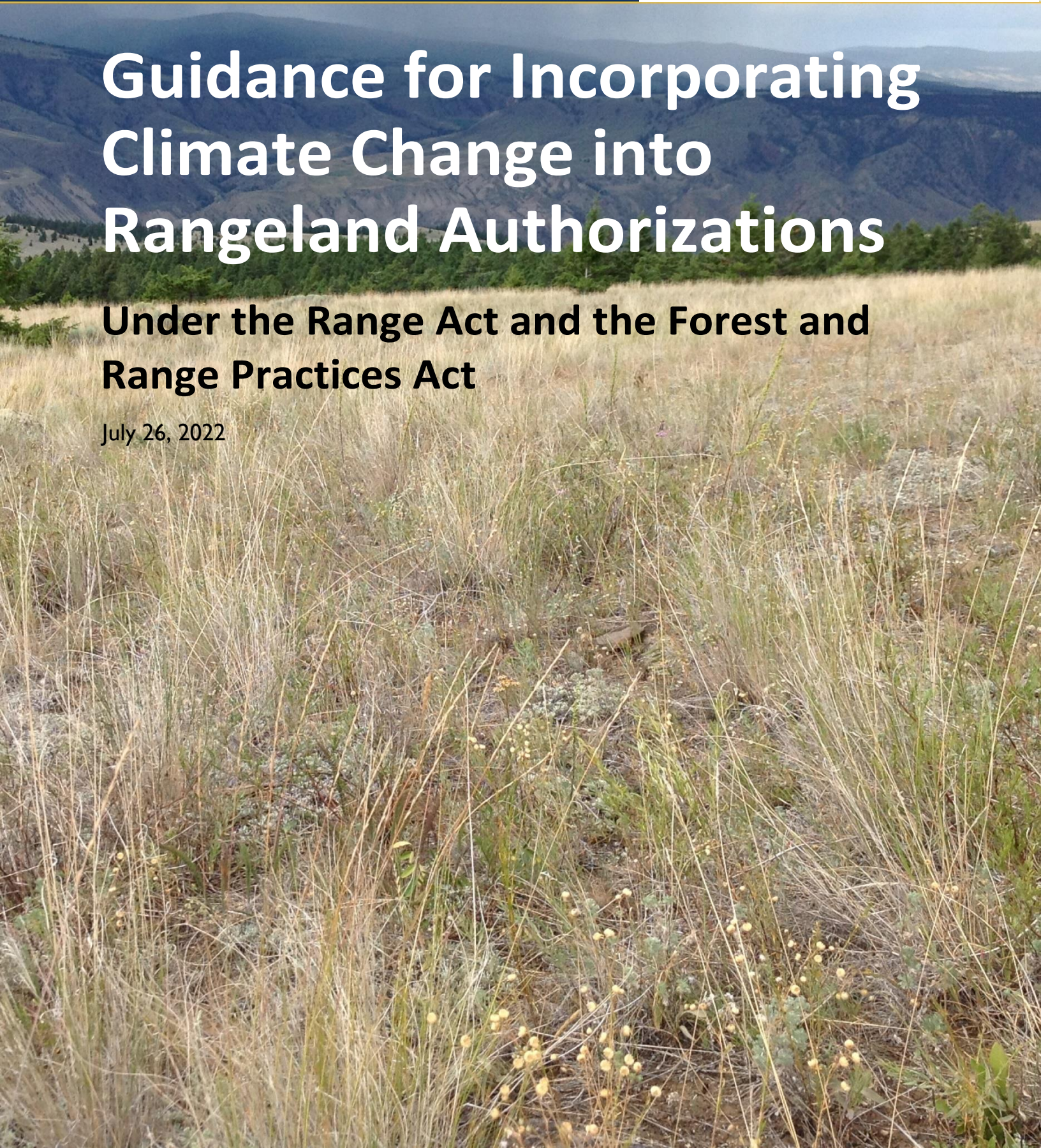


# Guidance for Incorporating Climate Change into Rangeland Authorizations

**Under the Range Act and the Forest and  
Range Practices Act**

July 26, 2022



**As the Province of British Columbia prepares for a changing climate, the Ministry of Forests continues to incorporate climate change adaptation into its daily business. This guidance outlines how climate change adaptation may be incorporated into decision processes under the *Range Act* and *Forest and Range Practices Act* to support long-term sustainable management of BC's range resources.**

