CLIMATE CHANGE
ADAPTATION PROGRAM

Planning and Information Exchange for Wildfire Impact Reduction

Project Report

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Planning and Information Exchange for Wildfire Impact Reduction

Discussion Document

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EXECUTIVE SUMMARY

Between August 2017 and February 2018, B.A. Blackwell & Associates Ltd. engaged agriculture producers who had experienced wildfires in the Okanagan and government agency staff involved in wildfire response, as well as individuals with Cariboo wildfire experience, in a consultation process to identify issues and potential solutions associated with communication before, during and after wildfires (i.e. during preparedness, response and recovery). Consultation was undertaken through one-on-one interviews and a focus group workshop. The project focus was on communication processes, as well data sources and mapping available to inform these processes.

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. This report summarizes the results of the consultation process and identifies issues and opportunities to improve communication and source information (mapping and property features). Through the consultation process, the following key components of effective wildfire communication were identified and developed:

- Effective and consistent communication and information sharing with agriculture producers prior to and during wildfires,
- Identification of agricultural values at risk through data collection and mapping, supplemented with input from the local agriculture sector, and
- Identification of opportunities to integrate producer knowledge and capacity in operations planning and fire response, including supporting individual agriculture producer wildfire preparedness.

The following challenges to effective communications were identified and are described in greater detail in the report:

- Need for strengthened or standardized communication protocols,
- Need to move from a reactionary approach to more preplanning and preparedness,
- Producer knowledge gaps around key government and industry contacts for information and support, emergency management processes, risk management and preplanning, and
- Lack of recognition of agriculture producers as an asset during wildfire and the difficulty faced by government in balancing risk and liability.

A total of 17 issues and potential solutions identified and discussed in the report are summarized in Table 1 below around the following four key themes:

1. Pre-season communication and preparedness planning,
2. Communication during wildfire,
3. Agricultural values at risk and data sources/options, and
4. Integration of agricultural knowledge and capacity.

Through the consultation process, it was identified that pre-season communication and preparedness planning *offers the greatest potential for implementable solutions* in the near term that may start to address some of the other com`munication issues experienced during wildfire (particularly around suppression operations, evacuation

and permitted re-entry protocols). A total of nine near term and priority actions are provided (see Section 4.0 for details):

1. Undertake a pilot project across select regions to test and evaluate pre-season communication
2. Promote farm level preparedness mitigation and planning through wide distribution of the *Agriculture Wildfire Preparedness and Mitigation Plan* template and guide (a stand-alone product developed during this project).
3. Promote Premises ID registration as a means of facilitating efficient identification of livestock producers (including hobby farms) with verifiable agriculture operations and premises during evacuation orders.
4. Develop a strategy to facilitate efficient identification of crop and other producers (not included in or registered with the Premises ID program) with verifiable agriculture operations and premises during evacuation orders.
5. Promote better engagement on the topic of wildfire with agriculture associations.
6. Recognize producers as assets during wildfire and in permitting for re-entry during evacuation orders.
7. Formalize the inclusion of an agriculture representative(s) in Emergency Operations Centers as applicable.
8. Support, recognize and link with community groups and communication networks.
9. Provide clear information and more information at the time of evacuation alert or order.

Table 1. Summary of issues identified and potential solutions.

Issues	Potential Solutions
Pre-season Communication and Preparedness Planning (Section 3.1)	
Communication Protocols	
1. Consistency, clarity and shared understanding of communication protocols (multi-agency with producers)	• Strengthening and formalization of communication protocols for communication with producers before and during wildfires. Key elements of formalized communication protocols in Appendix A.
Knowledge/ information gaps	
2. Information/knowledge regarding emergency management process, key contacts, and roles and responsibilities 3. Farm-level wildfire preparedness	• Annual local/regional pre-season meeting and information exchange with key emergency and response agency and producer contacts • Annual information bulletin and key contacts list for wide distribution to all producers • Periodic workshop and education/training opportunities targeted to commodity specific producer groups and agriculture industry representatives ("train the trainer") • Producer preparedness through distribution and support for the *Agriculture Wildfire Preparedness and Mitigation Planning* tool • Factsheet/s regarding insurance, business risk management and government disaster relief • Community-based producer pre-season planning initiatives such as establishing emergency communication processes and networks or purchasing shared protection resources
Communication During Wildfire	
4. Advance notice and timely (daily) info on fire risk/location	• Frequent updates when a wildfire is close by (as logistically feasible). • Establish a clear process for dissemination of daily information from BCWS to key sector contacts (element of pre-season planning) • Producers to familiarize themselves with the Provincial Strategic Threat Assessment map and understand local threats (during pre-planning) • Local authorities to conduct door to door notifications in advance of an evacuation alert being issued
5. Remote access to wildfire and emergency information sources and updates	• Investigate and implement alternative methods of information sharing (established in advance) at a regional level, to ensure messages reach producers with limited access to on-line communications
6. Centrally located online public information	• Consolidate and centralize locally relevant information producers need prior to evacuation alerts or orders being issued • Provide links to all relevant information sources in a user-friendly online format on the local government emergency management website. Producer information needs include: location of fire perimeter in relation to livestock/range and other agriculture operations, as much information as possible about fire growth, emergency status and evacuation route planning information for the local area.

Issues	Potential Solutions
7. Effective delivery of evacuation notices and associated information	• Develop effective notification systems employing best practices used in other jurisdictions; multi-step or layered approach with redundancies is ideal (pre-season communication protocol in section 3.1 and Appendix A) • Prepare an informational pamphlet to accompany evacuation notices and provide more information at time of alert or evacuation notice • Prepare an Information card to be issued at checkpoints - Including weblinks, key information, contacts, and define acronyms (as per above)
8. Obtaining reliable information and providing meaningful input during evacuation alerts/orders	• A multi-layer communications approach (additional details in Appendix A) • Regular and scheduled stakeholder meetings minimum weekly or following significant fire growth, subject to the local wildfire situation and stakeholder needs (standardization of stakeholder engagement discussed in section 3.1 and Appendix A) • Community meetings, ideally at a minimum before and after evacuation (standardization of public engagement in section 3.1 and Appendix A)
9. Protocols for permitting and re-entry (to perform essential services/activities)	• Regional districts to collaborate with agriculture resource specialists and industry representatives to develop options for practical, common sense procedures for permitted entry to evacuation zones (pre-season communication protocols for permitting detailed in Appendix A)
10. Management and coordination of livestock relocation for small scale farms.	• Facilitate pre-season planning between organizations that can provide local livestock relocation, care and handling support to small lot producers (BC Horse Council, Interior Horse Rescue Society, ALRT, CDART, SPCA) in order to designate who can do what; regional districts may be most suited to facilitate and coordinate involvement • Producers to pre-plan and identify and confirm sites or buddy farms to receive animals in advance of the fire season; this could include formal memoranda of understanding or informal buddy agreements
Agricultural Values at Risk and Data Sources/Options	
11. Datasets from multiple government data sources	• Utilize existing government *iMap* tool to customize layers that are user specific. These may be a generalized compilation of layers or user-defined lists of layers may be created/published. Some critical layers may be missing in *iMap* and resource staff may still need to be engaged (e.g., Forest Tenures Administration System, Premises ID, ALUI)

Issues	Potential Solutions

12. Producer supplied inventory of private farm assets and resources	• Pre-season:
	  ○ Encourage pre-season information collection and sharing with the regional district or local fire departments (potentially facilitated through association representatives or local community groups). Preferably these inventories would be referenced by PID and Folio Number for integration with regional district and BCWS mapping layers.
	  ○ Completion of individual *Agriculture Wildfire Preparedness and Mitigation Plans* (and associated maps) would facilitate information availability
	  ○ Provide an option for producers to attach inventory information to Premises ID
	• During a wildfire:
	  ○ Investigate methods for making farm/operation level maps available to responders on an incident by incident basis. Options include leaving a copy at the property gate or some other method of sharing either a hard copy or digital map with local government and/or BCWS.
	  ○ Provide an option for producers to attach an inventory list and/or map to an evacuation zone permit for re-entry

13. Availability of producer contact information	• Annual pre-season reminders to Premises ID holders and range tenure holders to update all information • Investigate options for capture of contact information through the property tax assessment process • Encourage pre-season information sharing or self-reporting of contact information in conjunction with property-level inventories (see Issue #12 above) ○ Research opportunities for agriculture associations or local community groups to provide the regional district with contact information (updated annually) based on their member contact lists and preferably linked to unique property identifiers such as the Folio Number and PID (used in tax assessment administration), subject to disclosure with members
14. Use of Premises ID for permitting system (for entry/re-entry to evacuation zones)	• Promote (through Ministry of Agriculture and agriculture associations) the benefits of Premises ID registration to small and large scale livestock producers in the context of livestock management during wildfire evacuations • Research alternative strategies that may be used to verify crop-based agriculture operations during wildfire evacuations; options include some form of self-reporting facilitated by regional districts or local fire departments such as pre-season information sharing (see Issue #12 above) and data capture through the property tax assessment process (see Section 4.0, Recommendation #4)
Integration of Agricultural Knowledge and Capacity	
15. Inclusion of local resource specialist in critical communication	• Strengthen protocols to include appropriate Range, Ministry of Agriculture resource specialists on EOC/PREOCs with local and on-the-ground knowledge, information systems knowledge, and connections with producers • Include agricultural associations in EOC to act as agriculture stakeholder representatives/liaisons and integrate local industry knowledge. (Protocols outlined in Appendix A)

