≥ 0%).

[d] **Timing** – High = continuing; Moderate = only in the future (could happen in the short term [< 10 years or 3 generations]) or now suspended (could come back in the short term); Low = only in the future (could happen in the long term) or now suspended (could come back in the long term); Insignificant/Negligible = only in the past and unlikely to return, or no direct effect but limiting.

4.2 Description of Threats

Continued climate warming will likely increase variability in temperature, moisture, or other weather conditions with potential direct effects on dispersal, thermoregulation, or loss of access to meadow forage due to icing or shrubification. Climate change is also projected to reduce the amount of suitable alpine habitat and increase distances between suitable patches of talus habitat. The magnitude of these impacts to Collared Pika is potentially high over the long-term but there is uncertainty due to lack of information on both baseline abundance and distribution, and population-level responses to projected climate change.

Threats to the Collared Pika are described below in the order in which they appear in the threat calculator assessment table (Table 2) and are described in more detail below.

IUCN – CMP Threat 3. Energy production & mining

3.2 Mining & quarrying (Impact: Unknown)

Little is known about the ability of Collared Pika to recolonize or habituate to mining and quarrying projects. Mineral exploration and development may affect Collared Pika populations through direct mortality and disturbance, where mining activities intersect talus slopes and foraging areas. Given the metapopulation structure exhibited by this species, these activities could also negatively affect recolonization and maintenance of populations. There are current and upcoming mining and exploration projects planned in Collared Pika habitat.

IUCN–CMP Threat 4. Transportation & service corridors

4.1 Roads & Railroads (Impact: Negligible)

Road construction may lead to the removal or alteration of talus, changes in vegetation surrounding talus, and an increase in predator abundance. The impact would be highest during the construction phase and recolonization of areas after road completion would depend on distance to closest patch. Incidental information suggests that Collared Pika can acclimatize to disturbance quite quickly (Collared Pika Working Group, personal communication, Nov. 9, 2020). This threat includes all roads associated with industrial development. There are a number of large road proposals being considered that fall within Collared Pika range.

4.2 Utility & service lines (Impact: Negligible)

Utility and service lines associated with mining and oil and gas exploration/development may lead to the loss of habitat through removal or alteration of talus, changes in vegetation surrounding talus, or increases in predator abundance.

IUCN–CMP Threat 6. Human intrusions & disturbance

6.1 Recreational activities (Impact: Negligible)

Recreational activities (e.g., hiking, sheep hunting) may increase Collared Pika vigilance and interfere with foraging. These activities are widespread in Collared Pika habitat, especially in the southern part of the range. Examples of areas where this may be a factor are Kluane National Park and Reserve, Tombstone and Kusawa territorial parks, as well as local recreation areas near communities (e.g., Keno Hill [Mayo] and Mount MacIntyre [Whitehorse]). Direct mortality from hunting is not believed to be an important factor in Collared Pika population abundance.

6.3 Work & other activities (Negligible)

This threat includes impact of helicopter activities on Collared Pika (e.g., landing, associated ground-based activity, fly-overs). Uncertainites exist regarding the impact of helicopter fly-overs on Collared Pika. A large amount of area within Collared Pika range will be exposed to helicopter activity over the next 10 years.

IUCN – CMP Threat 7. Natural system modifications

7.1 Fire & fire suppression (Negligible)

Nationally, fire regimes have become more active over the last half century showing increasing trends in both area burned (AB) and the number of large fires (NOF) as climate change continues to influence factors that drive wildlfire activity (Hanes et al. 2018, Coogan et al. 2019). The AB and NOF have increased across the range of Collared Pika, with significant increases in the Southwest Yukon and Pacific fire-regime zones (Hanes et al. 2019). Increased shubification in the alpine-tundra could increase fuel loads and dry soils resulting in increased fire frequency and intensity (Myers-Smith et al. 2011b) affecting Collared Pika foraging habitat. Resulting smoke may have health effects on Collared Pika and lower forage intake due to the need for increased vigilance in areas with poor visibility. These would be short-term events and probably not result in a large population-level impact.