## Introduction

This document supports considerations of climate change adaptation in decision processes for range agreements (licences and permits) under the *Range Act*, and range use plans under the *Forest and Range Practices Act*. It outlines potential adaptation measures and considerations for range program staff and clients. Adaptation measures are based on climate change risks and expected impacts, including those identified in the Preliminary Strategic Climate Risk Assessment for British Columbia (2019)<sup>1</sup>. According to the Ministry's 2021–2025 Climate Change Strategy<sup>2</sup>, the Ministry seeks to integrate climate change mitigation and adaptation into business and work planning processes and to include climate change impacts and opportunities in policy and operation decisions. This guidance will be updated periodically as new information and best adaptation practices become available, and in response to Ministry or Ranching sector climate adaptation initiatives.

## BC's Rangelands and Climate Change

BC's rangelands are comprised of diverse ecosystems including grasslands, forests, wetlands, alpine tundra, and deserts. Rangelands sustain vegetation consumed by livestock and wildlife and support recreationists, ranchers, and First Nations' interests. Climate change is altering rangelands and may change the quantity and quality of goods and services derived from these lands. A drastic change in rangeland environments due to new climate conditions could mean increases in the frequency and severity of wildfires, seasonal and long-term water shortages, flooding, more invasive species, and altered ecosystem connectivity. While some rangelands may be well-adapted to future climatic conditions or have wildfires as a part of their ecosystems, other locations will be stressed beyond their normal range of adaptability. For example, increased droughts and spread of invasive species could impact forage productivity, causing a shift in some ecosystems. Shifting climate conditions may affect rangeland ecosystems and development which could result in an increased risk to public safety, infrastructure, and access. At the same time, climate change could also lengthen growing and grazing seasons, and expand grassland ecosystems in some areas.

## Preparing for Climate Change

While short term general trends in climate change across BC are understood, local trends and longer-term impacts are highly uncertain. As a result, appropriate climate change adaptation measures may vary significantly across BC.

Rangeland management practices are inherently adaptive, responding to short-term and long-term climate patterns. Grazing management is predicated on annual forage production as well as long term trends in forage and water availability.

The following table provides an overview of climate risks and provincial climate change trends. The table lists some examples of major impacts to rangelands with potential adaptation measures. Table 1 is not an exhaustive list nor is it a rigid blueprint for action. Staff and clients can use this information as a starting point towards developing and adopting site-level forage allocation, and rangeland management plans and practices to mitigate climate risks or to benefit from opportunities. Range program staff and decision makers can use this guidance to consider resource values and integrate climate change adaptation into decision processes for rangeland agreements and range use plans. Potential adaptation measures described here are provided as a general resource and do not override relevant provincial, local, or federal requirements, or bind *Range Act* or *Forest and Range Practices Act* decision makers.



<sup>1</sup> Ministry of Environment and Climate Change Strategy. (2019). Preliminary Strategic Climate Risk Assessment for British Columbia. <https://www2.gov.bc.ca/assets/gov/environment/climate-change/adaptation/prelim-strat-climate-risk-assessment.pdf>

<sup>2</sup> Ministry of Forests, Natural Resource Operations, and Rural Development. 2021-2025 Climate Change Strategy. [https://intranet.gov.bc.ca/assets/intranet/flnrord/ocf/fccsb/climate-action-planning/20212025\\_climate\\_change\\_strategy.pdf](https://intranet.gov.bc.ca/assets/intranet/flnrord/ocf/fccsb/climate-action-planning/20212025_climate_change_strategy.pdf)

Table 1. Climate risks and examples of major impacts and potential adaptation measures