Issues	Potential Solutions

16. Integration/mobilization of local producer knowledge in operations planning	• Preseason: Producers to share relevant property and wildfire preparedness information with regional districts linked via PID and Folio Number for integration with BCWS mapping (see Sections 3.1, Issue #2 and 3.3, Issue #12)
	• During wildfire
	  ○ Producers share farm-level site map with BCWS on an as-needed, event specific basis (see Section 3.3, Issue #12)
	  ○ Strengthen BCWS protocols for engagement with producers, and government and industry agriculture specialists (see Section 3.1, Issue #1, Section 3.4, Issue #15, and specific protocols in Appendix A)

17. Recognition of capacity and resources to stay and be granted re-entry to evacuation zones	• Provide education and training for producers to develop individual wildfire preparedness and mitigation plans, including awareness of evacuation trigger points and evacuation contingencies (see Section 3.1) • Create a permitting protocol with provisions for producers who choose to stay and defend that allows for a working relationship with local authorities (including access to supplies, essential services, and reasonable access to adjoining lands) (protocols outlined in Appendix A)

COMMONLY USED ACRONYMS

BCWS	British Columbia Wildfire Service
IC	Incident Command (BCWS)
IMT	Incident Management Team (BCWS)
EOC	Emergency Operations Centre
PREOC	Provincial Regional Emergency Operations Centre
FLNRORD	Ministry of Forests, Lands, Natural Resource Operations, and Rural Development
RDOS	Regional District Okanagan-Similkameen
RDCO	Regional District of Central Okanagan
RDNO	Regional District of North Okanagan
POC	Project Oversight Committee

TABLE OF CONTENTS

LIST OF TABLES

LIST OF MAPS

1.0 INTRODUCTION

A number of British Columbia's agricultural operations are located in areas at high to extreme risk for wildfires. Some areas, such as the Cariboo and the Okanagan, have experienced several significant wildfire seasons in recent years. With climate change projections including more prolonged warm and dry periods during summer, as well as more extreme wildfire weather (combined effect of temperature, relative humidity, wind speed and precipitation), it is anticipated that the number and severity of wildfires will increase in the future. Wildfires threaten immediate agricultural production capacity including livestock, range and crop health and agricultural infrastructure. Due to the potential for negative impacts to agriculture, addressing wildfire risks was identified as a priority for adaptation actions in the Okanagan and in other parts of the province.

Effective information exchange and communication before and during wildfire events is widely understood to be one of the most important elements in reducing wildfire impacts by agencies and stakeholders involved in post-fire reviews. While issues have been identified with communication processes employed in past wildfires, the purpose of this report is to identify impactful solutions with the greatest potential for local implementation, as well as activities that are driven by the agricultural sector or that directly engage producers. The issues and potential solutions summarized in this report are based on input received from individual agriculture producers and other industry and agency stakeholders obtained through interviews and a focus group workshop.

B.A. Blackwell & Associates Ltd. (Blackwell) was retained by the Southern Interior Stockmen's Association (SISA) in partnership with the Okanagan Agricultural Adaptation Working Group (OAAWG)[1] to develop a pilot project in the Okanagan with a focus on enhancing wildfire preparedness and mitigating wildfire impacts in agricultural areas. This project builds on two previous wildfire-related pilot projects completed in BC to implement elements of *Regional Adaptation Strategies*, one in the Cariboo[2] and the other in the Cowichan[3]. In the Cariboo, a ranch-level wildfire mitigation and preparedness template was developed, primarily focused on hazard and asset identification. Workshops were held to explore the key areas for wildfire mitigation actions (particularly the barriers and key opportunities). Both the importance of reducing fuels near ranches, corrals and fences, as well as the use of Sprinkler Protection Units were identified as key opportunities. In the Cowichan, a livestock focused template and manual for farm-level planning for extreme events (including wildfire) was developed and tested with individual operations in a workshop setting. This project was livestock focused with potential for broader application.

The three broad goals of this Okanagan-based project were as follows:

1. Pilot a cooperative planning process with agricultural producers in two areas with high risk of wildfire;
2. Strengthen information available for emergency response regarding agricultural assets in areas with high and extreme risk of wildfire; and

[1] OAAWG partners include BC Agriculture & Food Climate Action Initiative, BC Ministry of Agriculture, three Okanagan Regional Districts, and several associations representing Okanagan agriculture operators (a full list of funding partners is listed in the Acknowledgements section of this document)
[2] http://www.bcagclimateaction.ca/regional-project/cb01/
[3] http://www.bcagclimateaction.ca/regional-project/cw10/)

3. Provide wildfire-related planning and informational resources to promote farm-level preparedness for agricultural operators.

As the project evolved, it diverged from the first goal as it became apparent that it would be more effective to gather input from a broad cross section of producers with experiences and knowledge related to wildfire (rather than attempting to focus in on specific geographic areas). The mapping exercise remained geographically focused, but the remainder of the project included a cross section of producers to explore needs and priorities for wildfire communication and information sharing.

Project guidance and input were provided by the Project Oversight Committee (POC) including key staff from the BC Agriculture and Food Climate Action Initiative and representatives from several other OAAWG partners.

The project resulted in two primary deliverables:

1. A summary report identifying solutions for improving communication and information flow before and during wildfire events; and
2. A wildfire preparedness and mitigation planning template and an accompanying guide to support individual agriculture operator preparedness.

The original scope of the project included a third deliverable: a mapping layer and database of key agriculture and industry data to facilitate effective and concerted response and preparedness. However, the mapping exercise demonstrated significant challenges in creating a unified, standalone mapping layer (incorporating existing provincially held data) that would adequately inform wildfire response and preparedness as discussed in Section 3.3.

2.0 PROJECT SCOPE AND METHODOLOGY

The geographic focus of this project is the Okanagan, including the Regional District of Central Okanagan (RDCO), Regional District of Okanagan Similkameen (RDOS), and Regional District of North Okanagan (RDNO). Specifically, with respect to the mapping layer/database exercise, sample maps were created for two agricultural areas located in the RDCO and the RDOS. The majority of the priority issues and potential solutions identified will be applicable to, and have relevance for, producers in areas at risk from wildfires throughout BC.

The scope of work for this project included the following key elements:

1. **Preliminary identification of the issues, challenges and successes (key themes)** around information sharing and communications processes with agricultural producers before and during wildfires. This information was drawn from interviews with selected individuals representing a cross-section of producers, agricultural associations and government agencies. (Please see 2.1 for additional details).
2. **Identification of key data sources and development of a series of sample maps to demonstrate/verify their usefulness for capturing key agricultural information and values (for both Crown and private lands) and for use in base emergency planning**. Much of the information was compiled from current provincial data sources (e.g. Premises ID, Range Use Plans, and the Agricultural Land Use Inventory).

Additional data deemed integral to base emergency response mapping was identified in focus group review and discussion. (Please see Appendix C for additional details).

3. **Focus group workshop** and discussion of issues and potential solutions framed around key themes, including evaluation of data sources and mapping layers and identification of information gaps. Participants included a cross-section of Okanagan producers and government agency representatives. (Please see 2.2 for additional details).
4. **Development and refinement of a farm-level wildfire preparedness and mitigation planning template** to provide a cross-section of agricultural operations with information and resources regarding farm-level wildfire preparedness and mitigation. This element incorporated key elements of the planning templates developed in previous Cariboo and Cowichan Valley projects with refinements for the Okanagan context. Project activities included:
    a. **Site visits to crop production operations** (January 16 and 24, 2017) to refine the previously livestock focused template and guide to capture the unique needs of tree fruit, vineyard and field/horticulture crop operations and to improve the template for all types of farm operations.
    b. **Workshops to demonstrate, test and refine the farm-level planning templates**, one workshop with tree fruit, vineyard and field/horticultural crop producers on February 13, 2017 and one workshop with livestock producers on February 14, 2017 to vet the content with representatives from a range of commodities.

The focus of this report is to document the issues identified and explore potential solutions for elements 1 to 3. The farm-level plan template and guide (element 4) are provided separately as a stand-alone project deliverables. The mapping layer and database product is available in Appendix B.