IUCN–CMP Threat 10. Geological events

10.3 Avalanches/landslides (Impact: Negligible)

Avalanches/landslides can both create and destroy Collared Pika habitat; however, Pika are most likely to recolonize slide areas after a period of weathering (>10 yrs). Little is known about this threat or whether slides are occurring at a higher than normal background levels.

IUCN–CMP Threat 11. Climate change & severe weather

11.1 Habitat shifting & alteration (Impact: Medium - Low)

Climate change models predict significant increases in temperature and precipitation for northern regions (Zhang et al. 2011). The results of these changes are seen in the upslope advancement of treeline (Flato et al. 2000, Danby and Hik 2007, Danby 2007, Dial et al. 2007) and shrubs (*Salix* spp., Dial et al. 2007, Myers-Smith 2011a, Myers-Smith et al. 2011b, Myers-Smith and Hik 2018) into high elevation tundra habitat used by Collared Pika. Wildfires in alpine-tundra may also enhance shrub expansion in disturbed soils (Myers-Smith et al. 2011b). Limited data are available to determine whether alpine meadows within Collared Pika range have progressed upslope at their higher elevational limits. These habitat shifts may increase distances among patches of talus suitable for Collared Pika potentially resulting in local extirpation and range retraction, especially in lower elevation populations. The extent and configuration of talus patches that characterize Collared Pika habitat have not likely changed in centuries, but encroaching vegetation and associated changes in snow cover characteristics could affect the quality of these patches.

In addition, the loss of permafrost (Bonnaventure and Lewkowicz 2011) and changing moisture and temperature regimes (Beniston 2005, Tait 2002, Danby et al. 2011) could affect species composition of alpine vegetation communities. Given the diet breadth of Collared Pika (COSEWIC 2011) and lack of information on nutritional consequences of anticipated changes to vegetation communities (increases in species richness and diversity), the population-level consequences of nutritional changes in forage on Collared Pika are unknown. Climate-induced vegetation change was also highlighted as being pervasive in scope and moderate in severity by experts interviewed as part of the Alaska Species Ranking System for mammals of high conservation priority (Droghini et al. 2022).

The magnitude of such changes that could be expected in the next two decades is unknown, and greater understanding of the potential effect is further challenged by lack of information on range-wide Collared Pika abundances and distribution. Uncertainty exists on the resilience of Collared Pika to adapt to these changing conditions. The effects of climate change may not be apparent within the 10-year timeframe for this assessment.

11.3 Temperature extremes (Impact: Medium - Low)

The effects of climate change are widespread across Collared Pika range, and in this case, specific to the acute, short-term effects of warmer summers. Climate change models predict that the annual mean temperature in the west-central Yukon will increase 2.5°C to 3.5°C by the 2050s (Werner et al. 2009, Zhang et al. 2011). These increased temperatures may result in lost foraging opportunities and reduced success of juvenile dispersal as Collared Pika seek shelter from the heat in the talus. Annual survival has also been linked to the timing of spring haypile initiation (Morrison et al. 2009).

Increasing ambient temperatures are also expected to have important direct consequences for Collared Pikas due to their physiological temperature tolerance limits. Pikas survive best under cool, dry conditions, and changes in either direction (i.e., higher temperatures, or cold wet conditions) leave them susceptible to death through exposure (Morrison and Hik 2007; Horn, 2013). For example, American Pika persistence (defined by patch occupancy), in the Great Basin was strongly influenced by both chronic heat stress (mean summer temperature) and acute cold stress (number of days temperatures under talus dropped below –5°C or –10°C; Beever et al. 2010). Because pikas appear capable of substantial behavioural thermoregulation, the extent to which these changes would affect population dynamics is unknown. A recent review of the published literature (Smith 2020) indicates that American Pika populations demonstrate a greater adaptive capacity and resilience to adverse environmental conditions (e.g., climate warming) than previously believed, but that a warming climate will still restrict dispersal and limit repopulation of recently extirpated isolated low-elevation habitats. It is unknown whether Collared Pikas have the same adaptive capacity to climate conditions as postulated by Smith (2020) for American Pikas because of the differing climate conditions experienced by Collared Pikas (e.g., longer harsher winters and more rapid climate change) relative to the American Pika populations included in the review. Nevertheless, the best available information suggests that the narrow niche of Collared Pika may render populations particularly vulnerable to negative effects of a changing climate that include increasing temperatures and precipitation variability. This suggests a strong potential of negative impacts of climate change to the persistence of this species over the long term.

