CLIMATE CHANGE ADAPTATION PROGRAM

Regional Adaptation Strategies Update: Okanagan

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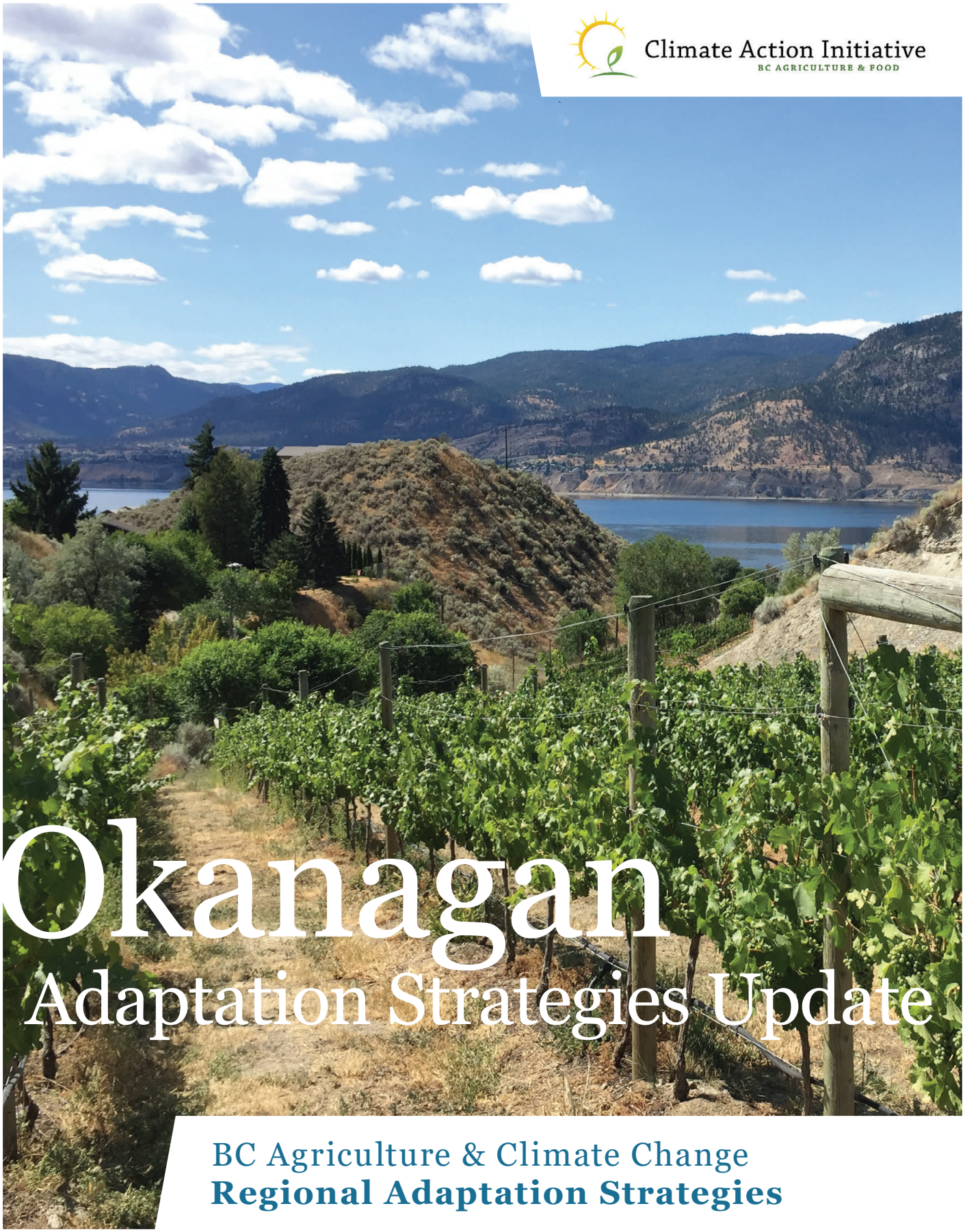

Climate Action Initiative
BC AGRICULTURE & FOOD

Okanagan
Adaptation Strategies Update

BC Agriculture & Climate Change
Regional Adaptation Strategies

Funding for this project was provided by the Governments of British Columbia and Canada under *Growing Forward 2*, a federal-provincial-territorial initiative.

other project partners
BCAC/ARDCorp

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The BC Agriculture & Food Climate Action Initiative was established by the BC Agriculture Council in 2008, and is led by an advisory committee of agricultural producers, food processors and representatives from various government agencies. The Initiative has been supported by the Investment Agriculture Foundation of BC with funding provided by the Governments of British Columbia and Canada.

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Introduction

The *Okanagan Adaptation Strategies* plan was completed in April of 2016. Project implementation began during the summer of 2016 and concluded in the spring of 2018. Also in early 2018, the BC Agriculture and Food Climate Action Initiative (CAI) undertook a process to re-visit the strategies and actions that were identified as high priorities in the original plan, to assess progress in plan delivery and to determine areas of focus for the future. The intent of this process was not to repeat the original (and still relatively recent) comprehensive planning process, but rather to undertake an efficient and targeted update that reflects progress, and captures changes in context and priorities.

This document outlines the Strategies Update process objectives and methodology, describes implementation progress, and defines key actions and implementation priorities moving forward. The Strategies Update process had three overarching objectives

- To review and reflect on progress in addressing priority actions from the *Okanagan Adaptation Strategies*;
- To identify highest priority areas in the plan that have not been addressed or require additional support; and
- To identify new or emerging adaptation priorities/projects.

Overview of Okanagan Adaptation Strategies

The original planning process took place in the Okanagan from the fall of 2015 to the spring of 2016, bringing together agricultural producers and specialists, along with local and provincial government representatives. Approximately 120 individual participants took part over the course of five workshops. A local advisory committee that included representatives from the Regional District of Okanagan Similkameen, the Regional District of Central Okanagan, the Regional District of North Okanagan, the BC Fruit Growers' Association, the BC Cherry Association, the Southern Interior Stockmen's Association, the BC Grape Growers' Association, the Certified Organic Associations of BC, Agriculture and Agri-Food Canada and the BC Ministry of Agriculture, provided guidance and input throughout the process.

The resulting *Okanagan Adaptation Strategies* plan outlines the anticipated changes in climate and the associated agricultural impacts.[1] It also provides clear actions, suited to the specifics of the local context, both with respect to projected changes in climate and local capacity and resources. The plan includes 14 strategies and 27 actions for agriculture to adapt to four priority impact areas:

1) Warmer and drier summer conditions;
2) Changes to pest populations (insects, diseases, weeds and invasive species);
3) Increase in extreme precipitation events; and
4) Increasing wildfire risk.

