



# COMMUNITIES ADAPTING TO CLIMATE CHANGE INITIATIVE

## CLIMATE CHANGE ADAPTATION DISCOVERY TOOL

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## INTRODUCTION: ADAPTATION DISCOVERY TOOL

### **What is the Climate Change Adaptation Discovery Tool (ADT)?**

The ADT summarizes the specific climate change impacts and adaptation actions identified by communities that participated in Columbia Basin Trust's (CBT) Communities Adapting to Climate Change Initiative (CACCI) 2008-2010: City of Rossland, City Castlegar, Regional District of Central Kootenay Area D, Village of Kaslo, City of Kimberley and the District of Elkford.

It is organized by thematic areas and includes an action checklist so that communities can assess their status and progress on adaptation planning over time. The ADT does not provide an exhaustive list of adaptation actions and is intended to be a living document. Additional adaptation resources can be found on CBT's online Adaptation Resource Kit. [www.cbt.org/adaptationresourcekit](http://www.cbt.org/adaptationresourcekit)

### **Purpose and Audience**

The ADT is a resource for communities within CBT's region and could be a resource for communities elsewhere. This tool will demystify the adaptation planning process by highlighting the potential impacts of climate change at the local level and adaptation actions that a community could take to prepare for those impacts. Some actions in the ADT could be integrated into Official Community Plans and other actions may be more appropriately undertaken by non-government groups or other levels of government.

### **Adaptation and Mitigation**

This tool focuses on preparing for and responding to potential climate change impacts at the local level, also known as climate change adaptation. Adapting to climate change is about being ready for a future that is different than what the community has experienced in the past due to changes in weather and climate.

Climate change mitigation is the act of reducing greenhouse gas emissions that contribute to climate change. Adaptation planning does not replace the need to reduce emissions. Accordingly, both adaptation and mitigation are necessary for communities to comprehensively address the impacts of climate change.

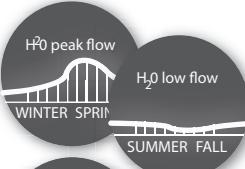
## CLIMATE MODEL PROJECTIONS

The potential climate change impacts listed in this tool are based on climate model projections by the Pacific Climate Impacts Consortium (PCIC). The projections are anticipated trends for the future and may or may not occur in a given year, season or location.

Climate projections for the Columbia Basin Region indicate that temperature and precipitation are changing:

- annual temperatures are expected to rise by 1.2 to 2.7 degrees Celsius by 2050;
- annual average precipitation is expected to increase, with a net decrease in summer precipitation;
- increased variability of temperature and precipitation;
- increased frequency of extreme weather events; and
- winter precipitation is more likely to fall as rain at lower elevations

### Primary Impacts Key

	<ul style="list-style-type: none"><li>• Increase in <b>freeze-thaw cycles</b></li></ul>		<ul style="list-style-type: none"><li>• Earlier <b>spring peak flows</b></li><li>• Decrease in late <b>summer low flows</b></li></ul>
	<ul style="list-style-type: none"><li>• Increase in the frequency of <b>extreme weather events</b></li></ul>		<ul style="list-style-type: none"><li>• Increase in the frequency and severity of <b>flooding</b></li></ul>
	<ul style="list-style-type: none"><li>• More <b>rapid runoff</b></li></ul>		<ul style="list-style-type: none"><li>• Increase in <b>variability</b> of temperature and precipitation</li></ul>
	<ul style="list-style-type: none"><li>• Lower water capture in storage <b>reservoirs</b></li></ul>		<ul style="list-style-type: none"><li>• Increase in the frequency and severity of <b>wildfires</b></li></ul>
	<ul style="list-style-type: none"><li>• Drier <b>soil</b> and vegetation</li></ul>		<ul style="list-style-type: none"><li>• Increase in <b>pests</b></li></ul>
	<ul style="list-style-type: none"><li>• Increase in <b>glacial runoff</b></li></ul>		<ul style="list-style-type: none"><li>• Increase in 'rain on snow' and 'rain on frozen ground' events</li></ul>



## DECISION-MAKING AND COMMUNICATION

The following actions are applicable across most communities and are important steps to incorporating climate change into the day-to-day decisions of local governments. A checklist is provided to assess actions already underway and actions to be added.

Strategies	Potential Actions	Doing Already	Add to Action List
<i>1.1 Undertake public outreach regarding climate change adaptation and planning actions as they are implemented</i>	<ul style="list-style-type: none"> <li>• Use all communication channels as well as relevant community events for outreach</li> </ul>		
<i>1.2 Ensure local government and community committees, plans and processes consider climate impacts/adaptation in their decision making</i>	<ul style="list-style-type: none"> <li>▪ Ensure there is a standing line item regarding climate change considerations in all staff memos to Council regarding major decisions</li> <li>▪ Review bylaws and regulations to account for and incorporate climate change</li> </ul>		
<i>1.3 Review and strengthen emergency management systems to address potential climate change impacts</i>	<ul style="list-style-type: none"> <li>▪ Ensure all relevant plans are included in review</li> </ul>		
<i>1.4 Develop an urban forestry and tree renewal strategy</i>	<ul style="list-style-type: none"> <li>▪ Ensure the planting of a diverse range of trees appropriate for a warming climate</li> <li>▪ Promote tree retention on residential and municipal properties</li> </ul>		
<i>1.5 Consider climate change in land use planning decisions</i>	<ul style="list-style-type: none"> <li>▪ Incorporate climate change considerations into Official Community Plans</li> <li>▪ Ensure planning and development-related activities - including bids, tenders and contracts - consider climate change impacts</li> </ul>		
<i>1.6 Expand network of weather stations and climate data collection stations</i>	<ul style="list-style-type: none"> <li>▪ Assess best locations for weather stations</li> <li>▪ Increase climate data processing at existing or new weather stations</li> </ul>		