Moreover, several factors currently preclude an understanding of the extent to which climate change has, or will, affect Collared Pika populations within the coming decades. These include very limited weather and climate monitoring over much of their range , lack of knowledge of Collared Pika baseline abundance and distribution, and an inability to predict how local conditions and behavioural adaptations of individuals could serve to mitigate negative effects of climate change.

11.5 Other impacts (Impact: Medium - Low)

The effects of climate change are widespread across the range of Collared Pika, and in this case, specific to changes in precipitation. This includes changes to historic snowpack dynamics (melt, timing, amount), frequency of snow and rain events during winter (Knowles et al. 2006) and impacts that these changes have on the growth and availabilty of forage. Annual precipitation is predicted to increase 10%–40% with a 30%–50% increase in winter precipitation by the 2050s (Werner et al. 2009; Zhang et al. 2011). This increased winter precipitation is expected to increase the frequency of freezing and thawing events in alpine and high latitude ecosystems (IPCC 2001; ACIA 2005; Zhang et al. 2011).

Winter mortality of Collared Pika is expected to rise as a result of icing-over of forage resources or through exposure. The main effect of winter rain and icing events on Collared Pikas would be to remove any positive benefit of the subnivean[9] environment that provides thermal insulation from ambient temperature extremes. Another effect would be a temporary loss of access to food resources stored in the talus that are not protected from rain and become encased in ice.

5. Management Objectives

To maintain sufficient suitable habitat[10] in Canada to allow Collared Pika to persist[11] and be resilient[12] to environmental change.

Rationale for Management Objective

Collared Pika have a demonstrated sensitivity to climate variability, coupled with poor dispersal ability and the naturally fragmented nature of its populations. These aspects of their life history, coupled with known climate-driven shifts in habitat, temperature, and precipitation heightens their vulnerability to climate change. Specific habitat targets cannot be quantified at this time because population and distribution information for Collared Pika is limited and/or incomplete. Consequently, there is little information with which to measure abundance trends or to complete a minimum population viability analysis. Fulfilling knowledge gaps will provide important information that will help determine the requirements of populations and will allow the management objective to be quantified in the future. The objective will be met by promoting public awareness and actions needed to address the impacts of climate change, investigating climate-related threats, monitoring populations, addressing knowledge gaps, identifying and conserving important habitat, refining distribution estimates, creating partnerships and evaluating intensive management options (See Broad Strategies and Conservation Measures below).

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[9] The area between the surface of the ground and the bottom of the snowpack.

[10] Talus that is located in suitable locations, connected to other talus patches through dispersal, and which have the appropriate characteristics to provide suitable forage, shelter habitat, and escape habitat.

[11] The long-term existence of a group of local populations (metapopulation or regional population) connected by dispersal. Individual local populations may experience extinction and be rescued by dispersal although the larger regional population would display a higher degree of stability in patch occupancy.

[12] Ensure that local populations are connected through dispersal to allow the regional population to recover from perturbations, adapt to sources of stress and maintain regional-level persistence of the species.

6. Broad Strategies and Conservation Measures

6.1 Actions Already Completed or Currently Underway

In Canada, numerous activities have been completed or are underway. The following list includes activities that address Collared Pika and provide context to the broad strategies outlined in Section 6.3

Yukon

- A long-term research base known as “Pika Camp” was established in 1995 by Dr. David Hik (then at the University of Alberta). This alpine research base supported research on how climate change affects plant and animal interactions in high-latitude alpine regions. Collared Pika were extensively studied at this site and has provided much of the information we know about Collared Pika in Canada.
- Government of Yukon, in collaboration with Friends of Dempster Country have been monitoring Collared Pika in Tombstone Territorial Park since 2009. The program monitors Collared Pika occupancy of talus patches over time. Recently, community-based scientists have become involved in the annual data collection.
- Government of Yukon and Environment and Climate Change Canada completed surveys in 2018, 2019 and 2020 to fill gaps for species distribution, and to establish baseline occupancy for populations in northern Yukon (Cannings et al. 2019; Kukka et al. 2020), as well as central and southern Yukon, including Kusawa Territorial Park (Jung et al. 2021).
- Yukon Conservation Data Centre is tracking Collared Pika occurences through observations provided by agencies/industry/public through formal surveys and incidental observations.
- Environmental assessments for projects in alpine habitats often include provisions for surveying for Collared Pika in talus patches that may be affected by development.