Upon completion of the planning process, $300,000 of *Growing Forward 2* funding was made available to implement collaborative projects identified in the plan. The advisory committee that was formed to guide the planning process transitioned into an oversight "working group" for development and delivery of projects. By the spring of 2018, six regional projects had been completed and funding had been fully expended.

[1] *The climate change projections and four impact areas are described in more detail in the Okanagan Adaptation Strategies available at: https://www.bcagclimateaction.ca/wp/wp-content/media/RegionalStrategies-Okanagan.pdf*

Methodology

The process to review and update the *Okanagan Adaptation Strategies* included the following four steps:

1) Undertaking analysis of progress on strategies and actions;
2) Conducting informal meetings with local project partners;
3) Holding an information gathering and prioritization workshop; and
4) Developing a draft document and circulating it for working group review prior to finalization.

Each of these steps is described in more detail below:

1) Progress analysis: CAI undertook a review of projects implemented to determine which strategies and actions from the *Okanagan Adaptation Strategies* plan have been completed (wholly or partially). This analysis also included a review of any recommendations for next steps or additional activities from completed projects to support further actions in priority areas.

2) Informal meetings with local project partners: Informal meetings were held with current project partners to discuss possible next steps pertaining to the six recently completed projects**.**

3) Prioritization workshop: A workshop was conducted to assess progress on the prioritized strategies and actions within the *Okanagan Adaptation Strategies* plan and to discuss preferred areas of focus for near-term implementation.

The workshop was held on Wednesday, March 28th 2018 at the Coast Capri Hotel in Kelowna. Workshop participation was by invitation and there were 20 participants including Okanagan producers and other key partners with active knowledge of implementation activities in the region.

The workshop began with an overview of the Okanagan adaptation projects completed to date, as they relate to the climate change impacts and strategies within each of the four Impact Areas in the plan. Workshop participants then voted on the most important strategies within each Impact Area (see Appendix 1: voting card). When selecting priorities, participants were asked to take into consideration the following:

- Areas within the original Strategies that had not yet been addressed;
- The potential to build on momentum, activities or results of earlier work with next steps;
- The degree of urgency of the strategy; and
- The potential for linkage to related local initiatives and/or synergistic opportunities.

The results of the voting activity were tallied and workshop participants were divided into small groups to discuss the strategies that received the most votes. Participants discussed the actions associated with the top strategies and brainstormed possible additional actions. Through facilitated small group discussion, the actions were prioritized and the necessary steps for implementing the actions were identified. A workshop summary was provided back to all workshop participants.

4) Draft development and completion: Utilizing the workshop summary, the CAI team developed a draft Strategies Update document. This document was then shared back with the local working group for feedback. Final adjustments and edits were completed, and the final Update was distributed back to workshop participants and project/program partners.

Summary of Progress to Date

This table provides a visual summary of progress made towards addressing the strategies in the *Okanagan Adaptation Strategies* plan. Additional details about projects can be found in the introductions to each strategy in the *Okanagan Adaptation Strategies Update* section (beginning on page 5). A table listing all strategies and actions, along with projects completed, is located in Appendix II.

Graphic representation of progress (2016-2018) within each strategy in the Okanagan Adaptation Strategies.

		not started	partially addressed	fully addressed
Strategy 1.1	Support the agriculture sector's participation in drought planning			
Strategy 1.2	Develop and implement agriculture-specific drought outreach			
Strategy 1.3	Provide knowledge & technology transfer for agricultural water management			
Strategy 1.4	Undertake applied research and demonstration for practices and technologies to improve resilience to hot and dry conditions			
Strategy 1.5	Undertake education and outreach (for Okanagan residents) to increase understanding of agricultural water user and climate change			
Strategy 2.1	Enhance cross-commodity approaches to monitoring and management for critical insect pests			
Strategy 2.2	Improve linkages between climate change projects and weather and pest monitoring data			
Strategy 2.3	Strengthen partnerships and knowledge transfer for management of invasive species			
Strategy 3.1	Improve processes and supports for individual producers to implement runoff and erosion management and riparian rehabilitation activities			
Strategy 3.2	Strengthen cooperative runoff/erosion management and riparian on individual watercourses			
Strategy 3.3	Support knowledge transfer for effective management of runoff and erosion and riparian areas			
Strategy 4.1	Support cooperative approaches to fuel management activities			
Strategy 4.2	Support individual operations with planning for wildfire preparedness and mitigation			
Strategy 4.3	Support regional-scale planning and implementation for wildfire preparedness and mitigation [2]			

Investment in Okanagan Adaptation Projects: 2016 – 2018

The *Okanagan Adaptation Strategies* plan identifies 14 strategies and 27 actions to support agricultural adaptation to climate change through the development of (regionally relevant) tools and resources that enhance adaptive capacity. Over a two-year period six regional projects (and five Farm Adaptation Innovator Program[3] projects)

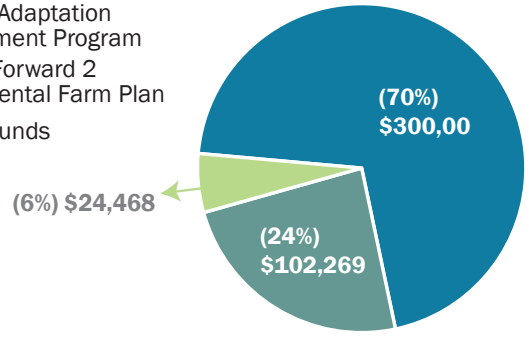
[2] *The Okangan Wildfire Project 'Planning and Information Exchange for Wildfire Impact Reduction' (see pages 18 and 20), while not focused on the sub-actions described in the original Okanagan Adaptation Strategies, did make progress in advancing the objectives of Strategy 4.3, and that progress is reflected in this chart.*

[3] *The Farm Adaptation Innovator Program (FAIP) supports farm level projects that seek to demonstrate, and evaluate practices and technologies that may reduce weather related production risks and/or increase new production opportunities.*

were undertaken to address the highest priorities identified in the *Okanagan Adaptation Strategies* plan. The regional projects were supported with $300,000 of seed funding provided through *Growing Forward 2* and $126,737 from contributing partners. The Farm Adaptation Innovator Projects (FAIP) projects were supported with $519,258 of Growing Forward 2 funding and $260,728 in funding from other partners.