## MUNICIPAL INFRASTRUCTURE

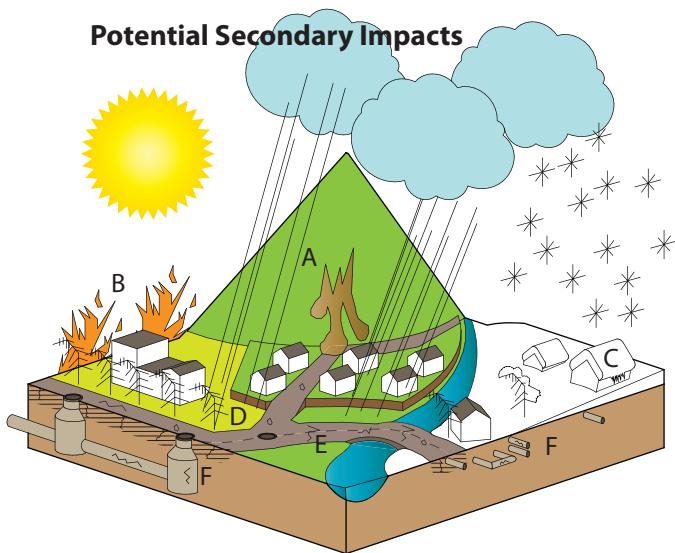
### Climate Model Projections (2050)

- Higher winter minimum and summer maximum temperatures
- Increased winter precipitation (greater likelihood of rain at lower elevations)
- Decreased summer precipitation
- Decreased snowfall and snowpack at lower elevations

### Potential Primary Impacts



### Potential Secondary Impacts



### MUNICIPAL INFRASTRUCTURE

- A- Increased chance of landslides
- B- Increased chance of wildfire and longer wildfire season
- C- Increased heavy snow and ice load on roofs
- D- Increased stress on urban trees
- E- Increased stress on roadways and bridges
- F- Increased freezing of buried pipes

**MUNICIPAL INFRASTRUCTURE**

Strategies	Potential Actions	Doing Already	Add to Action List
2.1 Incorporate climate change considerations into infrastructure assessments, plans and maintenance schedules	<ul style="list-style-type: none"> <li>▪ Conduct a climate change infrastructure risk assessment</li> <li>▪ Monitor at-risk infrastructure (e.g. asbestos cement pipes) for climate change impacts and to gain a better understanding of at-risk or vulnerable areas</li> <li>▪ Increase inspections and maintenance for at-risk areas (e.g. water source intake sites, water pump and pressure reduction stations)</li> <li>▪ Accelerate replacement or upgrading of infrastructure identified to be at-risk</li> </ul>		
2.2 Promote on-site water retention and management on residential and commercial properties	<ul style="list-style-type: none"> <li>▪ Utilize education and incentives to encourage residential and commercial property owners to consider on-site water retention and management techniques</li> </ul>		
2.3 Prepare climate change design guidelines for new residential builds and renovations	<ul style="list-style-type: none"> <li>▪ Research potential climate change design guidelines for expected local climate change impacts</li> <li>▪ Prepare and publicize climate change design guidelines for new builds and renovations that address expected local climate change impacts</li> </ul>		
2.4 Update road design standards to improve stormwater management	<ul style="list-style-type: none"> <li>▪ Require water retention or on-site stormwater management techniques for new roads</li> <li>▪ Consider water retention and on-site stormwater management techniques when repairing roads</li> </ul>		
2.5 Develop a landslide prevention strategy	<ul style="list-style-type: none"> <li>▪ Minimize development, disturbance and vegetation removal on and near slopes exceeding 25 per cent</li> <li>▪ Visually monitor at-risk slopes for signs of subsidence and instability</li> </ul>		
2.6 Encourage regional, provincial and federal agencies to assist municipalities in climate change adaptation	<ul style="list-style-type: none"> <li>▪ Encourage other agencies to prepare best practices guides for climate change adaptation</li> <li>▪ Encourage other agencies to provide funding for climate change adaptation programs and initiatives</li> </ul>		

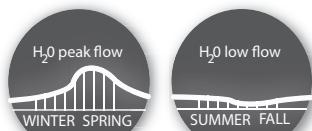
## FLOODING AND STORMWATER MANAGEMENT

### Climate Model Projections (2050)

Higher winter minimum and summer maximum temperatures

Increased winter precipitation (greater likelihood of rain at lower elevations)