British Columbia

- Nagorsen (2015) outlined that determining the full range extent and population demographics for Collared Pika are action priorities for British Columbia. The British Columbia Conservation Data Center does not record locations for Collared Pika (L. Ramsay, pers. comm., 2018).

Northwest Territories

- Northwest Territories Conservation Data Centre is tracking Collared Pika occurences provided through incidental observations.
- Environmental assessments for projects in alpine habitats typically include provisions for assessing, monitoring and mitigating potential impacts on Collared Pika.

Parks Canada Agency

- In Nah?ą Dehé / Nahanni National Park Reserve (Northwest Territories), incidental Collared Pika sightings are recorded and submitted to the Northwest Territories Conservation Data Centre.
- Nah?ą Dehé / Nahanni National Park Reserve is trialing a Collared Pika monitoring program based on the Government of Yukon's methods for rapid assessment of patch occupancy, which may be paired in the future with other alpine monitoring programs to understand habitat change. Impacts of developments, occurring within Nah?ą Dehé / Nahanni National Park Reserve, on Collared Pika (and their habitat) are mitigated through environmental assessment and permitting processes.
- In Kluane National Park and Reserve (Yukon) and Chilkoot Trail National Historic Site (British Columbia) incidental Collared Pika sightings are recorded. Those from Kluane National Park and Reserve are submitted to the Yukon Conservation Data Centre.

Alaska

- In 2018 and 2019, the Alaska Department of Fish and Game, in collaboration with the University of Alaska Anchorage and University of Idaho, initiated a multi-year study investigating Collared Pika demography, abundance, occupancy and foraging ecology.

6.2 Broad Strategies

The broad strategies of this management plan are described below. The priority is identified in relation to the conservation measures (see section 6.3 Conservation Measures).

1. Promote public awareness and actions needed to address impacts of climate change on Collared Pika.

2. Conduct targeted research to better understand the impacts of climate change on Collared Pika persistence.

3. Address knowledge gaps related to non-climatic limiting factors.

4. Refine Collared Pika distribution and monitor population trends.

5. Determine Collared Pika habitat and mitigate impacts from industrial development and human disturbance.

6. Initiate and support partnerships for monitoring and conserving Collared Pika populations.

7. Evaluate and apply intensive management options, if required.

To assist with the development and prioritization of conservations strategies, we sought input from pika (*O. collaris* and *O. princeps*) researchers. Experts on either North American pika species were surveyed with respect to their opinions regarding Pika ecology, knowledge gaps, conservation priorities, and threats faced by Collared Pika. Responses from 47 experts were obtained representing 427 person-years of experience with Collared Pika and American Pika. In addition, the survey also assessed the degree to which the surveyed experts agreed or disagreed on a range of topics, to allow for a greater understanding of the level of consensus within the scientific community (Jung et al. 2022). The results of this survey were used to prioritize the conservation measures in Section 6.3 below (Table 3).

6.3 Conservation Measures and Implementation Schedule

Table 3. Conservation Measures and Implementation Schedule for Collared Pika developed in part with input from North American pika species experts (Jung et al. 2022).

Conservation Measure	Priority[e]	Threats or Concerns Addressed	Timeline
Broad Strategy 1. Promote public awareness and actions needed to address impacts of climate change on Collared Pika.			
1.1 Increase public awareness of potential impacts of climate change on Collared Pika to encourage public participation in conservation efforts.	High	11. Climate Change and Severe Weather	2023–ongoing
1.2 Increase public awareness of the vulnerability of alpine ecosystems to climate change to promote positive conservation actions.	High	11. Climate Change and Severe Weather	2023–ongoing
1.3 Encourage and support jurisdictions (Government of Canada, NT, BC, YT) to meet their individual targets for climate change efforts.	High	11. Climate Change and Severe Weather	2023–ongoing
Broad Strategy 2. Conduct targeted research on the impacts of climate change on Collared Pika persistence.			
2.1 Obtain better information on how key climatic variables affect Collared Pika populations across their range (e.g., Climate Change Vulnerability Index [Nature Serve]).	High	11. Climate Change and Severe Weather	2023–2026
2.2 Conduct research to determine if/how Collared Pikas may be able to adapt to climate change.	High	11. Climate Change and Severe Weather	2023–2033