2.1 Preliminary Identification of Issues, Challenges and Successes

The project was informed throughout by the Project Oversight Committee (POC) and the earlier Climate Action Initiative Cariboo and Cowichan projects. Additionally, as a key part of the background research for this project, phone interviews and/or email questionnaires were conducted (20 in total) with a number of individual producers, agricultural association representatives, and staff in relevant provincial ministries. These discussions provided insights into key challenges and lessons learned from past wildfire seasons. Individuals were selected following the direction of the POC and as identified by Blackwell. Input was solicited based on experiences in the Okanagan and Cariboo as well as province-wide.

While the Okanagan has experienced several significant wildfire seasons in recent years (2003, 2004, 2009, 2010, 2014 and 2017), the Cariboo has also had particularly notable fire seasons, in 2009, 2010, 2014 and most recently in 2017, that have heavily impacted the ranching community and other agricultural producers. The Cariboo experience provides valuable lessons that are applicable to both the Okanagan agricultural community and provincially. The intent of the interviews was to capture the most recent successes and challenges to inform the context, underlying issues and common themes for further focused review and discussion. Agencies and producer sectors represented included:

- Okanagan and Cariboo producers (livestock, tree fruit, grapes/wineries);
- Industry associations (Cattlemens' Associations, Horse Council of BC, BC Agriculture Council);
- BC Ministry of Agriculture;
- BC Ministry of Forests, Lands, Natural Resource Operations and Rural Development (FLNRORD);
- BC Wildfire Service (BCWS);
- Regional Districts (RDCO and RDOS); and
- Emergency Management BC.

2.2 Focus Group Workshop

A focus group workshop was held in Summerland on November 27, 2017. The intention of the focus group workshop was for producers and representatives from key agencies to collaboratively develop practical, agriculture focused recommendations for improved planning and information sharing both before and during a wildfire event. Participants represented a cross-section of Okanagan agricultural producers (tree fruit, grapes/winery, cattle, horses, vegetable, small mixed farm), industry associations (BC Cattlemens' Association, BC Grape Growers Association) and local and provincial government agency staff (RDOS, Ministry of Agriculture, FLNRORD Range Branch, and BC Wildfire Service).

Bringing government agency representatives and agricultural producers together was valuable in developing a shared understanding of the challenges and priorities. The workshop was framed around four key themes and included an overview presentation, plenary discussions and small group break-out sessions. The four key themes were:

1. Pre-season communication and preparedness planning;
2. Communication during wildfire;
    a. Wildfire is in area but there is no imminent threat (i.e., no evacuation alerts/orders in place);
    b. Wildfire is occurring in immediate area (i.e., evacuation alerts/orders are being issued and enforced);
3. Agricultural values at risk and data sources/options for creating mapping resources; and
4. Integration of agricultural knowledge and capacity into wildfire response.

3.0 PRIORITY ISSUES AND POTENTIAL SOLUTIONS

While agricultural operations in the Okanagan are diverse, and both individual operations and experiences with wildfire vary, some common or sector-specific issues and potential solutions were identified and are summarized in the following subsections. Solutions are organized by the four key themes outlined above. Many solutions could be driven by the agricultural sector, particularly in partnership with local governments. In other cases, identified issues and solutions must be government led and implemented or may not have an identified solution within the scope of this project. However, in the wake of the 2017 wildfire season there are numerous reviews underway at various levels of government that will likely address some of broader and far-reaching issues. The substantial response efforts of all agencies and emergency responders in the context of the expansive and

unprecedented 2017 wildfires, and overextension of available resources, were widely acknowledged during the consultation process.

3.1 Pre-season Communication and Preparedness Planning

Pre-season communication emerged as a priority during the consultation process. When wildfires are not actually occurring, 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.

Communication *prior* to the wildfire season can help to support improved communication and preparedness *during* a wildfire. However, for pre-season communication to be effective it is important to identify what role this communication can (or should) play, who needs to be involved, what information needs to be distributed and what the preferred communication mechanisms are (e.g. workshops, emails, and/or local meetings).

Many issues identified in the other theme areas discussed below (in Sections 3.2, 3.3 and 3.4) point back to the need for early information sharing. Pre-season communication and preparedness planning offers the greatest potential for near-term activities to address some of the main communication issues experienced during wildfire (particularly around suppression operations, evacuation and permitted re-entry protocols).

During the consultation process, it was agreed that there is a need to move from a reactive wildfire response to proactive planning (outside the wildfire season). The RDCO is moving in this direction and has an Advance Planning section that is currently engaged in capturing relevant information regarding critical infrastructure, values and sectors at risk, and in identifying stakeholders and resource groups to engage with in order to facilitate preparedness planning and mitigation activities. Issues associated with pre-season communication and information exchange, as well as a number of potential solutions, are discussed below.

Issue #1: Consistency, clarity and shared understanding of communication protocols

Strengthening and formalizing communications processes and protocols between government agencies and producers *in advance of a wildfire* would serve to reduce uncertainty around process and potential for conflict. This was deemed particularly important with respect to standardized evacuation and re-entry permitting protocols, integration of local knowledge and inclusion of appropriate local resource specialists in emergency operations. While standardization in advance is desired, it was also recognized that advance communication plans need to be practical and flexible to adapt to varying and dynamic wildfire scenarios.

At present, communication protocols may be inconsistent due to different approaches at the various levels of emergency management. As a result, communication protocols and relationships between agriculture producers and agencies may need to be continually reestablished during an extended wildfire event. The 2017 wildfire season also highlighted the need for more consistent communication and protocols between regional districts. It was widely recognized that advance planning to consolidate and standardize regional approaches, as much as possible, would be beneficial to agricultural producers and the public.

Strengthening and formalization of communication protocols will require provincial and local governments to lead and implement**.** However, producer organizations will have a collaborative/ advisory role to play in developing effective protocols. For example, informing and educating regional districts about essential crop management needs in advance would support regional districts in developing protocols (in advance of the fire season) that anticipate and recognize these needs. With protocols formalized in advance, producer associations will be empowered to educate and train their own members. Producers are more likely to be engaged in education and training if the protocols are developed recognizing producer and commodity-specific concerns. This positive working relationship was demonstrated in the Cariboo during the 2017 wildfire season where an effective and well-received permitting system for re-entry to evacuation zones was developed and adapted in real time by the Cariboo Regional District in collaboration with the BC Cattlemen's Association.

Proposed elements for inclusion in a shared communication protocol are outlined in Appendix A.

Issue #2: Information/knowledge sharing regarding emergency management process, key contacts, and roles and responsibilities

Some producers do not have a clear understanding of the emergency management process and the roles and responsibilities of the various agencies involved. This can create confusion and uncertainty for producers and lead to communication breakdowns during a wildfire event. Producers may not be aware of their own roles in the process or of the key individuals/points of contact who they can engage with, or reach out to for assistance, during a wildfire event. Additionally, small lot or hobby farmers do not have industry association representation and often are the least prepared for and informed regarding emergency management processes. These producers may require targeted outreach to ensure they have resources and agency contacts specific to their needs.

Information exchange to support preparedness is a two-way consideration and emergency response agencies must also be informed of key agriculture stakeholder contacts, agriculture values at risk requiring protection, industry needs, and the support local producers can provide fire suppression resources during a wildfire event. A shared understanding of the key players and processes in advance will facilitate cooperation and improve communication during a wildfire.

Issue #3: Farm-level wildfire preparedness (planning, mitigation and risk management)

Producers vary in their level of wildfire preparedness. Some producers have a high level of knowledge and preparedness, have implemented FireSmart principles, and have tested systems and processes in place to prepare for and mitigate potential impacts of wildfire (particularly large, self-sufficient, remote ranching operations). Other producers may have limited knowledge and resources and/or may lack organized industry association supports and so have not prepared for, or taken actions to mitigate, wildfire impacts. In some cases, producers have implemented pre-planning and mitigation but are seeking independent verification of the adequacy of the preparedness.

As noted above, small scale farms have minimal access to information and organizational resources for preparedness. While organizations exist to provide emergency support for domestic animals (i.e., the Society for Prevention of Cruelty to Animals [SPCA], Animal Lifeline Emergency Response Team [ALERT], the Canadian

Disaster Animal Response Team [CDART]); these groups do not have the cohesive organization or capacity to support large numbers of small mixed livestock farms. See Section 3.2, Issue #10 for further discussion of issues related to small-scale farms.

There are also complex evacuation issues for some producers either due to relatively widespread operations – multiple locations with numerous (sometimes temporary) workers – or due to agritourism activities that may result in visitors on site who are unfamiliar with the area or wildfire risk. Operations with many "moving parts" need to have clear plans and procedures in place; these can be integrated elements of farm-level preparedness planning.