Investment in Okanagan Regional Adaptation Projects: 2016 – 2018

- Growing Forward 2 Regional Adaptation Enhancement Program
- Growing Forward 2 Environmental Farm Plan
- Partner Funds



$426,737
TOTAL REGIONAL ADAPTATION PROJECT FUNDING

Regional Adaptation Funding Partners

Okanagan Kootenay Sterile Insect Release Program
Okanagan Basin Water Board
BC Wine Grape Council
Beef Cattle Industry Development Fund
Regional District Central Okanagan
BC Ministry of Agriculture
Agriculture and Agri-Food Canada

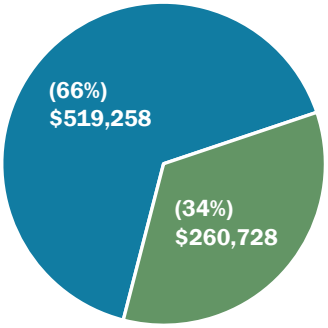
Program and Project Partners

Regional District North Okanagan
Regional District Central Okanagan
Regional District Okanagan Similkameen
BC Fruit Growers' Association
BC Grape Growers' Association
BC Tree Fruits Cooperative
BC Cattlemen's Association
Certified Organic Association of BC
Southern Interior Stockmen's Association
Sustainable Wine Growing BC/BC Wine Grape Council
Okanagan and Similkameen Invasive Species Society
Okanagan Kootenay Sterile Insect Release Program
Okanagan Basin Water Board
Agriculture and Agri-Food Canada
BC Ministry of Agriculture
BC Ministry of Forests Lands and Natural Resource Operations and Rural Development

Investment in Okanagan Farm Adaptation Innovator Projects: 2016 – 2018

$779,986
TOTAL FARM ADAPTATION INNOVATOR PROJECT FUNDING

- *Growing Forward 2* Farm Adaptation Innovator Program
- Partner Funds



FAIP Funding Partners

Agriculture and Agri-Food Canada
BC Ministry of Agriculture
Coral Beach Farms Ltd.
University of British Columbia
University of British Columbia Okanagan
Private Foundation
Paloverde Environmental Ltd.
Le Vieux Pin Winery/ Enotecca Wineries

FAIP Project Leads

Coral Beach Farms
University of British Columbia
University of British Columbia Okanagan
Canadian Agricultural Services
Le Vieux Pin Winery/ Enotecca Wineries

FAIP Project Partners

Alderson Creek Rehabilitation Environmental Society
Agriculture and Agri-Food Canada Pacific Agri-Food Research Centre
BC Cattlemen Association: Farmland-Riparian Interface Stewardship Program
BC Cherry Association
BC Fruit Growers' Association
BC Tree Fruits Cooperative
BC Grape Growers' Association
BC Wine Grape Council
UBC Okanagan
Okanagan producer cooperators

to date

$1,206,723 INVESTED IN OKANAGAN ADAPTATION PROJECTS

Okanagan Adaptation Strategies Update

The Strategies that have been identified as highest priority for near term implementation (through the process outlined in the Methodology) are highlighted in green text boxes. The eight prioritized actions (along with eight possible projects) developed and fleshed out through the workshop – and subsequent input received from the Okanagan Adaptation Working Group – are described under the relevant Strategy and highlighted in light blue text boxes.

Impact Area 1:
Warmer and drier summer conditions

Strategy 1.1 [Prioritized] - Support the agriculture sector's participation in drought planning

Progress to Date

No actions were undertaken by the CAI between 2016 and 2018 to accomplish this Strategy.

Priority Action #1

Consult with the agriculture sector to determine cross-sector objectives for drought planning

Agriculture is the largest water user in the Okanagan Valley and it is vital that the sector has meaningful input into how their access to water will be affected during periods of extreme drought. The Okanagan Basin Water Board (OBWB) is striving to coordinate and support the development of standardized *Drought Management Plans* – which define both the trigger conditions for drought stages and corresponding regulatory responses that might be imposed at each stage – for the region's 18 large water purveyors. Some water purveyors (such as Greater Vernon Water) have already created *Drought Management Plans*, while other purveyors are still working to develop them. Purveyors with water supply vulnerabilities may also develop a *Water Sustainability Plan* to address the impacts of land based activities on water resources (e.g. water quality, water availability) and to address issues relating to water allocation and conflicts between water users[4].

[4] *Historically, some purveyors (such as the District of Summerland's Trout Creek Reservoir) chose to augment their Drought Management Plan with a 'Water Use Plan' - a formal agreement at the purveyor level that directs how water will be shared between licensees during a crisis and which typically focuses on preserving adequate environment flows. Okanagan purveyors are now encouraged to develop a 'Water Sustainability Plan' which focuses on addressing the impacts of land-based activities on water resources, as well as addressing issues relating to water allocation, conflict among users and the environment and water quality risks. For more information on Water Sustainability Planning (and how it differs from Water Use Planning) visit: http://www.obwb.ca/environmentalflowswups/water-use-plans-vs-water-sustainability-plans/.*

Although agriculture is generally represented during drought management planning processes, there remains an opportunity for the sector to better define its own engagement and planning objectives as well as to make progress towards a 'shared vision' on how water could/should be distributed across commodities in a water crisis. While consensus building will be difficult, a meaningful first step would be to bring producers together for a facilitated discussion to identify common ground, information gaps/needs and preferred options for moving forward with next steps.

Activities

I. Determine the most appropriate method of consultation with the agricultural sector to achieve planning objectives

II. Engage in consultation with the agricultural sector in order to:
   - o Share information on the vulnerabilities of the Okanagan water supply and the rights and responsibilities of agricultural water users
   - o Facilitate dialogue to identify shared priorities on key water-use issues relating to water use planning
   - o Identify knowledge gaps that need to be filled to move the conversation forward (e.g. What is the economic impact of enforcing water reductions on different crops/users? What are models for managing/decision making when critical reductions are required?)

III. Consolidate and summarize the outcomes of the consultation process and share back with stakeholders

Implementation Details

- Consultation with the agriculture sector may involve a forum, small group consultations, a cross-commodity working group or some other mechanism
- The consultation process will need to include strong representation from all commodities
- Provincial surface water license holders should be included
- It will be important to bring research/discussion material into the consultation process to support constructive dialogue
- Consultations should include support/information sharing from local and provincial water planning experts to ensure a strong baseline level of knowledge
- The outcome of this forum could support the enhanced participation of the agriculture sector in the development of Water Sustainability Plans
- Ideally the consultation process would yield a set of sector endorsed cross-commodity 'principles and practices' to guide engagment of the agricultural community in water planning initiatives.
- The process may also yield a set of 'principles and practices' to provide direction on agricultural water use during extreme drought, but this may need to follow in a subsequent phase of the project depending on the level of consensus

Implementation Details continued...