Climate risk and provincial trend	Examples of major impacts to rangelands	Examples of potential adaptation measures
<p><b>Severe wildfire season</b></p> <p>Annual area burned is projected to increase by up to 4% by 2050<sup>1</sup></p> <p>Wildfires will become more severe and frequent.</p>	<ul style="list-style-type: none"> <li>• Short- and long-term damage to forage which may result in increased grazing pressure</li> <li>• increased soil erosion, exposures and sloughing</li> <li>• increased introduction and spread of invasive species</li> <li>• destruction of developments, infrastructure and rangeland</li> <li>• ecosystem disruption, wildlife displacement and landscape transformation</li> <li>• ash and debris may degrade water quality</li> <li>• changes in water run-off</li> </ul>	<ul style="list-style-type: none"> <li>• consider any local wildfire and fuel management plans</li> <li>• use livestock to create strategic fuel breaks</li> <li>• utilize prescribed fire to support fire-resilient ecosystems</li> <li>• rehabilitate and reseed disturbed areas after wildfire; consider managing for fire-resilient ecosystems</li> <li>• remove and manage fuels around high value range developments</li> <li>• renovate and build structures and range developments with fire-resistant materials</li> </ul>
<p><b>Drought - seasonal water shortage</b></p> <p>Drought is projected to increase under climate change due to rising temperatures and changes in precipitation from, timing and intensity that could affect both rain and snowmelt dominated systems.</p> <p>Water shortages will become more severe and frequent.</p>	<ul style="list-style-type: none"> <li>• increased variability in forage productivity, quality and species</li> <li>• increased water demand</li> <li>• may affect water quality and availability</li> <li>• decreased soil moisture</li> <li>• expansion of drought-tolerant invasive plant including annual grasses</li> <li>• habitat degradation could affect many species</li> </ul>	<ul style="list-style-type: none"> <li>• set appropriate forage allocation and utilization levels (conservative, flexible)</li> <li>• consider longer rest periods</li> <li>• install water developments including storage</li> <li>• fence sensitive riparian areas and provide supplemental watering</li> <li>• use water developments, supplements, and riding to control livestock distribution</li> <li>• increase hay production on Crown range to offset grazing forage loss</li> </ul>
<p><b>Drought – long term water shortage</b></p> <p>Higher temperatures are expected to increase evaporation and regional moisture deficit.</p> <p>Water shortages will become more severe and</p>	<ul style="list-style-type: none"> <li>• may affect water quality and availability</li> <li>• increased conflicts across users and competition with wildlife</li> <li>• may shift climate envelopes for indigenous species</li> <li>• increased variability in forage availability, quality and species</li> <li>• shifting forage may require infrastructure relocation</li> <li>• loss of natural resources makes rangeland</li> </ul>	<ul style="list-style-type: none"> <li>• manage rangeland within carrying capacity</li> <li>• improve water use, management and efficiency</li> <li>• use water storage developments; adapt locations</li> <li>• manage for conservative stocking rates</li> <li>• include precaution and flexibility in plans to adapt herd size to forage productivity and supply</li> <li>• support diversification of livestock species (e.g., shift to breeds with tolerance to heat)</li> <li>• encourage use of different grazing management</li> </ul>