Insurance considerations are an important element of wildfire preparedness and some producers are not fully aware of the specifics of their commercial insurance coverage with respect to crop losses at various stages of production, agriculture infrastructure and livestock losses and relocation costs. Producers need to be fully informed about provincial Business Risk Management programs (including insurance) as well as commercial insurance. Knowledge gaps also exist with respect to federal/provincial disaster relief programs and their conditions and limitations. It is also important for producers to be aware of policies and procedures around government-funded Livestock Relocation Assistance, as these may be subject to change. Many producers may also not be aware that the Province will rehabilitate and/or compensate for site and infrastructure damages on private land that are a direct result of BC Wildfire Service fire suppression activities.

Potential Solutions (Issues #1-3):

Pre-season information exchange and relationship building, as well as education and training supports for producers were identified as a clear solution to facilitate an improved and shared understanding of emergency management processes, protocols and roles and responsibilities in wildfire response. A number of potential pre-season solutions and actions are described below.

Annual pre-season meeting – An annual local/regional pre-season meeting is critical to facilitate information exchange and relationship building between key producer contacts and key contacts for agencies involved in response and emergency management. Ideally, this would be facilitated by regional districts in partnership with agriculture associations, BC Wildfire Service, Ministry of Agriculture and FLNRORD Range. Joint government/producer meetings will ensure a shared understanding of existing communication protocols in advance of the wildfire season, build local knowledge, and be particularly valuable to strengthen pre-planning in areas that do not have recent wildfire experience. This meeting might also provide a forum for strengthening or formalizing communication protocols.

The annual meeting could be targeted to key agriculture association representatives or volunteer stakeholder or community group representatives who could then disseminate information to producers (in advance of the wildfire season) using established communication and outreach methods. While agriculture associations can play an important role in supporting broader preseason education and outreach, it must be recognized that only a portion of producers will be reached in this way (see Informational Bulletin solution below).

The following content is recommended to be included in annual meetings:

1. *Fire threat and hazard outlook* – Preseason forecast and outlook for the coming fire season and identification of any high hazard or problematic areas of concern.
2. *Roles and responsibilities of all agencies involved in emergency response*
    a. Local regional district and/or municipal and Emergency Operations Centre (EOC), Provincial Emergency Operations Centre (PREOC), BCWS, Range Branch of the Ministry of Agriculture, Ministry of Forests, Land, Natural Resource Operations and Rural Development (FLNRORD), and RCMP
    b. The chain of command (who does what, who has the final say, who will liaise with producers during an event?)
    c. Location of local EOC (producers need to understand that EOC location is subject to the local government in charge and may not be close to the actual fire location)
3. *List of key points of contact (i.e., who to contact for what situation)*
    a. Government agency contacts
    b. Agriculture organization or local community/producer group points of contact to play a key role in communication and producer liaison and liaison with EOC.
    c. Other domestic animal support organizations applicable to small hobby farms (e.g., SPCA, Animal Lifeline Emergency Response Team, Canadian Disaster Animal Response Team)
    d. Annual updates for any staff or representative changes
    e. Identification of particular communication challenges (e.g. remote areas, smaller farms without association connections) and plans to close communication gaps
4. *Regional communication protocols or processes* including preferred means of communication with agricultural producers and a clearly defined communication hierarchy (revisited at the beginning of each wildfire season). [NOTE: Formalized communications protocols would necessarily originate with provincial and local governments. With protocols formalized in advance, both governments and producer organizations can plan and build suitable capacity, knowledge and skills. The proposed elements of a communication protocol are outlined in Appendix A].
5. *Producer training or informational needs defined on an annual basis*
6. *Review of lessons learned from the previous fire season* may add value for discussion

Annual informational bulletin – As the primary means for reaching a broad cross-section of producers, an annual "pre-season" bulletin would be valuable. The bulletin could provide key information in a succinct, user-friendly format (with acronyms defined) including a list of key government agency and agriculture sector contacts involved in emergency response and roles/responsibilities; and outline the emergency management process and how evacuation alerts and orders are issued and rolled out during an emergency. Additional information may include FireSmart planning tips, and preparedness and insurance reminders.

In order to reach as many producers as possible, this bulletin would most effectively be managed and distributed via mail-out (and e-alert where available) by local governments (regional districts). Combining a local government communication effort with sector-driven communication channels creates the greatest likelihood of reaching the cross-section of producers. Supplementary mechanisms could include posting on regional district websites and/or

agriculture association websites or providing copies at facilities and suppliers frequented by producers (e.g., feed suppliers).

Periodic workshops/training opportunities–Pre-season workshops, offered periodically, could include an educational component, and potentially be facilitated by local governments, government agencies, industry associations or other cooperative efforts. This would be focused on broader groups of producers (e.g., commodity groups such as vineyards, tree fruit, field crops, livestock) with specific informational needs and with frequency to be determined during annual pre-season meetings. These workshops could provide an opportunity to increase the level of knowledge among industry/commodity representatives that can transfer the knowledge and provide localized, agriculture and commodity specific training ("train the trainer"). Farm-preparedness planning materials have already been developed that could support this process (see immediately below).

Training and preparedness tools and resources that could be provided to interested groups and producer representatives include:

- Protocols for permitted re-entry (as applicable),
- Information on commercial insurance, business risk management programs, and government disaster relief and financial support programs,
- Information and training on farm-level mitigation and preparedness and FireSmart principles,
- Basic fire suppression training,
- Sprinkler planning and deployment, and
- Livestock relocation.

Distribution of and support for the *Agriculture Wildfire Preparedness and Mitigation Planning* tool (template and guide) – This planning tool has been developed as a separate project deliverable and will be made available on the BC Climate Action Initiative (CAI) website in spring of 2018 to support individual producer wildfire preparedness. The value of this tool could be further enhanced by the following:

- Wider distribution to producers (potentially via industry associations and regional districts)
- Training workshops (discussed above) and one-on-one support to producers to assist in developing their own preparedness plans; this type of support could potentially be sponsored by government and industry associations through a contract resource.

Informational factsheet or bulletin for producers regarding insurance, Business Risk Management programs, and government supports and programs in the event of wildfire disaster – This factsheet could be prepared and distributed by industry associations through existing communication channels (e.g., scheduled meetings, posted as a website resource on association sites, email/mail distribution, access to hard copy information as required).

Community-based producer pre-season planning initiatives – Producers can effectively work together during a wildfire to assist each other and planning in advance is key. This could include facilitated or informal meetings to connect with neighbours and the local community to undertake advance planning (this includes drills and

practicing 'what if' scenarios) and taking advantage of available training (see above). Working together producers can also:

- Develop neighborhood-level emergency communication processes (e.g., phone tree, email or social media). Some of these processes worked effectively in the Cariboo during the 2017 wildfire season.
- Consider and support options for purchasing shared resources (e.g., sprinkler kit, water tanks, pumps, hand tools) among clusters of small producers with an identified need. This could require preparedness activities, training and competence in use (which links with identification of any pre-season training needs).

3.2 Communication During Wildfire

A constant theme in the consultation process was that producers are seeking consistent and meaningful involvement in critical communication that materially affects their business interests and operations during a wildfire event. Effective engagement and information sharing between authorities and producers as early as possible (regardless of incident size and significance), and as regularly and consistently as possible during a wildfire event will help minimize misinformation and confusion and will serve to strengthen positive collaboration.

Strong and clearly established lines of communication between agricultural producers and local government are a valuable asset for producers – local governments make the decisions regarding evacuation and allowing access and re-entry for essential services and provide support for relocation of livestock during a wildfire event. The consultation process highlighted that there is a need for collaboration and consensus in developing regional and cross-regional strategies. In particular, jurisdictions with common points of interest and shared access would benefit from coordination of evacuation alerts and orders. When a wildfire crosses into or straddles two or more regional districts, differing protocols for granting entry and permitting are particularly troublesome and/or confusing around regional district borders (for both producers and those controlling access). These identified needs all point back to the value of structured pre-season communication and planning.

With respect to BCWS engagement with producers, communication is often most difficult during early stages of a wildfire event. Producers have noted that they want to know what fire response activities are being planned or implemented, including where and when these activities will take place and the rationale for these actions. Producers also want to know how they can prepare, and to receive notification with sufficient time to prepare. A clear point of contact is viewed as being critical. While these are desirable communication objectives and BCWS may make an effort to meet these expectations, it must also be recognized that wildfires are dynamic, constantly changing and are often unpredictable, especially during the early stages of an event.

Wildfire seasons, over the past 14 years (2003 to present) have challenged suppression resources throughout the province just by the sheer number, and the size and complexity, of wildfire events. Resource requirements have been overextended and BCWS has relied on out of province resources to support the suppression response. Additionally, shift changes every 14 days within the BCWS, as well as RCMP manning control points and EOC personnel, can disrupt consistency in wildfire incident specific knowledge and communication protocols. These changeovers increase the difficulty of communicating details, can lead to inconsistent interpretations, and the staff replacements may be inexperienced and/or unfamiliar with the local area. BCWS Incident Command

engagement and communication with local producers can be situational and inconsistent, and subject to individual management approaches.