Possible Partners

Agricultural organizations including (but not limited to):
- BC Tree Fruits Cooperative
- BC Fruit Growers' Association
- BC Grape Growers' Association
- BC Wine Grape Council
- BC Cattlemen/Southern Interior Stockmen's Association
- BC Cherry Association
- Certified Organic Associations of BC

Okanagan Basin Water Board
Water purveyors
Regional Districts:
- Regional District of North Okanagan (RDNO)
- Regional District of Central Okanagan (RDCO)
- Regional District of Okanagan Similkameen (RDOS)

BC Ministry of Agriculture
BC Ministry of Environment
BC Ministry of Forests, Lands, Natural Resource Operations and Rural Development

Timeframe

Short-term (less than two years)

Cost

Low (less than $50,000)

Strategy 1.2 [Prioritized] - Develop and implement agriculture-specific drought outreach

Progress to Date

This strategy has been addressed through the *Okanagan Agricultural Water Supply Status Communications* pilot project. This project included a partnership with the Okanagan Basin Water Board (OBWB), Greater Vernon Water and the City of Penticton (two Okanagan water purveyors) to pilot the development and distribution of purveyor-specific water supply communications materials through a variety of (existing and new) communications channels. The messages were provided to registered agricultural water users via a real-time e-alert distribution system (email, text and voice messages) between June and September 2017, and were also shared via traditional communications channels (e.g. purveyor website, water turn on letters, etc.).

Communications provided accurate information about the state of the individual purveyor's water supply and associated water conservation expectations for agricultural water users (e.g. local reservoir levels, local water restriction stages etc.). The pilot reached approximately 10% of agricultural water users in the City of Penticton and 3% of agricultural water users in Greater Vernon Water. Through follow-up evaluation, both participating purveyors and producers indicated there was value in the pilot and in expanding its reach.

Priority Action #2
Support the expansion of the Agricultural Water Supply Status Communications project

The main focus of a new project would be to broaden the reach of the water supply communications by increasing producer sign-up to the e-alert program both within the existing purveyor areas, and by adding additional water purveyors. It is important to do this to test the approach and materials with a broader range of producers and purveyor types – as well as across multiple production seasons. Other next steps could include improving "user experience" and updating the obwb.ca/ag website (which includes tips and resources for agricultural water users), along with improvements to the *Key Messaging* and *Communications Checklist Document*.

Activities

I. Incorporate recommendations from Phase 1 of the pilot into Phase 2 materials

II. Determine which Okanagan purveyors will participate in Phase 2

III. Support purveyors with training and outreach/agricultural water user sign-up

IV. Pilot Agricultural Water Supply Status Communications Phase 2 over a 2-3 year period, starting prior to the production season (January – early February)

V. Conduct an evaluation and summarize findings (including a mid-term evaluation after the first year of the pilot)

VI. Revise/revamp communications materials based on evaluation

VII. Facilitate discussion with OBWB/purveyors/other stakeholders to plan for long-term sustainability project and roll-out to all interested purveyors

Implementation Details

- OBWB is funding the Civic Ready software (used to send out e-alerts to agricultural water users) for the 2018 production season; beyond 2018 TBD
- The number of purveyors who can subscribe to phase 2 of the pilot would depend on the amount of resourcing available for a 'support person' to work with the purveyors during the pilot (the expense is linear)
- There is up front need for training and support for purveyors but it is likely that purveyors would require less assistance after a second phase of the pilot (reducing costs for continuing over the long-term)
- Some budget will be needed to support purveyors' outreach efforts (to encourage producers to sign up for the e-alerts)
- Provincial surface water license holders are not reached by this project (it is specific to water purveyors)

Possible Partners

Agricultural Water Users
Agricultural Organizations (listed on page 7)
BC Ministry of Agriculture
Okanagan Basin Water Board
Water purveyors

Timeframe

Medium-term (2-5 years)

Cost

Medium ($50,000-$100,000)

Strategy 1.3 [Prioritized] - *Provide knowledge & technology transfer for agricultural water management*

Progress to Date

Two projects were completed that partially address this Strategy. The *Vineyard Water-Use Efficiency Knowledge and Technology Transfer* project developed and delivered a suite of sustainable water management tools and resources for the Okanagan wine grape sector. The first phase of the project compiled existing research and knowledge — about vineyard water use efficiency technologies and practices — into a "State of Knowledge and Technology" report. This report informed the development of three fact sheets as well as an excel based water-use measurement tool to enable grape growers to track, benchmark and compare their water use performance. Two field days were hosted in summer 2017 to present the materials and to demonstrate water-use efficiency tools and techniques.

The *Farm Water Management Planning* pilot project adapted and piloted an individualized farm water planning process and toolkit previously developed for the Cowichan region. The toolkit takes a holistic approach to farm water issues, including water supply, irrigation/management, water quality and drainage – evaluating both current and future water challenges and opportunities.

A total of 16 Okanagan operations participated in the farm water management planning project including a broad range of operation types, water issues and farm sizes. Each participating farm received a customized *Farm Water Use Plan* that identified key water issues, strategies and resources to address water related challenges and opportunities. The project included an evaluation of the toolkit and process, both from the perspective of participating producers and in terms of considerations for broader future delivery.

Priority Action #3
Develop, enhance and promote informational resources and on-farm knowledge transfer for water-conservation/water-use efficiency practices

There is a strong appetite for new tools and resources to assist Okanagan producers in assessing and improving their water use efficiency. Producers are particularly interested in local demonstration/case studies that provide the water savings and cost-benefit calculations associated with particular practices/technologies (e.g. cost/benefits of irrigating vs. not-irrigating crops such as corn and forage, the costs/benefits of installing/retrofitting existing irrigation systems). Any new resources should also incorporate the full cost of water.

The *Farm Water Planning Toolkit* is seen as a potentially valuable tool to help promote water-use efficiency in the Okanagan. Offering this type of broader water planning service to Okanagan producers remains a priority. Facilitating producer access to water-use efficiency tools and technologies is also an area with promise – possibly including a tool library.

Activities

Farm Water Planning Toolkit

I. Explore options to offer the farm water planning tool (or a variation of the tool) through a field agent/water coach in collaboration with local partners (e.g. Regional Districts)

II. Develop additional knowledge transfer tools/resources to support producers who have completed a Farm Water Use Plan (such as):

- o Hosting workshops/field days for producers to share water efficiency themes from Farm Water Use Plans
- o Creating a 'farm report card' so producers can assess how their water use compares to their neighbours (similar commodities)

Additional Knowledge Transfer Resources

III. Develop a series of new water management knowledge transfer resources such as:

- o Cost-benefit analyses for implementation of top recommendations from the *Farm Water Planning* pilot project (e.g. installing water meters, switching out/retrofitting irrigation systems, soils management)
- o A 'tool library' for producers to test and evaluate technologies before they purchase (soil moisture sensors)
- o A cross-commodity review of new, low-cost technologies for water management (similar to Vineyard Water Use Efficiency project)
- o Fact sheets or other quick to access resources about key water management practices (e.g. how to know whether you need to check for leaks or do an irrigation assessment, how much does it cost to put in a water meter and what are the benefits)

Implementation Details

- It will be necessary to prioritize among the activities listed above (or to identify areas of greatest opportunity)
- The top recommendations (to producers) from the *Farm Water Management Planning* project provide a good starting point for where to focus the development of new resources (i.e. identifies gaps in knowledge/infrastructure)
- The establishment of a 'tool library' was one of the key recommendations in the *Vineyard Water Use Efficiency State of Technology and Knowledge Report*. Greater Vernon Water has a supply of tools that could be made available for distribution through the library.