Broad Strategy 3. Address knowledge gaps related to non-climatic limiting factors.			
3.1 Conduct research to assess Collared Pika dispersal and colonization ability.	Medium	Knowledge gap	2023–2033
3.2 Obtain better information on the effects of interspecific resource competition and predation on Collared Pika populations.	Low	All threats	2028–2033
Broad Strategy 4. Refine Collared Pika distribution and monitor population trends.			
4.1 Continue existing monitoring programs for Collared Pika, and initiate new programs in strategic areas.	High	All threats	ongoing
4.2 Refine Extent of Occurrence and Area of Occupancy estimates.	Medium	All threats	2023–2028
4.3 Determine Collared Pika presence in areas/regions where their distribution is unknown using Traditional Knowledge, local knowledge,and surveys.	Medium	All threats	2023–2028
4.4 Periodically re-survey sites with historic Collared Pika presence.	Low	All threats	2023–2033
Broad Strategy 5. Determine important Collared Pika habitat and mitigate impacts from industrial development and human disturbance.			
5.1 Identify important Collared Pika habitat and assess habitat connectivity across their range (e.g., develop a habitat suitability map).	Medium	All threats	2023–2026
5.2 Project future habitat suitability based on climate scenarios, and identify potential climate refugia for Collared Pikas.	Medium	11. Climate Change and Severe Weather	2023–2026
5.3 Use tools to manage, protect and mitigate impacts within important Collared Pika habitat and maintain habitat connectivity between patches (e.g., develop Best Management Practices, protected areas)	Medium	All threats	2023–ongoing
5.4 Reduce non-climatic stressors to increase resilience of Collared Pikas (e.g., enforcing dogs-on-leash regulations, limit development in certain alpine areas).	Low	1. Residential and Commercial Development 3. Energy Production and Mining 6. Human Intrusions and Disturbance	2023–ongoing

Broad Strategy 6. Initiate and support partnerships for monitoring and conserving Collared Pika populations.			
6.1 Collaborate with Indigenous groups on Collared Pika research, monitoring, conservation, and stewardship	High	All threats	ongoing
6.2 Promote and support partnerships in research initiatives necessary to fill knowledge gaps	Medium	All threats	ongoing
6.2 Promote and support citizen science aimed at monitoring and conserving Collared Pika populations and their habitat.	Medium	All threats	ongoing
Broad Strategy 7. Investigate and apply intensive management options, if required.			
7.1 If local extirpations and/or range retraction occurs, research cause of the decline.	High	All threats	2028–2033
7.2 Conduct research on feasibility and techniques associated with population augmentation and intensive management.	Low	All threats	2028–2033
7.3 If appropriate, apply population augmentation and/or intensive management options to recover local population.	Low	All threats	2028–2033

[e] "Priority" reflects the degree to which the measure contributes directly to the conservation of the species or is an essential precursor to a measure that contributes to the conservation of the species. High priority measures are considered those most likely to have an immediate and/or direct influence on attaining the management objective for the species. Medium priority measures may have a less immediate or less direct influence on reaching the management objective, but are still important for the management of the population. Low priority conservation measures will likely have an indirect or gradual influence on reaching the management objective, but are considered important contributions to the knowledge base and/or public involvement and acceptance of the species.

6.4 Narrative to Support Implementation Schedule

Inherent to each of these strategies is the involvement of Indigenous groups and the incorporation of Traditional Knowledge. Traditional Knowledge, collected and applied in an appropriate and culturally respectful manner, can be used to address knowledge gaps and deepen our understanding of Collared Pika distribution, ecology, and impacts of climate change. Involvement of Indigenous groups can contribute to all aspects of Collared Pika conservation including monitoring, outreach and education, research and employing multiple knowledge sources into decision-making processes.