Specific issues with respect to communication during wildfire, and potential solutions, are described in greater detail below. Issues and solutions are divided into those relevant when a wildfire is in the area (but there is no evacuation alert or order in place) and those relevant when an evacuation alert or order has been issued.

When Wildfire is in the Area, but Threat is not Imminent (no evacuation alerts or orders)

Issue #4: Advance notice and timely (daily) info on fire risk/location

Producers need to prepare well in advance of an evacuation and would benefit from early information about fire location and risk, including the likelihood that they will be on evacuation alert or order. For example, they may need to prepare to move animals, or may need to consider an early harvest (if possible). Wildfire status updates (fire perimeter) are desired at least daily. While most producers are aware of – and use – the BCWS website (subject to internet availability); it was noted that a lot of information is flowing from various sources during a wildfire and a clear process for the dissemination of reliable daily information from BCWS is desired.

Potential Solutions:

- While the BCWS website is generally updated daily, it was identified that some producers would prefer more frequent updates when a wildfire is close by (although this may not be logistically feasible).
- As part of pre-season communication (Annual Meeting): Establish a clear process for dissemination of daily information from BCWS – such as daily BCWS email updates to producer representatives (key people identified in industry associations or "first call" contacts in community-based producer groups).
- As part of pre-season planning (Producer Preparedness planning): Producers to familiarize themselves with the Provincial Strategic Threat Assessment map[4] and identify local threats during pre-planning.
- Local authorities to conduct door-to-door notifications in advance of an evacuation alert being issued (e.g., advance notification by RCMP is occasionally conducted and was deemed helpful during the Finlay Creek wildfire). This could also be established through pre-season protocols.

Issue #5: Remote access to existing wildfire and emergency information sources and updates

Communication of wildfire information is currently heavily reliant on online and social media tools (BCWS, regional district emergency management, Castanet); however, not all producers have reliable internet or cellular service, or service may be affected by fire and power outages. Through pre-season communication mechanisms, an effort can be made to identify local communication issues and specific limitations and local (informal/formal) communication systems already in place for disasters. Backups and alternatives to mainstream messaging can then be established (in advance) to address these circumstances.

[4] https://www.for.gov.bc.ca/ftp/!Project/WildfireNews/PSTA/PSTA_Threat_Overview_2015.pdf

Potential Solutions:

- Investigate and implement alternative methods of information sharing (established in advance) at a regional level, to ensure messages reach producers with potentially limited or compromised access to official BCWS and emergency management online bulletins and status updates or official social media communication. (A multi-layer communication approach and potential options are discussed in greater detail below under Issue #8 and in Appendix A).

Issue #6: Centrally located online public information (BCWS bulletins and maps, local government emergency management, DriveBC)

There is typically a high reliance on a large number of online resources for providing (and receiving) public information. Producers would benefit from consolidation and consistency of information in a way that is both user-friendly and locally relevant. Mapping is critical and a consistent approach to mapping and legends is desired by some producers. While it is not feasible for various government agency information platforms to be modified for consistency, it would be possible to consolidate the links for various information sources at a central location (such as regional district websites). Another relatively straightforward change would be to ensure that BCWS updates and bulletins include the wildfire location (not just the wildfire name).

Potential Solutions:

- Consolidate and centralize locally relevant information producers are seeking prior to evacuation alerts or orders being issued.
- Provide links to all relevant information sources in a user-friendly online format on the local government emergency management website. Information of value to producers includes: location of fire perimeter in relation to livestock/range and other agriculture operations, as much information as possible about fire growth, emergency status and evacuation route planning information for the local area.

When Wildfire is Occurring in Immediate Area (i.e. evacuation alerts/orders are being issued and enforced)

Issue #7: Effective delivery of evacuation notices and associated information

Producers have articulated the need for evacuation notices to be effectively delivered with a preference for site visits to be conducted where phone and/or internet communication is unreliable or where power is out. A number of lessons were learned during the 2017 wildfire season about possible “best practices” for managing information and communication during an evacuation alert/order situation.

Good systems were reported to have been in place in the Cariboo Regional District that incorporated a multi-stage, layered approach including a notice on the door and robo-calls, followed by door to door notification utilizing volunteer search and rescue support resources. Since no one notification system will reliably reach all residents and producers, redundancy and multiple steps or layers are required for effective notification. The RDCO and RDNO currently utilize opt-in email notification systems that allow residents to subscribe to receive Emergency Management notifications or email updates (and the RDOS is in the process of testing and implementing an emergency mass notification system).

Some producers are unfamiliar with the stages of evacuation, how these are issued and rollout and what the implications to their operations are (particularly with respect to an evacuation order, the potential duration and conditions for permitted return, if any). It was noted that supplementary printed information provided at key notification points (i.e., at time of door-to-door notification and at evacuation zone controls) would be beneficial.

Potential Solutions:

- Develop effective notification systems employing best practices used in other jurisdictions (multi-step or layered approach with redundancies is ideal; pre-season communication protocol previously discussed in section 3.1 and Appendix A)
- Prepare an informational pamphlet to accompany evacuation notices and provide more information at time of alert or evacuation notice – include description of evacuation stages, define acronyms used, provide weblinks to relevant official information sources, and contacts for information and questions.
- Prepare an Information card to be issued at checkpoints - including weblinks, key information, contacts, and define acronyms (as per above).

Issue #8: Obtaining reliable information and providing meaningful input during evacuation alerts/orders

During a wildfire, producers cannot rely on information that may be distributed via social media or from unofficial sources. As previously described in section 3.1, a layered communication approach is recommended, based on a shared understanding of the local constraints and existing community networks. Options include:

- E-news, direct email, or mass notifications (opt-in or opt-out),
- Robo calls, automated phone trees such as Telus “one phone”,
- “Word of mouth” via established community groups, and agriculture association representatives,
- Regular stakeholder meetings (BCWS), and
- Community meetings (PREOC).

This further highlights the importance of pre-season information exchange and establishing connections prior to the wildfire season in order to link into and utilize existing local community communication systems (See Section 3.1).

Potential Solutions:

- *A multi-layer communication approach* is detailed above and in Appendix A.
- *Regular and scheduled stakeholder meetings* – Meetings should be held at a minimum weekly or following significant fire growth, subject to the local wildfire situation and stakeholder needs. The meetings should be accessible to as many producer stakeholder representatives as possible including via a conference call alternative. These meetings were very successful, where implemented in the Cariboo during the 2017 wildfires. (Standardization of stakeholder engagement is previously discussed section in 3.1 and Appendix A). The meetings can serve a two-way communication purposes by:

  - Informing and updating agriculture stakeholders of wildfire status and operations being planned and implemented (i.e., what activities, where and when, the rationale for these actions, and how producers can prepare with sufficient notification), and
  - Providing an opportunity for BCWS and authorities to gather intelligence from producers on fire activity or any observed issues and receive producer input on operations and areas of concern (e.g., backburning plans, locations of livestock, contacts for potentially affected stakeholders, fireguards and fencing, etc.)
- *Community meetings*–ideally at a minimum before and after evacuation (i.e., at the time of evacuation and prior to people being allowed to move back into an area that had been evacuated). While a meeting at the time of evacuation may not be practical given public safety concerns, it would still be a sound communication objective. (Standardization of public engagement is previously discussed in section 3.1 and Appendix A)

Issue #9: Protocols for permitting and re-entry (to perform essential services/activities)

Some effective approaches to permitting were identified during the 2017 wildfires including linking Premises ID to permits for livestock producers to re-enter evacuation zones and as a data source during evacuation orders. Regardless of the entry permitting process employed, producers have indicated the need for a protocol that is clearly communicated and consistently implemented by RCMP at control points. If producers face uncertainty about returning to their properties for essential services (subject to situational risk and individual capacity and preparedness), they may stay during an evacuation order and put themselves at greater risk.

Permitting systems may be situational and may evolve during a wildfire event. The systems employed during the 2017 wildfires ranged from the Cariboo Regional District approach of using Premises ID in collaboration with the BC Cattlemen's Association, to less formal approaches utilizing case-by-case assessment, sign-in sheets, and escorted passes. Escorted passes take government staff away from their regular work and encumber/restrict the activity of producers who have greater knowledge and experience on their properties than the attending escorts. The merits and limitations associated with using Premises ID are discussed in greater detail in Section 3.3.

Establishing and communicating criteria for re-entry pre-season, would likely create a much smoother process for all involved. Producers would also prefer that a consistent permitting system be applied across all regional districts. However, every wildfire situation and every regional district is unique and it may be more feasible to have a "toolbox" of options rather than one system in advance. While a permitting system must be established by the local government in charge of the EOC, it may however, be developed in collaboration with industry specialists, as demonstrated by the 2017 wildfire experience in the Cariboo.