Possible Partners

Agricultural organizations (listed on page 7)
BC Ministry of Agriculture
Okanagan Basin Water Board
Regional Districts (listed on page 7)
Water purveyors

Timeframe

First few projects = Short term (under 2 years)
Multiple projects = Medium term (2-5 years)

Cost

Activity area (Farm Water Planning)
= Medium ($50,000 - $100,000)

Activity area (Knowledge transfer resources)
= Low (under $50,000) to Medium ($50,000-$100,000)

Strategy 1.4 [Not Prioritized] *- Undertake applied research and demonstration for practices and technologies to improve resilience to hot and dry conditions*

Progress to Date

Two Farm Adaptation Innovator Program (FAIP) projects were undertaken between 2016 and 2018 to partially address this Strategy. One project, *Optimization of Water Use in Vineyards in the Okanagan Using Precision Irrigation*, evaluated techniques that allow for customized irrigation of different sections of a vineyard based on specific soil characteristics. A detailed analysis of soil properties across 5 vineyards was conducted. Irrigation equipment was then installed for precise and timed delivery of water and nutrients specific to the mapped soil conditions. The project gathered data on associated changes in costs of labour and management in the vineyard and, over time, will collect data on the changes in the amount of water used in the vineyard.

The second project focused on emerging opportunities for cherry growers to expand production northward and into higher elevations (due to warming and longer growing seasons). These opportunities could be accompanied by challenges with soil quality (soil pathogens) and water availability. The project, *Evaluating Opportunities to Expand Cherry Production*, looked at key production issues in mature orchards and evaluated practices that may help growers establishing new orchards to optimize their water use and biological resilience of the soil. The project assessed the impact and cost effectiveness of mulch, compost and post-harvest deficit irrigation on water use efficiency, soil water holding capacity, crop production and soil health in two new orchards and in an established orchard.

Strategy 1.5 [Not Prioritized] *- Undertake education and outreach (for Okanagan residents) to increase understanding of agricultural water use and climate change*

Progress to Date

No actions were undertaken by the CAI between 2016 and 2018 to accomplish this Strategy.

Impact Area 2:
Changes to pest populations
(insects, weeds, diseases and invasive species)

Strategy 2.1 [Not Prioritized] *- Enhance cross-commodity approaches to monitoring and management for critical insect pests*

Progress to Date

No actions were undertaken by the CAI between 2016 and 2018 to accomplish this Strategy.

Strategy 2.2 [Prioritized] *- Improve linkages between climate change projections and weather and pest monitoring data*

Progress to Date

This strategy has been partially addressed through two projects.

The *BC Decision Aid Support Tool for Tree Fruit Growers* adapted the successful Washington State Decision Aid System (DAS) for the Okanagan tree fruit industry and provides growers with a real-time digital tool to support management decisions that are becoming more difficult due to shifting pest and disease emergence patterns under climate change. The tool links to data from 27 weather stations, along with weather forecast data and pest models, to predict pest emergence timing. The tool has a clear, simple interface and links to conventional and organic management recommendations. While the Okanagan-Kootenay Sterile Insect Release Program (OKSIR) is covering ongoing annual costs relating to BC DAS until 2021, (and the tool is available free of charge to Okanagan tree fruit growers) there will be a need to conduct an Okanagan weather station gap analysis in the future.

The Farm Adaptation Innovator Project *Climate Change Influence on Disease Control Patterns in the Okanagan Tree Fruit Industry* established a baseline for the distribution of three key disease areas: tree cankers, fruit rots and soil diseases. The project also began to connect horticultural and pathology data to a geographical mapping system (GIS) to determine the uniformity, stability and potential shifts resulting from natural variability within pathogen populations initiated by climate change. Over time, data and mapping could visually convey information about disease distribution and its relationship to microclimate, soils and pest management techniques.

Priority Action #4
Disseminate pest information and resources broadly to producers and specialists

As pest life cycles and pest distribution patterns shift with climate change, producers will need to be more proactive in their pest management practices. Increasing knowledge transfer relating to economically significant and/or emerging pests will assist producers with making timely decisions around pest management. Currently, real-time information on pest emergence (e.g. first spotted wing drosophila emergence) tends to reside with individuals and/or organizations and it can be difficult for producers to access this information when required. Increasing accessibility to real-time pest emergence information would expedite decision making at the farm-level. There is also an opportunity to enhance pest management resources (to support pest identification, management and controls for conventional and organic operations) through the development and distribution of digital and/or printed materials, and other knowledge transfer activities. The activities listed below provide options for knowledge transfer and will need to be further refined during project development.

Activities

I. Consult with agricultural sector to determine economically significant pests/emerging pests of concern

II. Identify project objectives and preferred knowledge transfer activities. These activities may include:

- o Development of new fact-sheets
- o Hosting presentations/workshops/field days
- o Developing targeted promotional campaigns/outreach (such as InsectWeek – where one pest is highlighted each week)
- o Tie-in/cross-promotion with exiting Okanagan projects and programs such as BC DAS tool (described on page 12), www.oiso.ca (described on page 14), and BC Tree Fruits field staff

III. Compile materials/resources to be distributed (e.g. resin blocks, ID booklets, fact-sheets) and develop new material as needed

IV. Pilot knowledge transfer activities and conduct an evaluation

Implementation Details

- Knowledge transfer activities listed above are not exhaustive and may be further refined by the Okanagan Working Group and/or project committee
- Fact-sheets/pest emergence information can be distributed through Growers Supply stores and other retail outlets, and through industry group digital channels
- Translation into other languages (e.g. Punjabi) may be valuable
- Resources should include information about host species and vectors (for pests and invasive species)
- The Alberta Insect Pest Monitoring Network has a good webpage and also provides weekly pest alerts (good reference point)

Possible Partners

Agricultural organizations (listed on page 7)
BC Tree Fruits Cooperative Field Service staff
Regional Districts (listed on page 7)
Okanagan Kootenay Sterile Insect Release
Okanagan and Similkameen Invasive Species Society
Agriculture and Agri-Food Canada
BC Ministry of Agriculture

Timeframe

Short-term (less than 2 years)

Cost

First few activities - Low (less than $50,000)
Additional activities - Low (less than $50,000)

Strategy 2.3 [Prioritized] - *Strengthen partnerships and knowledge transfer for management of invasive species*

Progress to Date

Previously, the Okanagan did not have a centralized system to share information pertaining to invasive species identification and management and as a result, producers (and the public) had difficulty accessing information to identify and manage invasive plants and insects. To address this gap, the Okanagan Invasive Species Online website (www.oiso.ca) was developed to serve as a valley-wide one-stop-shop for local invasive species information. The website is designed for the agriculture sector and allows producers to search for invasive species by commodity, species name, category and plant/flower colour. The site also features an "Ask an Expert" function that allows users to fill out a form and then to be connected with an expert in their area who can assist with identification and treatment options. Producers are able to sign-up for alerts about species in their regional district and relevant to their commodity and can also view species of concern (found in their Regional District) on a map.