### Potential Primary Impacts



Spring Flow

Summer Flow

Rain on Frozen Ground



Freeze-Thaw

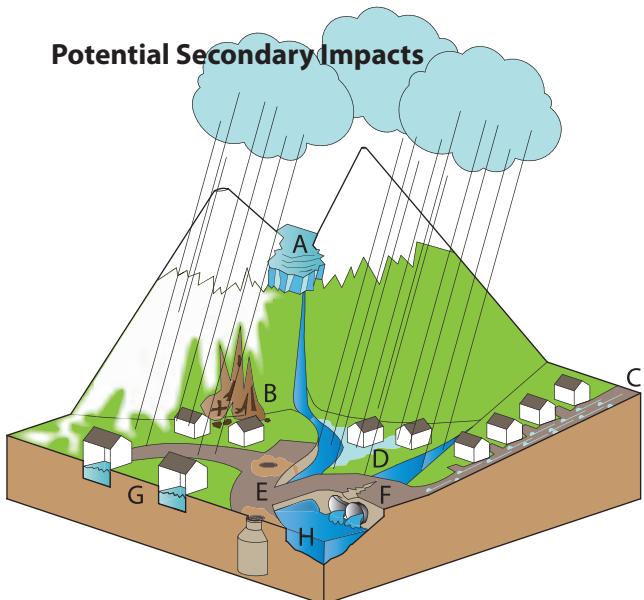
Glacial Runoff

Flooding



Extreme Weather

### Potential Secondary Impacts



### FLOODING AND STORMWATER MANAGEMENT

A- Increased glacial runoff

B- Debris torrents

C- Increase in rapid runoff

D- Increase in flooding

E- Sewer backup and overflow

F- Culvert failure

G- Basement flooding

H- Increase in water volume for stormwater systems

## FLOODING AND STORMWATER MANAGEMENT

Strategies	Potential Actions	Doing Already	Add to Action List
<i>3.1 Promote on-site water retention and management on residential and commercial properties</i>	<ul style="list-style-type: none"> <li>▪ Utilize education and incentives to encourage homeowners and commercial property owners to consider on-site water retention and management techniques</li> </ul>		
<i>3.2 Renew or update current Official Community Plan (OCP) actions related to stormwater management and flooding</i>	<ul style="list-style-type: none"> <li>▪ Identify at-risk drainage catchments</li> <li>▪ Design drainage and flood control on the basis of updated return cycles for storm events</li> <li>▪ Create wide buffer zones around streams</li> <li>▪ Incorporate low impact development standards</li> </ul>		
<i>3.3 Update subdivision and servicing bylaws to better address flooding and stormwater management</i>	<ul style="list-style-type: none"> <li>▪ Incorporate low impact development standards into new developments, such as reducing paved areas, maintaining natural features, incorporating green space using absorbent landscaping techniques and constructing wetlands and detention ponds</li> </ul>		
<i>3.4 Ensure climate change is considered in all drainage infrastructure replacement and repairs</i>	<ul style="list-style-type: none"> <li>▪ Minimize the use of culverts and restrictions to stream channels to maintain natural stream patterns where possible</li> <li>▪ Ensure that trash racks or debris screens (for storm drains and culverts) adequately capture and hold debris while still allowing flows to enter</li> <li>▪ Ensure debris can be easily removed from the trash racks by an excavator</li> <li>▪ Update road design standards to require water retention or on-site stormwater management techniques, such as the removal of curbs and gutters and the construction of swales and sand filters</li> <li>▪ Ensure that resizing of stormwater pipes can accommodate additional run-off as a result of increased climatic variability and increased impervious surfaces</li> </ul>		
<i>3.5 Prepare or update a community flood management plan</i>	<ul style="list-style-type: none"> <li>▪ Undertake a flood hazard study, including analysis of stream flow data for flood return frequency and possible blockage sites in water systems</li> <li>▪ Ensure the community has an emergency flood plan with evacuation procedures</li> <li>▪ Review floodplain designations to incorporate climate change projections and potential geomorphological changes</li> <li>▪ Consider adopting a “design flood” strategy of temporarily storing water in depression areas (parks, green space, buffer zones, and agricultural fields)</li> <li>▪ Ensure infrastructure development is discouraged within floodplains and that land use restrictions are enforced</li> </ul>		

## FLOODING AND STORMWATER MANAGEMENT CONTINUED

Strategies	Potential Actions	Doing Already	Add to Action List
<i>3.6 Update master drainage (MDP)/ stormwater management plans to reflect climate change projections</i>	<ul style="list-style-type: none"> <li>▪ Update drainage infrastructure data to ensure all information required for hydraulic analysis is current and reliable (e.g. pipe diameters, pipe invert elevations, open channel cross-sections, and channel/pipe lengths)</li> <li>▪ Ensure climate load, maturing capacity, and other change loads are analyzed in preparation of the plan</li> <li>▪ Address hydrological (potential peak flow rates) and hydraulic (quantify capacity) analyses using current and projected (2050) climate values, updated vulnerability analysis and updated location analysis for debris screens for large debris</li> <li>▪ Ensure that the plan incorporates actions at the property, neighbourhood and watershed scale</li> </ul>		
<i>3.7 Increase record keeping and frequency of maintenance, inspections and cleanups for all drainage infrastructure</i>	<ul style="list-style-type: none"> <li>▪ Increase the frequency of fall inspection/cleanup for creek and stream culverts to reduce risk of debris blockages</li> <li>▪ Maintain records documenting the amount, type, and date of debris removed from culvert or storm sewer inlets</li> <li>▪ Review maintenance/inspection schedules for storm-water drains to minimize risk of localized flooding in areas that have flooded in the past</li> <li>▪ Consider the need for equipment to assist with debris removal</li> </ul>		