Broad Strategy 1. Promote public awareness and actions needed to address impacts of climate change on Collared Pika.
Outreach and education will increase public awareness of Collared Pikas, the threats they face, and will contribute to societal and political desire to protect species at risk and ecosystems that are vulnerable to climate change. Pikas, in general, have public appeal, as such their role as an indicator and flagship species of healthy alpine ecosystems should be promoted to provide system-based context for their management efforts. Outcomes from increased public awareness campaigns would include increased participation in citizen science initiatives and mobilization of Traditional Knowledge to address knowledge gaps surrounding distribution and population trends. These initatives will also will inform the public about actions that individuals and groups can take to contribute to Collared Pika conservation. Outreach and education will also contribute to the the societal shift necessary for Canada to meet its climate targets as outlined in the Paris Agreement. Under the Paris Agreement, Canada committed to reducing its greenhouse gas emissions by 30% below 2005 levels by 2030 (United Nations / Framework Convention on Climate Change 2015). In 2019, the 2005 level was estimated at 730 Mt CO_2 eq (Environment and Climate Change Canada 2020). Similarly, the governments of the Yukon and Northwest Territories have pledged to reduce greenhouse gas emissions by 30% below 2005 levels by 2030 (Government of Yukon 2020, Government of Northwest Territories 2019).

Broad Strategy 2. Conduct targeted research on the impacts of climate change on Collared Pika persistence.
Given that climate change is the main threat to Collared Pika populations, it is critical to fill in knowledge gaps related to the underlying mechanisms of climate change impact on Pikas, and to better understand the potential for Pikas to adapt to climate change. While Collared Pikas are known to be vulnerable to severe weather events, the specific climatic factors and mechanisms are poorly understood. Consequently, identifying the key climatic factors that impact Collared Pika persistence, through analyses such as the Climate Change vulnerability Index (NatureServe 2022), will be critical in understanding how Pika populations may respond to climate change. Filling in these knowledge gaps, using both western science and Traditional Knowledge, are a prerequisite for implementing effective conservation actions.

Broad Strategy 3. Address knowledge gaps related to non-climatic limiting factors.
Non-climatic factors limiting Collared Pika include their poor dispersal ability, and the possible impacts of interspecific resource competition and predation. Collared Pikas' ability to colonize new suitable habitat is critical for their persistence, especially if their current habitat becomes inhospitable due to climate change. The success of dispersal could be measured by looking at population-level genetic data, specifically by investigating frequency of genetic exchange and relatedness within a metapopulation.

The impact of predation and interspecific competition from other herbivores (e.g., Hoary Marmot [*Marmota caligata*], Arctic Ground Squirrel [*Spermophilus parryii*]) on Collared Pika populations have not been well studied and their impacts remain unknown (COSEWIC 2011). Predators of Collared Pika include Ermines (*Mustela ermine*), Short-tailed Weasels (*Mustela erminea*), Red Foxes (*Vulpes vulpes*), and avian predators such as Golden Eagles (*Aquila chrysaetos*; COSEWIC 2011). While predation and interspecific competition has proved difficult to study, the use of emerging technologies (e.g., remote cameras, unmanned aerial vehicles) could address this knowledge gap. In addition, marmot and other herbivore sightings should be included during surveys, citizen science initatives and as a topic during Traditional Knowledge collection efforts.

Broad Strategy 4. Refine Collared Pika distribution and monitor population trends.
It is important to determine the current distribution of Collared Pika, along with collecting information on population trends. This knowledge will provide the necessary baseline for monitoring population abundance and distribution trends across their range. For filling knowledge gaps related to Collared Pikas' distribution, the priority areas would focus on a site at the centre and leading and trailing edges of their current range to monitor changes in occupancy rates and distribution. For filling knowledge gaps related to population trends, the priority would be to survey a select number of areas that can be surveyed repeatedly over time to detect change (existing and/or new sites) and reanalyze existing data.The development and use of standardized protocols will support consistency among studies. The analysis for these monitoring methods can also be statistically complex so accessible analytical methods need to be developed and shared (e.g., publishing statistical code or developing user-friendly interfaces).