Priority Action #5
Enhance and promote the Okanagan Invasive Species Online website

The initial step of creating the Okanagan Invasive Species Online website (www.oiso.ca) was the first phase in creating a comprehensive resource for producers. This phase –with its very limited budget and timeline - enabled development of the website structure and its basic content. There are areas of the website – such as the pest management and mitigation information sections – that require enhancement. However, prior to expanding the website's content, an interim step will be to undertake a formal 'user experience evaluation' which can then inform refinements. Following the evaluation and phase 2 content development, the website will be more broadly promoted and a long-term administrative and funding strategy will be evolved to ensure site upgrades and maintenance over time.

Activities

Phase One:

I. Conduct a formal evaluation of the website with users (e.g. user experience, missing information, etc.)

II. Incorporate improvements into website

III. Add new content to improve coverage of invasive species and management options for agriculture

Phase Two:

IV. Develop and execute an outreach campaign to promote the website to producers. This may include:

- o Distribution of website swag (e.g. magnets, etc.)
- o Speaking engagements, booths at events
- o Cross-promotion through CAI (and partner) activities
- o Industry group newsletters, websites, etc.

Phase Three:

V. Develop a long-term administrative and funding strategy for oiso.ca

Implementation Details

- Since the website was recently launched (April 2018), it would be beneficial for Phase 1 (formal evaluation) to happen in a timely manner, and prior to a broad outreach campaign
- An advisory committee of key stakeholders (e.g. sector groups, Regional Districts, Ministry of Agriculture) should be formed to provide strategic, technical and resourcing guidance on future phases of the website
- Opportunities may arise to cross-promote the website through priority action #4

Possible Partners

Agricultural organizations (listed on page 7)
Okanagan and Similkameen Invasive Species Society
Regional Districts (listed on page 7)
BC Ministry of Agriculture
Agriculture and Agri-Food Canada

Timeframe

Short-term (less than 2 years)

Cost

Low (less than $50,000)

Impact Area 3:
Increase in extreme precipitation events

Strategy 3.1 [Prioritized] - Improve processes and supports for individual producers to implement runoff and erosion management and riparian rehabilitation activities

Progress to Date

No actions were undertaken by the CAI between 2016 and 2018 to accomplish this Strategy.

Priority Action #6
Assess processes and supports for producer implementation of runoff/erosion management practices and riparian rehabilitation

Due to both recent flooding events and anticipated changes in climate, there is growing awareness of the need for effective and proactive management of runoff and riparian areas. Supports available to producers interested in undertaking riparian rehabilitation are limited and the complexity of obtaining the necessary approvals to undertake this type of work remains a challenge to action. This action includes reviewing the current tools and resources available (in BC and elsewhere), as well as identifying options for improving the opportunities and capacity for runoff/erosion management and in particular, riparian maintenance and rehabilitiation activities on farmland.

Activities

I. Assess the current process, policy and programmatic supports (for producers undertaking riparian rehabilitation), including:

- o Identifying existing supports (e.g. human resources, cost-share incentives, key organizations)
- o Documenting the regulatory process/steps
- o Identifying gaps, issues and opportunities
- o Consulting with producer organizations, government agencies and specialists to identify key issues and/or opportunities

II. Conduct a literature review of case studies on effective alternatives for producer-led riparian rehabilitation

III. Conduct consultation with (and facilitate dialogue between) producer groups and key agencies to determine preferred options to improve processes and supports

IV. Determine/outline steps for strengthening coordination and support for runoff/erosion management and riparian rehabilitation

V. Explore the potential for a 'riparian framework for agriculture'

Implementation Details

- Existing and/or recent programs should be included (e.g. Environmental Farm Plan/Beneficial Management Practices Programs, Farmland and Riparian Interface Stewardship Program)
- Floodplain mapping (underway with OBWB and RDCO - estimated completion December 2018) should be analyzed for applicability
- A layered approach to engagement/consultation may be pragmatic – smaller groups might be more effective than larger groups
- The consultation process will require clear objectives (what needs to be accomplished for the process to be successful) and facilitated discussion
- The project should include an asset assessment – what do people (organizations, stakeholders) bring to the table
- As part of the baseline work, it might be beneficial to look at organizational objectives and whether there are stated shared interests/values
- This activity would be most beneficial if undertaken across all three Regional Districts

Possible Partners

Agricultural organizations (listed on page 7)
Municipal governments
Okanagan Basin Water Board
Regional Districts (listed on page 7)
First Nations
NGOs (watershed groups etc.)
Water purveyors
BC Ministry of Agriculture
BC Ministry of Environment
BC Ministry of Forests, Lands, Natural Resource Operations and Rural Development
Department of Fisheries and Oceans
Insurance companies (should have interest in flooding resilience)

Timeframe

Medium term (2-5 years)

Cost

Medium ($50,000-$100,000)

Strategy 3.2 [Not Prioritized] *- Strengthen cooperative runoff/erosion management and riparian restoration on individual watercourses*

Progress to Date

No actions were undertaken by the CAI between 2016 and 2018 to accomplish this Strategy; however, one Farm Adaptation Innovator Program project does relate to this topic. The *Economic, Social and Environmental Benefits of Riparian Rehabilitation as a Climate Change Adaptation Strategy* assessed a group riparian restoration process (supported through the Environmental Farm Plan Program and Beneficial Management Practices Program) that involved producers in the Alderson Creek drainage, in the Fortune Creek Watershed, near Armstrong, BC. The project established a quantitative baseline for assessing stream health to enable post-restoration comparison (to assist in quantifying the value of riparian restoration). The project also assessed social and economic variables – as well as stakeholder attitudes, opinions, and knowledge exchange – related to the restoration efforts.

***Strategy 3.3 [Not Prioritized]** - Support knowledge transfer for effective management of runoff, erosion and riparian areas*

Progress to Date

No actions were undertaken by the CAI between 2016 and 2018 to accomplish this Strategy

Impact Area 4: Increasing wildfire risk

***Strategy 4.1 [Not Prioritized]** - Support cooperative approaches to fuel management activities*

Progress to Date

No actions were undertaken by the CAI between 2016 and 2018 to accomplish this Strategy

Strategy 4.2 [Prioritized] - Support individual operations with planning for wildfire preparedness and mitigation

Progress to Date

This Strategy was addressed through the development of the *Agriculture Wildfire Preparedness and Mitigation Planning Workbook and Guide* (one part of a two-part project to support wildfire planning and risk mitigation activities in the Okanagan). The project combined farm-level resources developed through previous projects in the Cariboo and the Cowichan and added new content to reflect the needs of tree fruit, vineyard and field/horticulture crop operations (including sections on visitor and employee evacuation). Now applicable to all farm types, the new resources walk producers through planning and preparedness actions to undertake before, during and after a wildfire.