## COMMUNITIES ADAPTING TO CLIMATE CHANGE INITIATIVE

## COMMUNITY WATER AVAILABILITY

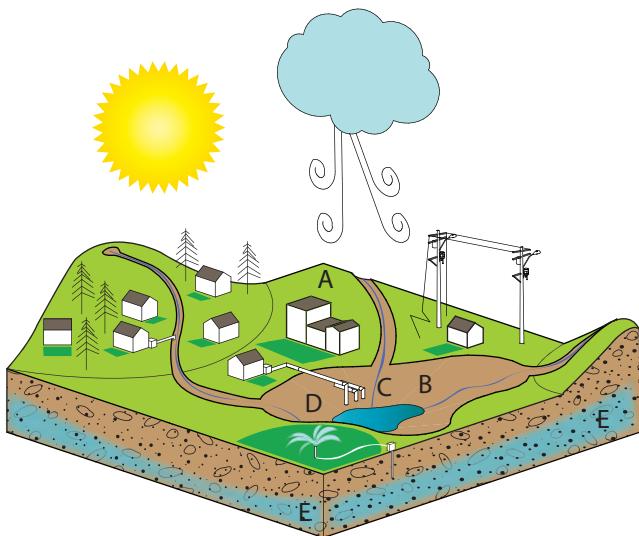
### Climate Model Projections (2050)

- Higher winter minimum and summer maximum temperatures
- Increased winter precipitation (greater likelihood of rain at lower elevations)
- Decreased summer precipitation
- Decreased snowfall and snowpack at lower elevations

### Potential Primary Impacts



### Potential Secondary Impacts



### COMMUNITY WATER AVAILABILITY

- A- Power lines may be damaged and electric water pumps may be affected
- B- Reduced water supply in reservoirs when demand is highest
- C- Increased stress on water supply infrastructure
- D- Water demand could exceed supply
- E- Aquifers may be less reliable

## COMMUNITY WATER AVAILABILITY

Strategies	Potential Actions	Doing Already	Add to Action List
4.1 Educate water users regarding future potential water shortages associated with climate change	<ul style="list-style-type: none"> <li>▪ Ensure all residents and water users are informed regarding potential future water shortages associated with climate change</li> <li>▪ Ensure all water licence holders and small water system operators are informed regarding potential future climate-change-related water shortages</li> </ul>		
4.2 Reduce water demand	<ul style="list-style-type: none"> <li>▪ Adjust municipal building bylaws, regulations and standards to require low-flow plumbing fixtures for all new buildings</li> <li>▪ Establish water education programs to encourage water users to reduce water use through practices and technologies such as low flow toilets, rainwater collection, irrigation timing, topsoil build-up, low flow irrigation, and xeriscaping</li> <li>▪ Establish incentives to encourage demand reduction, such as differential water pricing based on use or fixture replacement incentives</li> <li>▪ Require water meters for all residential and commercial water users</li> <li>▪ Reduce water use in municipal buildings and landscaping</li> <li>▪ Implement municipal leak detection and repair programs</li> </ul>		
4.3 Explore and promote the use of alternative water sources for non-potable uses	<ul style="list-style-type: none"> <li>▪ Promote the use of rain barrels or cisterns for outdoor water use</li> <li>▪ Support change in provincial legislation and regulations to allow grey water collection for outdoor use and for some household use</li> </ul>		
4.4 Analyze community water supply volumes	<ul style="list-style-type: none"> <li>▪ Establish water flow monitoring on creeks that provide community water supply</li> <li>▪ Map and monitor community aquifers to understand characteristics</li> </ul>		
4.5 Increase municipal water storage capacity	<ul style="list-style-type: none"> <li>▪ Investigate increasing the water storage capacity of the municipal reservoir</li> <li>▪ Consider building new municipal reservoirs</li> </ul>		
4.6 Prepare for drought	<ul style="list-style-type: none"> <li>▪ Have a water use restriction policy in place for years of drought</li> <li>▪ Prepare a drought plan</li> </ul>		

## COMMUNITY WATER AVAILABILITY CONTINUED

Strategies	Potential Actions	Doing Already	Add to Action List
<i>4.7 Prepare for and reduce the potential for interruptions to the operation of electric water pumps</i>	<ul style="list-style-type: none"> <li>▪ Ensure the availability of back-up power for key water supply components: e.g. pumps</li> <li>▪ Ensure reliability of water delivery systems through appropriate electricity supply maintenance and upgrades for electric water pumps</li> </ul>		
<i>4.8 Increase inspection and maintenance of municipal water source intakes and pump and pressure reduction stations</i>	<ul style="list-style-type: none"> <li>▪ Reduce water system damage from freeze/thaw cycles and sedimentation by increasing inspection and maintenance</li> </ul>		