Broad Strategy 5. Determine important Collared Pika habitat and mitigate impacts from industrial development and human disturbance.
Knowledge gaps related to Collared Pikas' habitat use, dispersal ability and the characteristics of effective movement corridors are required to assess the potential rescue effect of climate refugia, and protect important current and future Collared Pika habitat. A habitat suitability model for Collared Pika and how this changes under different climate change scenarios is a necessary step to help address these key questions. Best management practices for working and recreating in Collared Pika habitat, developed in collaboration with Indigenous groups, will help communicate these actions to the public and relevant stakeholders (e.g., tourism operators and the mining industry). These could include recommendations to reduce local disturbances that may modify talus, reduce shelter, alter vegetation along the talus edge, increase predator abundance or create barriers to dispersal between habitat patches. Special management areas or protected areas could also be implemented to protect important habitats.

Collared Pika can be impacted by non-climatic stressors like human disturbance that take time and limited energy resources normally devoted to preparing haypiles for winter and anti-predator behaviours. Increased public awareness regarding potential human displacement and disturbance of Collared Pikas when working, recreating or harvesting in alpine environments could be developed and promoted through best management practices, education and outreach, enforcing existing dogs-on-leash regulations and limiting development in certain alpine areas.

Broad Strategy 6. Initiate and support partnerships for monitoring and conserving Collared Pika populations.
Collaborative efforts are needed for effective action. Engaging partners (e.g., government agencies, Indigenous groups, wildlife management boards, academia, public, and non-government organizations), and supporting collaborations in research initiatives necessary to fill knowledge gaps will promote efficient management efforts across the range of Collared Pika. In particular, citizen science programs and involvement of Indigenous groups can increase the capacity for Collared Pika monitoring programs while simultaneously promoting public awareness.

Broad Strategy 7. Investigate and apply intensive management options, if required.
With some of Canada's most dramatic wildlife range contractions predicted to occur among high-latitude species such as Collared Pika, efforts to maintain populations within suitable habitat may require intensive management. Although these intensive management options were rated by experts as less important than other actions, they were still supported as possible options to address significant declines. Little is known about the efficacy of these options, so research into their effectiveness is warranted in the event that they are required.

7. Measuring Progress

The performance indicators presented below define and measure progress toward achieving the management objective. Every five years, the success of this management plan will be measured against the following performance indicators:

- The amount and distribution of suitable habitat is identified for Collared Pika for current and future climate change scenarios by 2027.
- Studies investigating the resilience of Collared Pika to climate change are completed by 2032.
- Collared Pika continue to persist in the core of their current range and long-term monitoring programs are established to monitor for changes at the edges of their distribution.

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Appendix A: Effects on the Environment and Other Species

A strategic environmental assessment (SEA) is conducted on all SARA recovery planning documents, in accordance with the *Cabinet Directive on the Environmental Assessment of Policy, Plan and Program Proposals*[13]. The purpose of a SEA is to incorporate environmental considerations into the development of public policies, plans, and program proposals to support environmentally sound decision-making and to evaluate whether the outcomes of a recovery planning document could affect any component of the environment or any of the Federal Sustainable Development Strategy's[14] (FSDS) goals and targets.

Conservation planning is intended to benefit species at risk and biodiversity in general. However, it is recognized that implementation of management plans may also inadvertently lead to environmental effects beyond the intended benefits. The planning process based on national guidelines directly incorporates consideration of all environmental effects, with a particular focus on possible impacts upon non-target species or habitats. The results of the SEA are incorporated directly into the strategy itself, but are also summarized below in this statement.

Conservation measures described in this Management Plan are not expected to have negative effects on other species and will likely indirectly benefit other SARA Schedule 1 wildlife species in the areas such as Yukon Podistera (*Podistera yukonensis*) and Spiked Saxifrage (*Micranthes spicata*). Conservation planning activities for the Collared Pika will be implemented with consideration for all co-occurring species, with focus on species at risk, such that inadvertent negative impacts to individuals and their habitats are avoided. The SEA concluded that this plan will clearly benefit the environment and will not entail any significant adverse effects. The reader should refer to the following sections of the document in particular: description of the species' needs, threats, management objectives and the conservation measures.

[13] www.canada.ca/en/environmental-assessment-agency/programs/strategic-environmental-assessment/cabinet-directive-environmental-assessment-policy-plan-program-proposals.html
[14] www.fsds-sfdd.ca/index.html#/en/goals/