Priority Action #7
Undertake knowledge transfer and training to support individual operation preparedness/mitigation

To date, the interest in the *Agriculture Wildfire Preparedness and Mitigation Planning Workbook and Guide* has been strong (including distribution of the resources at the BC Cattlemen's Emergency Management Workshops in 2018), but there remains ample opportunity to further distribute the resource and to provide additional support to producers in completing their individual wildfire preparedness plans. Supports may include facilitated workshops, how-to-videos and distribution of the resources through partnerships with agricultural groups and/or local agencies.

Activities

I. Consult with the sector to confirm the types of supports producers require for completing their wildfire plans

II. Develop the best mechanism(s) for broad promotion/distribution of the guide/workbook that reflect the type of support desired by producers. This may include:

- o Development of how-to-videos and/or webinars
- o 'Train the trainer' model
- o Small group workshops (requested by groups of producers)
- o Commodity specific workshops
- o Distribution through industry groups and other agencies involved in emergency preparedness

III. Distribute the resources to producers through selected mechanism(s)

IV. Evaluate the level of uptake and success of outreach/supports

Implementation Details

- Ag Safe BC has created a fillable form PDF which will increase accessibility and function for producers across BC
- Kwantlen Polytechnic University has a good model for hosting webinars which allows people to come together from various locations to participate in an active/engaging way, led by a central host/speaker
- Option of "train the trainer" for commodity groups builds on the approach used by the BC Cattlemen's Association with the 2018 workshops
- Workshops could be application based – a group of producers get together and request a facilitator
- Improvements should be made to how producers can share the 'tear-away sheet' with key agencies (and possibly use of information shared)
- This action supports (and ties into) Priority Action #8 (below)

Possible Partners

Agricultural organizations (listed on page 7)
Ag Safe
Community groups in the Okanagan who represent producers/hobby farms not reached by agricultural organizations (e.g. Joe Rich Community Group)
Municipal Governments
Regional Districts (listed on page 7)
BC Ministry of Agriculture
BC Wildfire Service (FLNRORD)

Timeframe

Short-term (less than 2 years)

Cost

(variable: depends on outreach methods/supports)
Low (less than $50,000) to Medium ($50,000-$100,000)

Strategy 4.3 [Prioritized] - Support regional-scale planning and implementation for wildfire preparedness and mitigation

Progress to Date

This Strategy was partially addressed through the development of the *Discussion Document: Planning and Information Exchange for Wildfire Impact Reduction* (one part of a two-part project that supported wildfire planning and risk mitigation activities in the Okanagan). Through consultation with the agricultural community and key agencies (including a focus group), the Discussion Document identifies challenges (and solutions) relating to communication and information flow between producers and response agencies, before and during wildfire events.

The consultation indicated that pre-season communication and preparedness planning offer the greatest potential for implementable solutions in the near-term and may help to address some of the communication issues experienced during wildfire (particularly around suppression operations, evacuation and permitted re-entry protocols). The report identifies solutions with the greatest potential for local implementation, as well as activities that can be driven by the agriculture sector or that directly engage producers. Nine actions were prioritized for near-term implementation.

Priority Action #8
Pilot structured (pre-season) wildfire communication mechanisms between agriculture and key agencies

Effective information exchange and communication before (and during) wildfire events is widely understood as one of the most important elements in reducing wildfire impacts to the agriculture sector. When wildfires are not actively occurring in an area, both government agencies and producer organizations are better able to prepare for, and participate in, processes to enhance and improve lines of communication. In addition, if pre-season communication becomes an annual regional activity, it can be continuously improved upon over time and can evolve to address emerging and complex issues.

This pilot project will bring producers and key response agencies together for a local/regional pre-season meeting to facilitate information exchange and relationship building. Meeting topics could include: fire threat/hazard outlook, roles and responsibilities of agencies involved in emergency response, key points of contact and regional communication protocols or processes. In addition, key topics (covered in the pre-season meeting) could be summarized in a bulletin and distributed to producers prior to the start of the wildfire season. Additional information/communication tools may be piloted during the wildfire season and the pilot may also include additional educational components (i.e. producer 'training' activities) such basic fire suppression, livestock relocation, sprinkler planning and deployment, etc.

Activities

I. Identify pilot partners and stakeholders

II. Determine objectives and parameters of pilot project (based on recommendations in *Discussion Document: Planning and Information Exchange for Wildfire Impact Reduction*)

III. Develop and vet supporting resources

IV. Execute information exchange pilot project

V. Evaluate and summarize outcomes of pilot project and make recommendations for improvements

Implementation Details

- Scale of the project will need to be determined, but it is likely only feasible to pilot with one Regional District
- Timing of pilot will be important. Okanagan Regional Districts have been overburdened with emergency response in recent years (floods, wildfires) and they will need sufficient capacity to partner on the pilot
- Pilot must consider other efforts and initiatives underway and ensure that the work is complementary
- The report *Addressing the New Normal: 21st Century Disaster Management in British Columbia* should be consulted for additional recommendations that may be incorporated into the pilot
- There may be some linkage with farm-level preparedness and mitigation planning (described in priority action #7) and the communications/information exchange pilot project - all opportunities to promote farm-level preparedness planning should be capitalized on

Possible Partners

Agricultural Organizations (listed on page 7)
Regional Districts (listed on page 7)
Municipal Governments
BC Ministry of Agriculture
BC Ministry of Forests, Lands, Natural Resources Operations and Rural Development
BC Wildfire Services

Timeframe

Short-term (less than 2 years)

Cost

Medium ($50,000-$100,000)

Appendix I

Okanagan Voting Card

Check TWO strategies from Area A

A Impact Area 1: Warmer and drier summer conditions

- ☐ **Strategy 1.1** Support the agriculture sector's participation in drought planning
- ☐ **Strategy 1.2** Develop and implement agriculture-specific drought outreach
- ☐ **Strategy 1.3** Provide knowledge & technology transfer for agricultural water management
- ☐ **Strategy 1.4** Undertake applied research and demonstration for practices and technologies to improve resilience to hot and dry conditions
- ☐ **Strategy 1.5** Undertake education and outreach (for Okanagan residents) to increase understanding of agricultural water user and climate change

Check TWO strategies from Area B

B Impact Area 2: Changes to pest populations

- ☐ **Strategy 2.1** Enhance cross-commodity approaches to monitoring and management for critical insect pests
- ☐ **Strategy 2.2** Improve linkages between climate change projections and weather and pest monitoring data
- ☐ **Strategy 2.3** Strengthen partnerships and knowledge transfer for management of invasive species