Potential Solution:

- Regional districts to collaborate with agriculture resource specialists and industry representatives to develop options for practical, common sense procedures for permitted entry to evacuation zones. These should be applicable to both crop and livestock producers in the region, building on past successes. (Pre-season communication protocols for permitting are detailed in Appendix A).

Issue #10: Management and coordination of livestock relocation for small-scale farms

During wildfire events regional districts can face significant challenges in supporting the range of livestock producers, from large beef cattle and dairy herds, to hobby farms and small lot livestock farms. For producers with extensive tracts of land and large herds/flocks of livestock, relocation is generally not an option. In the case of cattle and range livestock, the movement of herds on the landbase – out of the path of fires – is the preferred management approach, which in turn may require the ability of ranchers to remain in an evacuation zone.

During the 2017 wildfire season, lack of structured support for small scale farms was identified as a big gap. Local authorities were not prepared for the large number of small farms affected, and animal relocation/livestock management became an issue. As previously discussed in Section 3.1, Issue #3, these producers largely rely on assistance from agencies with limited resourcing and capacity to coordinate large scale efforts. It is particularly challenging for EOCs to coordinate logistical support and administer permits for these small-scale livestock producers that are often the most vulnerable and least prepared. In the absence of information and support, small-scale farm operators may also rely on social media (Facebook) to organize and coordinate relocation.

Potential Solutions:

- Facilitate pre-season planning between organizations that can provide local livestock relocation, care and handling support to small lot producers (BC Horse Council, Interior Horse Rescue Society, ALRT, CDART, SPCA) in order to designate who can do what. Regional districts may be most suited to open a dialogue with these organizations to review issues and coordinate involvement.
- Producers to pre-plan and identify and confirm sites or buddy farms to receive animals in advance of the fire season. This could include formal memoranda of understanding or informal buddy agreements.

3.3 Agricultural Values at Risk and Data Sources/Options

During the consultation process it was recognized by all parties that the right information must be available early on to ensure that agricultural assets (values) are identified, recognized and, as much as possible, protected during a wildfire event. Through this project, mapping was explored as a potential means for compiling and sharing data about agricultural assets.

Current Mapping Data and Sources

The key data sources to assist emergency responders in identifying and locating agricultural values on the landscape are in the domain of the Ministry of Forests, Lands, Natural Resource Operations and Rural Development (related to range tenures) and the Ministry of Agriculture (related to private home ranch/farm lands). Access to data is variable; some is publicly available through the government's provincial DataBC warehouse (Range Tenure data), some is available only within government ministries (Agriculture Land Use Inventory or ALUI) and some is confidential and only available by request, on an incident by incident basis, for emergency response use by authorized users (Premises ID).

Of the three provincial agriculture information data sources utilized in the pilot project mapping, all attributes in the Range Tenure data and the Premises ID data were determined to be useful for identifying agricultural values and providing contact information, with the caveat that Premises ID data is restricted by confidentiality

requirements and (as noted above) is available only in specific circumstances. In addition, both of these datasets rely on producers to update information as it changes.

The ALUI data is updated by the Ministry of Agriculture, subject to funding, utilizing photo interpretation and windshield surveys to field verify as required. It was determined that some attributes from this dataset are of value to wildfire response (fencing, irrigation type) while other information is not useful (crop spacing and density). While the ALUI provides general qualitative information on agriculture operations such as the types of structures present (corrals, paddocks, field/pasture fencing, trellis structures, feed storage, barn) and types of crops grown and general livestock types, it does not provide sufficient detail to indicate the scope of operations (e.g., hectares under production, numbers of livestock) or infrastructure, and does not provide location information.

Pilot Project Mapping and Consultation

A draft series of maps was developed for the pilot project, merging the three separate government datasets to demonstrate the agricultural values at risk and data sources/options for review and discussion at the focus group workshop. An initial list of agricultural values (attributes) and available source data were also provided for review and discussion. Through this consultation process a number of challenges were identified regarding the mapping layer, data sources and key information to be included. Furthermore, it is recognized that existing government mapping tools such as *iMap,* as well as new tools under development (see Appendix B), could help to support improved integration of agriculture values and knowledge using both spatial and non-spatial data. The pilot mapping product and data sources are described in greater detail in Appendix B.

It was noted that the utility of the mapping layer and data requirements depend on the intended purpose and users. The mapping layer should have utility to be applied to base emergency planning mapping, for use by BCWS responders to inform operations (e.g., backburning, etc.), to identify values at risk, and for re-entry permitting within evacuation zones. Mapping to support the identification of agricultural values at risk and inform suppression operations must a) identify producers and agriculture assets, and b) identify resources and their locations (water, equipment and human resources). A comprehensive list of information and property features deemed useful by producers for inclusion in base emergency response mapping is provided in Appendix C.

During the consultation process, there was agreement that mapping layers with excessive or irrelevant information are too complex to be effective or user friendly and will require considerable effort to update. The consensus was to keep any mapping layers simple and data sources concise, and to only include information relevant to wildfire response (preparedness and suppression planning and operations). The mapping layer does not have to be too complex to be effective. Focus group participants indicate that mapping should have the following qualities:

- Be simple with easy to access layers with relevant information
- Ability to zoom in to local area (segments)
- User driven, with the option to select relevant layers applicable to the needs and application of the individual user

Through the process of developing the maps, it became clear that while centralized data/maps have already served some important purposes, this approach isn't likely to address some of the key informational gaps (which will likely need to be addressed through other communication and information sharing approaches). This points to the importance of local input and knowledge to supplement maps of agricultural values on the land base (further addressed in the section that follows). Mapping can serve as a bridge when these local resources are overextended or unavailable. The mapping tool can also be a useful tool to inform international or out-of-province suppression crews.

Overall, the mapping resource was considered to be less of a priority than the other pieces of the communication picture. The focus group workshop format may not have been the most effective venue for assessing the mapping product. Potentially more work is required to simplify the mapping to include only information required by responders during a wildfire.

Issue #11: Datasets from multiple government data sources

Challenges related to custodianship (management and updating) of data for a merged mapping layer were identified and mapping applications already utilizing much of the same data were recommended. Currently, resource staff who hold key spatial layers (custodians) are the product/program gatekeepers and must be engaged during wildfires where data is not readily available internally or publicly (i.e., internal Range contact lists, Forest Tenures Administration System, Premises ID). This is not always effective, subject to the demands of the wildfire season and staff availability. However, a number of relevant map layers are already accessible through the existing government mapping application *iMap*.

Custodianship options discussed included one merged dataset with a designated government custodian. The second (likely preferred) option is to standardize the layers/data to be used and accessed by EOC and BCWS that are already held in existing systems and databases with designated custodians who maintain and update them. Provincial government agencies already utilize *iMap* which accesses a multitude of government spatial layers housed in *DataBC* (may be viewed in *iMap* application or *Google Earth*). With this approach, each agency populates its respective database and no one agency is responsible; the data is all there, and it is simply a matter of aggregating it according to user defined preferences. This could be managed through saved layers that are wildfire specific ("canned" layers) or through individual queries. The relevance of particular layers will depend on the user (i.e., Range or Agrologists vs BCWS user determined).

Potential Solutions:

Utilize existing government *iMap* tool to customize layers that are user specific. These may be a generalized compilation of layers or user-defined lists of layers may be created/published. Some critical layers may be missing in *iMap* and resource staff may still need to be engaged (e.g., Forest Tenures Administration System, Premises ID, ALUI).

Issue #12: Producer supplied inventory of private farm assets and resources.

Private farm information for Premises ID holders may be available on an incident-specific basis by request. Outside of this source, private property producer contacts and other relevant information must be supplied by

producers themselves through other means. Producer information useful to emergency responders (besides contact information) includes available resources such as equipment, water sources (gravity feed, reservoirs), stand pipes, skilled personnel, sprinklers, access points to Crown land, as well as values and hazards on site (see a comprehensive list in Appendix C). Producer inventories could also include annually updated information on local producer contacts (facility managers or individual site managers), evacuation concerns, values at risk specific to the continuity of the operation and hazards (such as propane tanks, stored fuel or pesticides) on private property. Collecting and updating this information is a challenge. Some of this information could potentially be gathered through annual pre-season communication and updates of contact lists and inventories (facilitated by agriculture associations or community groups).

Additional information sharing protocols could be implemented during a wildfire event. For example, producers could make their farm map available to responders on an event specific basis (e.g., placed in a PVC pipe at the farm gate, for responders to access as needed, or shared as digital data). This inventory information could also be tied to a permit system for re-entry, and could be provided by producers at the time of application. Producers may have concerns regarding the confidentiality of this information. For example, there may be concerns that making this information public could affect their insurability.