<p>frequent.</p>	<p>more susceptible to wildfires and insect outbreaks</p> <ul style="list-style-type: none"> <li>• may lead to ecosystem regime shifts</li> <li>• expansion of drought-tolerant invasive plant species especially annual grasses</li> <li>• increased pests e.g., grasshoppers</li> </ul>	<p>regimes (e.g., deferred and rotational grazing)</p> <ul style="list-style-type: none"> <li>• reduce stocking rates</li> <li>• develop reserve pastures (pasture banking) and alternative grazing areas that could be used during drought or wildfires</li> <li>• securing water rights for Range Act agreement holders</li> <li>• monitor and eradicate new invasive plant species</li> </ul>
<p><b>Extreme precipitation</b> Heavy precipitation events will become more frequent and intense<sup>3</sup></p>	<ul style="list-style-type: none"> <li>• soil erosion</li> <li>• plant and forage damage</li> <li>• impacts to plant communities and composition</li> <li>• opportunity to capture and store water</li> </ul>	<ul style="list-style-type: none"> <li>• manage grazing to maintain soil conditions and riparian ecosystems (to enable the riparian ecosystems to safely absorb and release water)</li> <li>• maintain riparian vegetation to control grazing</li> <li>• ensure range developments are designed and built to withstand extreme precipitation events and to capture and store water during these events</li> <li>• increase hay production</li> </ul>
<p><b>Moderate flooding</b> (lower-level, more frequent than severe floods). Lower-level floods are expected to become more frequent.</p>	<ul style="list-style-type: none"> <li>• waterlogged soils could affect forage and productivity</li> <li>• natural resources could experience damage due to inundation, debris and water, and soil contamination</li> <li>• riparian and aquatic invasive plants expansion (some of which may be toxic to livestock)</li> </ul>	<ul style="list-style-type: none"> <li>• flood proof or locate critical developments upland</li> <li>• adjust turn out dates to minimize trampling, soil compaction, and reduce risk to livestock</li> <li>• identify and remove or fence off toxic invasive plants (e.g., poison hemlock) before grazing the impacted area</li> </ul>
<p><b>Increase in invasive plants</b> Invasive plants may overtake and outcompete existing species and be detrimental to certain species or ecosystems.</p>	<ul style="list-style-type: none"> <li>• some native species may be less competitive in new climate and disturbance conditions and may be increasingly vulnerable to invasive species in some regions, facilitating regime shifts</li> <li>• invasive plants may reduce rangeland productivity and increase variability in forage availability and quality</li> </ul>	<ul style="list-style-type: none"> <li>• maintain aggressive controls and practices for high priority invasive species</li> <li>• address invasive species in range use plans</li> <li>• expand invasive species management practices to include species beyond those listed in the Invasive Plants Regulation</li> <li>• limit soil disturbance, overgrazing and trampling, which can change plant communities, destroy biological crust and open soil to invasive plants</li> <li>• immediately revegetate all soil disturbances resulting from forest and range</li> <li>• manage grazing to maintain late seral vegetation communities</li> <li>• use livestock to manage palatable invasive plants</li> <li>• align grazing rotations to target or avoid grazing</li> </ul>

<sup>3</sup> Spittlehouse, D.L. (2008). Climate Change, Impacts, and Adaptation Scenarios: Climate Change and Forest and Range Management in British Columbia. <https://www.for.gov.bc.ca/hfd/pubs/Docs/Tr/Tr045.pdf>

		<p>during critical phenological stages of invasive plants</p> <ul style="list-style-type: none"> <li>• monitor for new invasive species and report them</li> <li>• work collaboratively with land managers and neighbours to manage expanding invasive plant populations.</li> </ul>
<p><b>Ecosystem changes</b> (reduced connectivity and ecosystem shifts)</p> <p>Ecosystems will generally shift northward and to higher elevations.</p> <p>Forage productivity will decline in some areas (e.g., drought susceptible areas) and increase in others (e.g., higher elevations).</p>	<ul style="list-style-type: none"> <li>• increased competition with wildlife and user conflicts</li> <li>• changes in habitat suitability and connectivity may make species more, or less prevalent (e.g., shifts in pollinators, vegetation, wildlife and pests)</li> <li>• changes to growing periods</li> <li>• fragmentation can threaten species and ecological processes</li> <li>• changes to access to certain species or habitats</li> <li>• recovery could take decades, but for higher elevation ecosystems losses may be permanent</li> </ul>	<ul style="list-style-type: none"> <li>• monitor range health and assess resources</li> <li>• consider ecosystem connectivity in landscape level plans</li> <li>• manage rangeland within carrying capacity</li> <li>• use of prescribed fire to reduce forest ingrowth and encroachment on grasslands</li> <li>• manage to improve ecosystem resiliency</li> <li>• consider potential fire ecology impacts</li> </ul>

## Additional Resources

- [Preparing for Climate Change](#)
- [ClimateBC](#)
- [BC Drought Drought and Water Scarcity Response Plan](#)
- [BC Climate Explorer, a climate visualization tool for biogeoclimatic ecosystem classification](#)

## Contacts

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