## COMMUNITIES ADAPTING TO CLIMATE CHANGE INITIATIVE

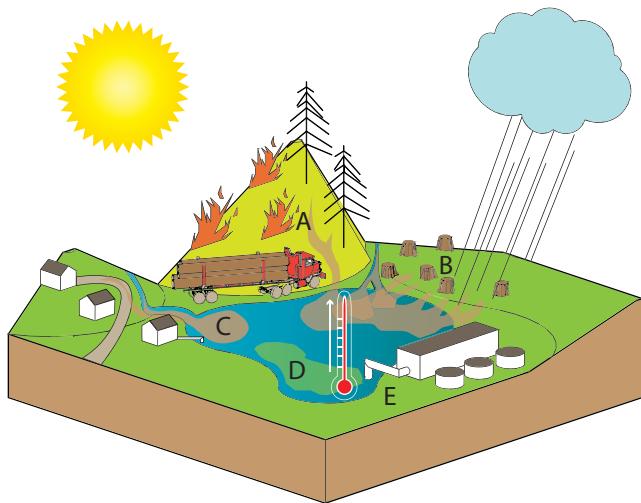
## WATERSHEDS AND WATER QUALITY

- Climate Model Projections (2050)**
- Higher winter minimum and summer maximum temperatures
  - Increased winter precipitation (greater likelihood of rain at lower elevations)
  - Decreased summer precipitation
  - Decreased snowfall and snowpack at lower elevations

### Potential Primary Impacts



### Potential Secondary Impacts



### WATERSHEDS AND WATER QUALITY

- A- Increased soil erosion due to salvage logging and wildfire
- B- Logging due to forest fire fuel reduction strategies
- C- Large amounts of surface water runoff causing sedimentation and turbidity
- D- Increased likelihood of bacterial contamination
- E- Higher water treatment costs

## WATERSHEDS AND WATER QUALITY

Strategies	Potential Actions	Doing Already	Add to Action List
5.1 Create a watershed management plan	<ul style="list-style-type: none"> <li>▪ Work with regional stakeholders (including landowners and other levels of government) to identify watershed-level management opportunities</li> <li>▪ Develop guidelines for development in the headwaters of the tributaries and rivers in the region</li> <li>▪ Ensure generous buffer zones and limited development in proximity to streams and rivers, particularly those which may feed community reservoirs or aquifers</li> <li>▪ Support forest management practices that maximize and protect water supply</li> <li>▪ Repair and replant damaged areas with suitable vegetation</li> <li>▪ Establish a community forest to manage Crown land near municipal boundaries</li> </ul>		
5.2 Reduce the potential for wildfire in community watersheds and plan appropriate watershed wildfire responses	<ul style="list-style-type: none"> <li>▪ Implement a wildfire fuel reduction program in community watersheds</li> <li>▪ Obtain standing permission from the local and provincial governments for wildfire response in the municipality's watersheds</li> <li>▪ Identify alternative drinking water sources in case of wildfire in a community watershed</li> </ul>		
5.3 Increase water quality monitoring	<ul style="list-style-type: none"> <li>▪ Monitor water intakes for critical water temperature thresholds</li> <li>▪ Provide advice and support to enable water users and both publicly and privately owned water systems to monitor water quality at intake</li> </ul>		
5.4 Adjust water system maintenance schedules and equipment to reflect potential climate change-related water quality issues	<ul style="list-style-type: none"> <li>▪ Implement uni-directional flushing to increase the velocity of flushing in water distribution systems to dispel biofilm build-up</li> <li>▪ Consider finer types of water filters at water intakes</li> </ul>		

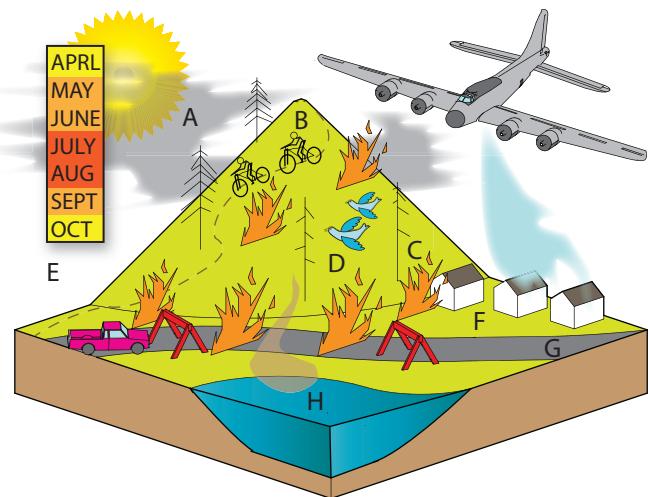
## WILDFIRE

- Climate Model Projections (2050)**
- Higher winter minimum and summer maximum temperatures
  - Increased winter precipitation (greater likelihood of rain at lower elevations)
  - Decreased summer precipitation
  - Decreased snowfall and snowpack at lower elevations

### Potential Primary Impacts



### Potential Secondary Impacts



### WILDFIRE

- A- Smoke affecting air quality and viewscapes
- B- Tourism and recreation negatively impacted by wildfire (See 8.0 - Tourism)
- C- Loss of mature timber and plantations
- D- Loss of wildlife habitat
- E- Increased length of fire season
- F- Increased risk of property damage
- G- Road closures
- H- Increased runoff and erosion into community water supply