Pre-season Solutions:

- Encourage pre-season information collection and sharing with the regional district or local fire departments (potentially facilitated through association representatives or local community groups). Preferably these inventories would be referenced by PID and Folio Number for integration with regional district and BCWS mapping layers.
- Completion of individual *Agriculture Wildfire Preparedness and Mitigation Plans* (and associated maps) would facilitate information availability. (Pre-season protocols previously discussed in Section 3.1).
- Provide an option for producers to attach inventory information to Premises ID

Solutions during a wildfire event:

- Investigate methods for making farm/operation level maps available to responders during a wildfire on an incident by incident basis. Options include leaving a copy at the property gate or some other method of sharing either a hard copy or digital map with local government and/or BCWS.
- Provide an option for producers to attach an inventory list and/or map to an evacuation zone permit for re-entry (to respect the confidentiality concerns of producers, information on private structures must be kept exclusively for emergency information).

Issue #13: Availability of producer contact information

During a wildfire event, the most important informational need is the local owner/manager contact information to facilitate response agency engagement with producers; however, this information may not be readily available or current. In many cases, this information is not available in an existing database, and/or not spatially represented. This is the case for crop producers in particular. Contact information is held in internal government

databases for Range tenure holders and livestock farmers with a Premise ID (both can be spatially linked). Private farms are spatially identified in the ALUI but contact information is not included.

While every property on the BC Tax Assessment has a unique property identifier (PID) number, publicly listed property information for each PID does not include owner contact information. Regional districts may hold limited contact information by PID. Contact names/numbers for property managers or owners are the information that is most likely to change over time and are a challenge to obtain and update. Ensuring the appropriate contact is further complicated, by a range of owner, occupant, manager arrangements: the farm owner and occupant (lessee) may be different, satellite operations may have different on-site managers or a single manager may manage multiple properties under different ownership.

Potential Solutions:

- Annual pre-season reminders to Premises ID holders and range tenure holders to update all information.
- Investigate options for capture of contact information through the property tax assessment process.
- Encourage pre-season information sharing or self-reporting of contact information in conjunction with property-level inventories (see Issue #12 above).
- Research opportunities for agriculture associations or local community groups to provide the regional district with contact information (updated annually) based on their member contact lists and preferably linked to unique property identifiers such as the Folio Number and PID (used in tax assessment administration), subject to disclosure with members.

Issue #14: Use of Premises ID for permitting system (for entry/reentry to evacuation zones)

Premises ID was used successfully in the Cariboo Regional District, primarily as a filter, to verify a producer's legitimacy, property location and reason for entry. Through the consultation process, linking permits to Premises ID was seen as a viable protocol that could potentially be applied systematically in other regions of the province. However, it was recognized that Premises ID is subject to limitations and caveats: enrolment is voluntary, producer buy-in has historically been low, some critical information may not be included, non-livestock agricultural operations are not captured, and the data is subject to confidentiality (under the *Animal Health Act*) and must be requested on an incident by incident basis. Furthermore, it is incumbent on producers to keep the information up to date. However, producers may increasingly see the benefit of a Premises ID based on the 2017 wildfire experience in the Cariboo. The use of the ID number itself as a filter is not restricted by confidentiality requirements. Since Premises ID has no applicability to crop producers, an alternative strategy is necessary to facilitate efficient identification of crop producers with verifiable agriculture operations and premises during evacuation orders.

Potential Solutions:

- Promote (through Ministry of Agriculture and agriculture associations) the benefits of Premises ID registration to small and large livestock producers in the context of livestock management during wildfire evacuations

- Research alternatives strategies that may be used to verify crop-based agriculture operations during wildfire evacuations. Options include some form of optional or mandatory self-reporting facilitated by regional districts or local fire departments such as pre-season information sharing (see Issue #12 above) and data capture through the property tax assessment process (see Section 4.0, Recommendation #4)

3.4 Integration of Agricultural Knowledge and Capacity

The previous Section (3.3) was focused on strengthening the availability of spatial data or other types of data that can be spatially linked or gathered centrally to enhance information about agricultural values on the land base. However, agricultural organizations and producers also have knowledge, capacity and resources that can assist with limiting wildfire, supporting suppression and allowing for fast and efficient post fire recovery.

A consistent theme heard from the agricultural sector is that producers often have valuable information and capacity to contribute to local response efforts. This may include mechanisms for sharing information and/or resources or it may extend further to physical response. Some producers feel they have the resilience, capacity, resources and operation-level advance planning and preparedness in place to stay and defend. The challenges and considerations include risk and liability, levels of training that will be acceptable and recognized by government, and how best to inventory and mobilize producer resources and expertise to support emergency planning and response.

The key to integrating producer knowledge and capacity is to recognize agriculture producers on the land as an asset rather than a liability during wildfire events. Not only do agriculture producers have value in fighting fire and supporting operations planning, various agriculture practices will support response efforts and should be allowed to continue during evacuation orders. Practices such as heavy spring grazing, haying close to home bases, and irrigation, support fuel hazard reduction, create fire breaks and provide anchor points for suppression operations and activities. The sentiment among producers is that regional districts need to balance considerations of risk and liability within the local context and with a good understanding of producer capacity, resources and resilience.

Issue #15: Inclusion of local resource specialist in critical communication

As noted in the previous section, mapping cannot replace local knowledge. Resource specialists with appropriate knowledge and training must be included in EOCs and PREOCs to advise the management team, including BCWS, and liaise with agriculture producers on an event specific basis according to an established process. This is particularly important in the event of a larger wildfire requiring advance planning, construction of guards, and for planning of backfires –where the mapping layers can be valuable resources as a starting point. However, relationships are critical in verifying operations plans and making the best decisions during wildfire operations.

Consultation with local District Range (FLNRORD) and Ministry of Agriculture staff has been identified by producers as an important communication link to ensure local agricultural values are recognized, and these staff can also act as liaisons. While this has been common practice in some regions, it is not a consistent or standardized approach. These individuals have valuable local and systems knowledge; however, reliance on individual expertise can also be limiting and unrealistic in prolonged, dynamic and rapidly changing wildfire scenarios and this challenge was evident during the 2017 wildfires. The resource base of local expertise could be

broadened through training and inclusion of key local agricultural leaders who have strong linkages to agricultural groups and expertise to support government staff.

Potential Solutions:

- Strengthen protocols to include appropriate Range, Ministry of Agriculture resource specialists on EOC/PREOCs with local and on-the-ground knowledge, information systems knowledge, and connections with producers.
- Include agricultural associations in EOC to act as agriculture stakeholder representatives/liaisons and integrate local industry knowledge. (Protocols previously outlined in Appendix A).

Issue #16: Integration/mobilization of local producer knowledge in operations planning

Some producers have adopted FireSmart and have planned extensively for a wildfire event. Their operations can potentially be identified for establishment of retardant lines, safe zones for fire fighters, and/or used tactically in development of a fire guard strategy. Additionally, producers may have extensive past fire experience and/or knowledge of the local landscape as well as resources on site that can be utilized by suppression operations, such as private water sources, equipment and trained personnel.

Through the consultation process, it was identified that suppression activities (e.g., backburns and fireguards) planned and/or conducted by BCWS would benefit from local producer knowledge to confirm livestock locations, identify agriculture values, locate fireguards to minimize impacts to range and infrastructure, and allow for more efficient recovery. Based on past wildfire experience, particularly on range land in the Cariboo, it was observed that miles of valuable fence infrastructure may be destroyed to protect relatively low value infrastructure. Utilization of producer expertise during operations planning will ensure a better understanding of the value of agriculture infrastructure that needs to be protected from fire and suppression impacts.

Potential Solutions:

- *Preseason* – (See Sections 3.1, Issue #2 and 3.3, Issue #12). Producers to share relevant property and wildfire preparedness information with regional districts (preferably linked via PID and Folio Number for integration with BCWS and local authority mapping).
- *During wildfire*
    - Producers share farm-level site map with BCWS on an as-needed, event specific basis. (See Section 3.3, Issue #12).
    - Strengthen BCWS protocols for engagement with producers, and government and industry agriculture specialists (See Section 3.1, Issue #1, Section 3.4, Issue #15, and specific protocols in Appendix A).

Issue #17: Recognition of capacity and resources to stay and be granted re-entry to evacuation zones

Some producers will choose to stay on their properties in the event of an evacuation order, potentially putting themselves at great risk. This is likely to be more common where there are not clear criteria in place for permits to allow re-entry to an evacuation zone. An important consideration and challenge is ensuring that these individuals

are better equipped to remain safely, without endorsing that they stay on their properties. It is important for authorities to recognize that producers can provide essential services during a fire through maintaining their essential agriculture operations (e.g., haying and irrigation contributing to fuel load threat reduction), fire monitoring, as well as infrastructure protection from fire and looting.