Check ONE strategy from Area C

C Impact Area 3: Increase in extreme precipitation events

- ☐ **Strategy 3.1** Improve processes and supports for individual producers to implement runoff and erosion management and riparian rehabilitation activities
- ☐ **Strategy 3.2** Strengthen cooperative runoff/erosion management and riparian restoration on individual watercourses
- ☐ **Strategy 3.3** Support knowledge transfer for effective management of runoff and erosion and riparian areas

Check ONE strategy from Area D

D Impact Area 4:Increasing wildfire risk

- ☐ **Strategy 4.1** Support cooperative approaches to fuel management activities
- ☐ **Strategy 4.2** Support individual operations with planning for wildfire preparedness and mitigation
- ☐ **Strategy 4.3** Support regional-scale planning and implementation for wildfire preparedness and mitigation

Appendix II

Summary of strategies, actions and implementation to date

Impact Area 1 **Warmer and drier summer conditions**		
Strategy	**Actions**	**Implementation Details**
Strategy 1.1 Support the agriculture sector's participation in drought planning	Action 1.1A Consult with the agricultural sector to determine cross-sector objectives for drought planning	not yet addressed
	Action 1.1B Develop a framework for (consistent and structured) engagement of agricultural water users in local drought planning processes	
Strategy 1.2 Develop and implement agriculture-specific drought outreach	Action 1.2A Create a consistent (and data-driven) system for disseminating source-specific water supply information	mostly addressed by pilot project *Agricultural Water Supply Status Communications*
	Action 1.2B Establish and implement sector-appropriate outreach mechanisms	
Strategy 1.3 Provide knowledge & technology transfer for agricultural water management	Action 1.3A Share and promote existing (BC-specific) water and irrigation management tools and resources	partially addressed by pilot projects *Vineyard Water Use Efficiency Knowledge and Technology Transfer* and *Integrated Farm Water Management Planning*. Action 3.1B also partially addressed by FAIP projects *Optimization of Water Use in Vineyards in the Okanagan Using Precision Irrigation* and *Expanding Cherry Production in British Columbia under Climate Change*
	Action 1.3B Develop (new) knowledge transfer resources to provide information about water management best practices	
Strategy 1.4 Undertake applied research and demonstration for practices and technologies to improve resilience to hot and dry conditions	Action 1.4A Demonstrate and evaluate options for increasing crop resilience (to hot and dry conditions)	not yet addressed
	Action 1.4B Demonstrate and evaluate options for innovative agricultural water management technologies and practices	partially addressed by FAIP projects *Optimization of Water Use in Vineyards in the Okanagan Using Precision Irrigation* and *Expanding Cherry Production in British Columbia under Climate Change*
Strategy 1.5 Undertake education and outreach (for Okanagan residents) to increase understanding of agricultural water user and climate change	Action 1.5A Develop information materials to improve public knowledge of agricultural water use/practices and climate change	not yet addressed

Impact Area 2
Changes to pest populations (insects, diseases, weeds and invasive species)

Strategy	Actions	Implementation Details
Strategy 2.1 Enhance cross-commodity approaches to monitoring and management for critical insect pests	Action 2.1A Develop a cross-section plan for shared monitoring, management and knowledge transfer	not yet addressed
	Action 2.1B Pilot implementation of new cross-sector approaches for monitoring and management	
Strategy 2.2 Improve linkages between climate change projects and weather and pest monitoring data	Action 2.2A Develop resources to link weather and pest/disease data with decisions support tools (e.g., pest phenology predictions, disease pressure tools)	mostly addressed by new tool *Decision Support Tool for Tree Fruit Growers (BC DAS)*
	Action 2.2B Integrate climate change considerations into pest research and analysis	partially addressed by new tool *Decision Support Tool for Tree Fruit Growers (BC DAS)* and FAIP project *Climate Change Influence on Disease Control Patterns in the Okanagan Tree Fruit Industry*
	Action 2.2C Disseminate pest information and resources broadly to producers and specialists	
Strategy 2.3 Strengthen partnerships and knowledge transfer for management of invasive species	Action 2.3A Enhance knowledge transfer for monitoring and management of agriculturally significant invasive species	partially addressed by new resource *Okanagan Invasive Species Online*
	Action 2.3B Create a centralized (Valley-wide) online information source for outreach/knowledge transfer regarding invasive species/pests	

Impact Area 3
Increase in extreme precipitation

Strategy	Actions	Implementation Details
Strategy 3.1 Improve processes and supports for individual producers to implement runoff and erosion management and riparian rehabilitation activities	Action 3.1A Assess existing and alternative processes (policy, programmatic and financial tools) to support implementation of runoff /erosion management and riparian rehabitation	not yet addressed
	Action 3.1B Facilitate dialogue between producer groups and key agencies to determine preferred options to improve processes/supports	

Impact Area 3 (continued) Increase in extreme precipitation		
Strategy	**Actions**	**Implementation Details**
Strategy 3.2 Strengthen cooperative runoff/erosion management and riparian on individual watercourses	Action 3.2A Pilot approaches to bring landowners (and key agencies) together to plan and implement runoff/erosion management and riparian activities	not yet addressed (relates to FAIP project *Economic, and Environmental Benefits of Riparian Rehabilitation as a Climate Change Adaptation Strategy)*
	Action 3.2B Enhance existing tools/programs (e.g. FRISP, EFP) focused on multi-producer (group) implementation of runoff/erosion management and riparian restoration	
Strategy 3.3 Support knowledge transfer for effective management of runoff and erosion and riparian areas	Action 3.3A Promote cross-agency and sector sharing of key resources and demonstration opportunities	not yet addressed
Impact Area 4 **Greater frequency and intensity of extreme heat events**		
Strategy	**Actions**	**Implementation Details**
Strategy 4.1 Support cooperative approaches to fuel management activities	Action 4.1A Identify common threats/issues and specific (geographic) areas where collaborative solutions are needed	not yet addressed
	Action 4.1B Support implementation of priority (selected) fuel management activities	
Strategy 4.2 Support individual operations with planning for wildfire preparedness and mitigation	Action 4.2A Pilot wildfire preparedness and mitigation planning tools for individual operations	partially addressed through resource *Agriculture Wildfire Preparedness Planning Workbook and Guide*
	Action 4.2B Undertake knowledge transfer and training to support individual operation preparedness/mitigation	
Strategy 4.3 Support regional-scale planning and implementation for wildfire preparedness and mitigation	Action 4.3A Support development of Community Wildfire Protection Plans (CWPPs) - in partnership with agricultural stakeholders - and implement recommendations of benefit to agriculture in existing CWPPs	partially addressed through Discussion Document *Planning and Information Exchange for Wildfire Impact Reduction* *(see footnote 2 on page 3)*
	Action 4.1B Establish regional livestock emergency relocation and management plans	