**WILDFIRE**

Strategies	Potential Actions	Doing Already	Add to Action List
6.1 Implement a wildfire fuel reduction program	<ul style="list-style-type: none"> <li>▪ Develop a strategy to reduce fuel in the interface</li> <li>▪ Undertake a feasibility study on biomass energy potential based on trees identified for fuel reduction</li> </ul>		
6.2 Implement a FireSmart education program for residents	<ul style="list-style-type: none"> <li>▪ Develop FireSmart educational brochures, manuals, and webpages linked to the municipality's website</li> <li>▪ Undertake annual FireSmart public workshops, field trips to schools and public events</li> <li>▪ Ensure all residents receive FireSmart education materials, including those in rural areas, elderly people and second homeowners</li> <li>▪ Ensure FireSmart education programs build and maintain support for interface fuel management</li> </ul>		
6.3 Ensure appropriate FireSmart development and renovations in high-risk fire areas	<ul style="list-style-type: none"> <li>▪ Update zoning bylaws to incorporate fire hazard objectives such as restricting development in high- and extreme-risk fire zones</li> <li>▪ Designate a Fire Hazard Development Permit Area that establishes requirements for siting, form, exterior design and finish of buildings and other structures, as well as landscaping, trees and other vegetation</li> <li>▪ Update the Subdivision and Servicing Bylaw to address wildfire risk including requiring underground wiring and locating sidewalks, boulevards and highways to act as fire-breaks and evacuation routes</li> <li>▪ Update the Building Bylaw to require and provide incentives for FireSmart building standards for new builds and renovations</li> </ul>		
6.4 Develop trails, parks or roads within municipal boundaries to serve as firebreaks and provide access for firefighting	<ul style="list-style-type: none"> <li>▪ Utilize zoning bylaws, development permit areas and parks master plans to promote the establishment of trails, parks or roads in high-risk fire areas</li> </ul>		
6.5 Establish a community forest to manage Crown land near municipal boundaries	<ul style="list-style-type: none"> <li>▪ Establish a community forest to manage forested land in high-risk fire zones near municipal boundaries, including the establishment of firebreaks, fuel reduction strategies and forest health maintenance</li> </ul>		
6.6 Establish a community evacuation plan	<ul style="list-style-type: none"> <li>▪ Establish a community evacuation plan that follows BC Operational Guidelines for Evacuations</li> <li>▪ Integrate the evacuation plan with FireSmart education programs</li> <li>▪ Incorporate the evacuation plan into all municipal emergency preparedness plans</li> </ul>		

**WILDFIRE CONTINUED**

Strategies	Potential Actions	Doing Already	Add to Action List
<i>6.7 Improve local firefighting capacity</i>	<ul style="list-style-type: none"> <li>▪ Consider identifying additional firefighters and volunteers</li> <li>▪ Purchase additional trucks equipped with sprinkler equipment</li> <li>▪ Establish water storage tanks in unprotected areas</li> <li>▪ Establish a backup power supply (generator) in the event that electric pumps are unavailable</li> <li>▪ Identify and designate easily accessible water sources</li> <li>▪ Improve connections and relationships with the nearest provincial fire centre</li> </ul>		
<i>6.8 Strengthen regional district and municipal partnerships to address wildfire issues in the surrounding area</i>	<ul style="list-style-type: none"> <li>▪ Develop partnerships with adjacent landowners and tenure holders</li> <li>▪ Develop partnerships with adjacent municipalities or regional districts</li> <li>▪ Develop partnerships with provincial Wildfire Management Branches and local fuel specialists</li> </ul>		

## COMMUNITIES ADAPTING TO CLIMATE CHANGE INITIATIVE

## FOOD SECURITY AND AGRICULTURE

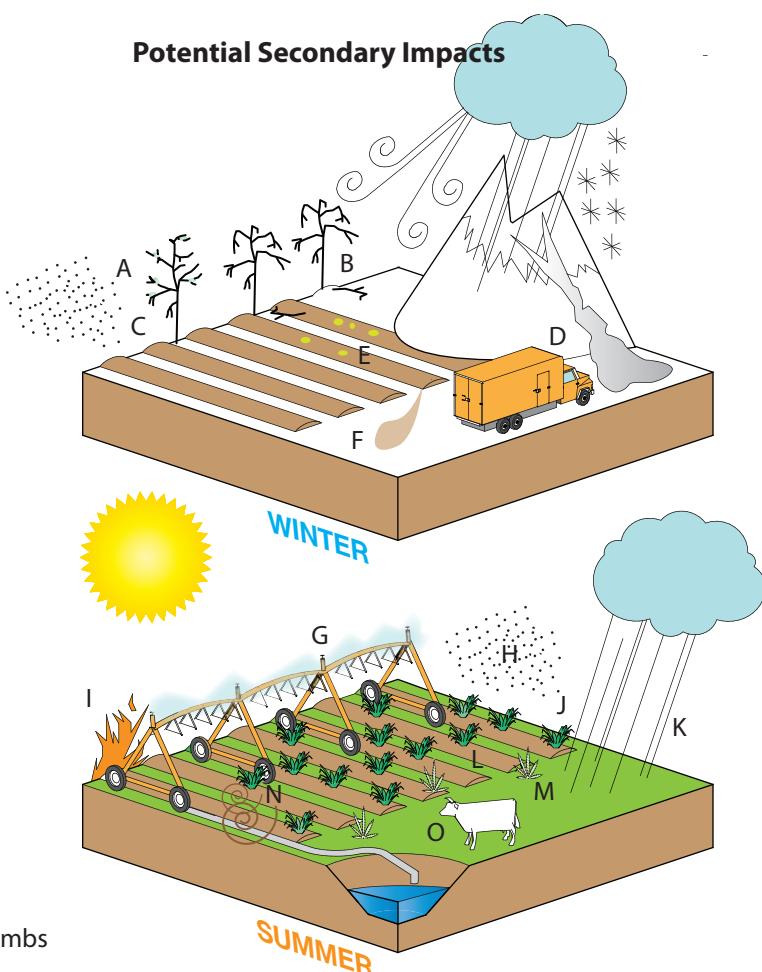
### Climate Model Projections (2050)

- Increased winter minimum and summer maximum temperatures
- Increased winter precipitation (rain at lower elevations)
- Decreased summer precipitation
- Decreased snowfall and snowpack at lower elevations
- Increase in frost free days

### Potential Primary Impacts



### Potential Secondary Impacts



### FOOD SECURITY AND AGRICULTURE

#### WINTER

- A- Early budding
- B- Heavier snow and freezing rain could break tree limbs
- C- Higher pest survival
- D- Transportation disruptions
- E- Less snow coverage may harm perennials
- F- Increased soil erosion with rain on frozen ground

#### SUMMER

- G- Increased irrigation requirements
- H- Pollinators may be affected
- I- Increased chance of wildfire
- J- Orchard and crop planning could be more uncertain
- K- Crop damage from extreme precipitation events

## FOOD SECURITY AND AGRICULTURE

Strategies	Potential Actions	Doing Already	Add to Action List
7.1 Monitor changes in food production capabilities due to climate change	<ul style="list-style-type: none"> <li>▪ Monitor changes in crop diseases and pests</li> <li>▪ Monitor increases or decreases in crop viability due to climate changes</li> </ul>		
7.2 Promote increased local food production, food preservation and seasonal eating	<ul style="list-style-type: none"> <li>▪ Encourage pilot projects to develop and expand local food production</li> <li>▪ Monitor and communicate information on current financial agricultural incentives to food growers</li> <li>▪ Promote increased local food production, food preservation and seasonal eating in school programs</li> <li>▪ Encourage backyard gardening through mentoring programs and workshops</li> <li>▪ Permit chicken raising within municipal boundaries</li> <li>▪ Help re-establish grower support organizations such as farmers' institutes and farm equipment co-ops</li> <li>▪ Support community gardens, community greenhouses, school gardens and education programs</li> </ul>		
7.3 Encourage local growers to use adaptive methods to deal with a changing climate	<ul style="list-style-type: none"> <li>▪ Encourage local growers to use seasonal climate predictions to plan their growing season</li> <li>▪ Encourage local growers to diversify crops, use succession planting and intensive cropping</li> <li>▪ Encourage the construction and use of greenhouses</li> <li>▪ Support and promote local seed banks</li> <li>▪ Encourage local growers to attract pollinators by planting appropriate habitats, building bee homes and discouraging insecticide/ pesticide use</li> <li>▪ Promote appropriate irrigation, water retention and soil management methods among growers</li> </ul>		
7.4 Maximize access to agricultural land for local growers	<ul style="list-style-type: none"> <li>▪ Conduct an Agricultural Land Reserve (ALR) survey to establish why land is not being used for farming</li> <li>▪ Assess ways to maximize uptake of agricultural land for agricultural purposes</li> <li>▪ Support policies that provide access to land for food growing within municipal and regional district boundaries</li> <li>▪ Encourage growers seeking land to network with relevant local and regional stakeholders to increase their chances of securing land</li> <li>▪ Designate unused public lands suitable for growing as community gardens, greenhouses or demonstration farms</li> </ul>		
7.5 Protect agricultural land and topsoil	<ul style="list-style-type: none"> <li>▪ Utilize OCP policies, zoning bylaws, development permits and other tools to protect agricultural land and topsoil within municipal boundaries</li> <li>▪ Maintain nutrient holding capacity of soils by organic matter additions, crop rotation, and use of Nitrogen fixing crops</li> </ul>		

## FOOD SECURITY AND AGRICULTURE CONTINUED

Strategies	Potential Actions	Doing Already	Add to Action List
7.6 Support opportunities for local food producers to increase their food sales	<ul style="list-style-type: none"> <li>▪ Assist with the establishment and promotion of farmers' markets and co-ops</li> <li>▪ Explore the re-launch of farmers' institutes</li> </ul>		
7.7 Prepare for short-term food shortages	<ul style="list-style-type: none"> <li>▪ Update municipal emergency plans to address short-term shortages</li> <li>▪ Undertake community awareness programs regarding the need for all residents to have a minimum three-day store of food and water</li> </ul>		
7.8 Engage in proactive highway maintenance to reduce the risk of food shortages due to road closures	<ul style="list-style-type: none"> <li>▪ Ensure storm drains and creeks that flow under highways are kept clear of debris</li> </ul>		
7.9 Ensure climate change adaptation is reflected in Agriculture Area Plans and other long-term food plans	<ul style="list-style-type: none"> <li>▪ Encourage regional district representatives to address climate change adaptation in regional Agriculture Area Plans</li> </ul>		
7.10 Secure water resources for agricultural land	<ul style="list-style-type: none"> <li>▪ Conduct land use inventories (using Ministry of Agriculture Standards) to help develop an agricultural plan</li> <li>▪ Use the Agricultural Water Demand Model to determine current and future agricultural water needs</li> </ul>		

## COMMUNITIES ADAPTING TO CLIMATE CHANGE INITIATIVE

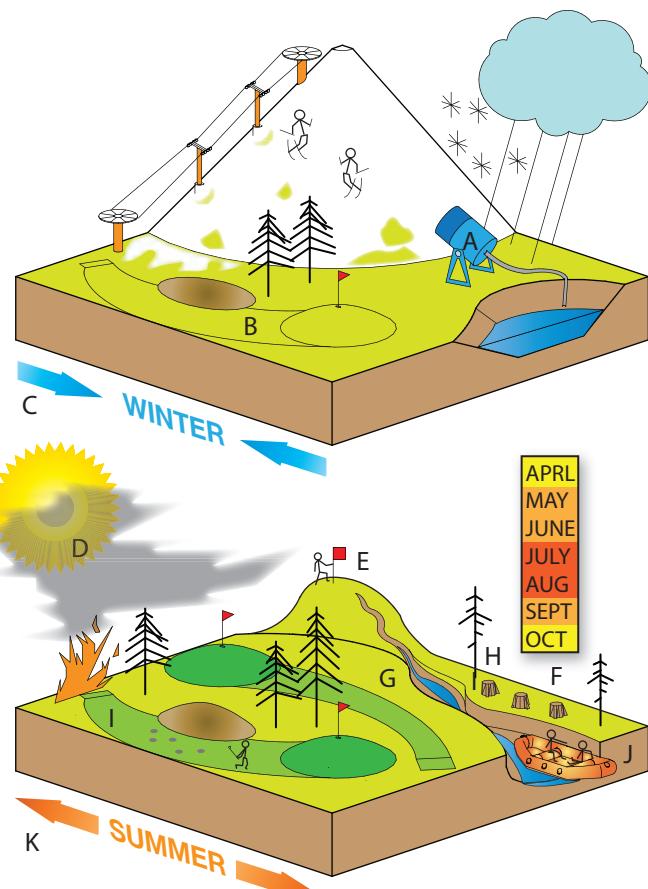
## TOURISM

- Climate Model Projections (2050)**
- Higher winter minimum and summer maximum temperatures
  - Increased winter precipitation (greater likelihood of rain at lower elevations)
  - Decreased summer precipitation
  - Decreased snowfall and snowpack at lower elevations

### Potential Primary Impacts



### Potential Secondary Impacts



## TOURISM

### WINTER

- A- More water used for snowmaking  
 B- Turf damage due to ice  
 C- Shorter ski season

### SUMMER

- D- Smoke affecting air quality and viewscapes  
 E- Hiking and biking trails closed due to fire hazard or burned areas  
 F- Increased length of fire season  
 G- Water scarcity for irrigation  
 H- Increased logging due to mountain pine beetle  
 I- Turf grass diseases and pests  
 J- Unpredictability of rafting and river sports season  
 K- Longer summer season

**TOURISM**

Strategies	Potential Actions	Doing Already	Add to Action List
<i>8.1 Diversify and enhance the promotion of winter and summer tourism products</i>	<ul style="list-style-type: none"> <li>▪ Diversify winter tourism products</li> <li>▪ Create a more formal structure for trail maintenance, expansion and operation in municipalities and electoral areas of regional districts</li> <li>▪ Enhance the promotion of trails as a summer tourism attraction through websites and other means</li> <li>▪ Enhance the promotion of local nature tourism</li> </ul>		
<i>8.2 Increase the climate resilience of existing tourism operations</i>	<ul style="list-style-type: none"> <li>▪ Continue or consider snowmaking at ski hills at the beginning of ski seasons, and supplement as needed during the ski season</li> <li>▪ Create more natural golf courses, including seeding with more drought resistant turf/grass species</li> <li>▪ Conserve water on golf courses through reduction of turf area and installation of grey water systems to reuse water</li> <li>▪ Protect trails from wildfire, damage associated with interface fuel reduction and salvage logging associated with mountain pine beetle</li> <li>▪ Examine the merits of reinstating hydrometric stations on rivers and creeks that supply water for local water-based tourism</li> </ul>		
<i>8.3 Ensure tourists are safe from climate-related hazards</i>	<ul style="list-style-type: none"> <li>▪ Ensure appropriate ice and snow management in key pedestrian areas</li> <li>▪ Provide designated cooling areas for summer festivals and events</li> </ul>		



## ENERGY

Energy conservation and energy efficiency are usually seen as tools to reduce carbon emissions, rather than tools to adapt to climate change impacts. But these tools can also have important adaptation benefits. Potential reduced reservoir levels in extreme drought years will mean the possibility of reduced generating capacity for hydro-electricity providers, leading to the need to find other sources of electricity or costly imports from outside the province. Receding glaciers may exacerbate the problem. As well, climate policies aimed at reducing fossil fuel use could mean rising costs of electricity, even from renewable sources. Lowering demand for power leaves communities less economically vulnerable to cost increases and shortages. Considering energy efficiency hand in hand with adaptation ensures that energy efficiency gains will have mitigation benefits that continue under a changing climate. The following are strategies and actions from the City of Rossland's climate change adaptation plan.

Strategies	Doing Already	Add to Action List
9.1 Develop a Community and Corporate Energy Plan		
9.2 Control sprawl and promote infill development		
9.3 Identify and implement energy conservation measures on a Corporate Local Government level		
9.4 Provide incentives for the development of renewable energy facilities		



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