While remote producers and ranchers tend to be well equipped and self-sufficient, training may be particularly beneficial in outlying areas where emergency response resources are not as readily available. An important component of supporting producers who choose to stay on their properties is education to promote individual agriculture operation preparedness with a focus on prevention.

Potential Solutions:

- Provide education and training for producers to develop individual wildfire preparedness and mitigation plans, including awareness of evacuation trigger points and evacuation contingencies. (See Section 3.1).
- Create a permitting protocol with provisions for producers who choose to stay and defend that allows for a working relationship with local authorities (including access to supplies, essential services, and reasonable access to adjoining lands). (Protocols previously outlined in Appendix A).

4.0 PRIORITY SOLUTIONS AND NEAR-TERM ACTIONS

During the consultation, a number of opportunities were identified to improve communication processes and information flow before and during wildfire that will ultimately reduce the impact of wildfires on agriculture producers. Many communication protocols and processes in need of improvement must be directed and implemented by local governments responsible for emergency management and provincial government agencies involved in response. However, producers and industry associations have an important role to play in collaborative pre-planning and information sharing, and in working with government to support the development and strengthening of communication protocols during wildfire.

Pre-season communication and preparedness planning (both within government and the producer community) offers the greatest potential for implementable solutions in the near term that may start to address some of the other communication issues experienced during wildfire. The near-term actions are focused on solutions that agriculture producers and/or their industry associations can play a significant role in implementing.

Action #1: Undertake a pilot project across select regions to test and evaluate pre-season communication with the goals of establishing relationships, key players and their roles and responsibilities; addressing producer knowledge gaps; providing a forum for information sharing (including producer values at risk and resources to support wildfire response); and building local knowledge. Key components to include in a pilot communication plan, as described in Section 3.1 and Appendix A, include:

- Annual meetings with producers, local government, BCWS and other government agencies involved in response (see Section 3.1 for details);
- Information bulletins or factsheets, and web information (see Section 3.1 for details);
- Periodic workshops to provide information and training to producers (see Section 3.1 for details); and

- Individual farm pre-planning support including distribution of planning tools and resources such as the *Agriculture Wildfire Preparedness and Mitigation Plan* template and guide, workshops and/or one-on-one supports to interested individuals. This component could include a mechanism for producers to share relevant information from individual wildfire plans with local government in order to build a database of agriculture values at risk and resources available for use by EOCs in an emergency.

Action #2: Promote farm level preparedness mitigation and planning through wide distribution of the *Agriculture Wildfire Preparedness and Mitigation Plan* template and guide via regional districts, agriculture advisory committees, community groups, local fire departments, suppliers, and most importantly, via agriculture associations (i.e., through posting on websites, presentation at scheduled meetings, distribution through regular association communication, and training of industry liaisons to provide training to individual producers). Options for further investigation include distribution to property owners with annual property tax notices or to producers during annual farm status reviews. Producers are ultimately responsible for exercising due diligence – being prepared and mitigating in advance to minimize or prevent wildfire impacts.

Action #3: **Promote Premises ID registration as a means of facilitating efficient identification of livestock producers (including hobby farms) with verifiable agriculture operations and premises during evacuation orders** This can be facilitated by agriculture associations and livestock associations and animal protection agencies (BC Cattlemen's Association, BC Horse Council, CDART, ALRT, etc.). Outreach efforts must be clear about the value and application of this data to support emergency response with strict confidentiality in order to encourage buy-in from producers.

Action #4: Develop a strategy to facilitate efficient identification of crop and other producers (not included in or registered with the Premises ID program) with verifiable agriculture operations and premises during evacuation orders. This will likely require some system for self-reporting of relevant property level information (e.g., type and scope of operations/values at risk, fire preparedness and resources available, and any evacuation concerns such as large numbers of visitors or employees). Self-reporting (linked to unique private property identifiers such as PIDand/or Folio Number) could be facilitated by regional district emergency management departments or local fire departments. Consider additional data capture through the property tax assessment process. Ideally, systems developed may be utilized for crop and livestock producers and might be particularly useful for capturing information on small lot livestock producers and hobby farms. The confidentiality of this information and its strict application to emergency response will need to be clearly communicated to encourage buy-in from producers. The Farmer ID issued through the BC Agriculture Council may be used to verify agriculture producers; however, similar to Premises ID, this is a voluntary program and will not capture all producers.

Action #5: Promote greater engagement on the topic of wildfire with agriculture associations. Some associations such as the BC Cattlemen's Association are very involved both before and during wildfires in supporting members and proactively providing information, training and resources. Other industry associations, particularly crop systems industries, are less involved and/or wildfire is not currently a topic of concern for outreach and engagement with members. Individual producers have a role to play in lobbying their associations and associations have an important role to play in encouraging their members to adapt to be aware and to be prepared for wildfires.

Action #6: Recognize producers as assets during wildfire and in permitting for re-entry during evacuation orders. During evacuation orders, local government permit systems to grant re-entry to evacuation zones should recognize commodity specific essential agricultural activities that producers require access for. Additionally, the permit system should recognize individual producer preparedness, as well as agriculture practices, resources and capacity that can support wildfire response. Industry associations can play an advocacy role in the development of permit systems and protocols, preferably in advance of the fire season. Participation in annual pre-season meetings may be an avenue to facilitate this collaboration.

Action #7: Formalize the inclusion of an agriculture representative in Emergency Operations Centers as applicable. Currently, it is at the discretion of local government to invite agriculture specialists, including government Agrologists and Range staff or non-government industry specialists to participate in the EOC. In regions where agriculture values are at risk from wildfire, agriculture associations can provide valuable industry and commodity-specific knowledge to support suppression operations and emergency response through communication/liaison and information sharing regarding the agriculture industry.

Action #8: Support, recognize and link with community groups and communication networks. Smaller neighbourhood or community groups allow rural residents to effectively work together, assist each other during a wildfire and establish an emergency communication protocol. This is particularly important in more remote locations without institutional supports nearby or areas with limited communication infrastructure or services (cellular, internet). Community groups can also play an important role in mutually supporting small lot producers and hobby farms that, on their own, may have limited resources.

Action #9: Provide clear information at the time of evacuation alert or order. During an evacuation alert or order, not only do notifications need to be effectively delivered, but important information must be clearly communicated. Information factsheets for distribution at time of door to door notice and at control points are a simple but effective tool to increase awareness, facilitate information flow and improve evacuation. Regional districts could consider building templates in advance with translation as required.

5.0 REFERENCES

BC Ministry of Agriculture. 2018. BC Wildfire Recovery for Agriculture: Where to Start. A Farm Business Recovery Planning Workbook. Retrieved from http://www.cattlemen.bc.ca/docs/bc_wildfire_recovery_-_ag_nov_3_2017.pdf. February 19, 2018.

Forestry Canada Fire Danger Group. 1992. Development and Structure of the Canadian Forest Fire Behavior Prediction System: Information Report ST-X-3.

Ministry of Forests, Lands and Natural Resource Operations BC Wildfire Service. 2016. Provincial Strategic Threat Analysis 2015 Fire Threat Analysis Component of BC Wildfire Service Fire Threat. Retrieved from https://www.for.gov.bc.ca/ftp/!Project/WildfireNews/PSTA/PSTA_Threat_Overview_2015.pdf. February 19, 2018.

APPENDIX A – ELEMENTS OF COMMUNICATION PROTOCOLS

Some key elements of formalized communication protocols may include the following:

1. *Standardized pre-season communication and information sharing between local government, government agencies and producers*
2. *Local government collaboration/coordination in cross-jurisdictional emergency management (subject to local capacity and resources)*
    a. Coordinated messaging and accessibility for information during wildfires
    b. Coordinated re-entry permit systems
    c. System for determining collaboration and leadership in the event of multi-jurisdiction fires or potential for fires to cross jurisdictions
3. *Multi-layered approach to outreach for critical communication or notifications and ongoing information sharing during wildfire*
    a. Ensure redundancy/contingencies in messaging, based on an understanding of local communication issues, local communication service and accessibility, including consideration for potential sustained power outages and linkages with established and recognized local communication networks including:
        i. Individual contact via door to door notification (utilizing RCMP or other resources), phone (landline or mobile), internet/email
        ii. Automated mass messaging systems
        iii. Directed communication with community group liaisons
    b. Recognize and link with local community groups and established local communication networks
    c. Consider best practices and methods used successfully during past wildfires in other jurisdictions
4. *Practical evacuation zone re-entry permit system*
    a. Establish a process for identifying legitimate agriculture producers or farm entities with verifiable premises and operations of a nature that require essential ongoing, onsite care – consider successes in Cariboo using Premises ID and Range Agreement Number to verify legitimate ranch/ range operations and permit re-entry to livestock producers. An alternate process would be required to capture crop producers and others without Premises ID (see Section 4.0, recommendations #3 and #4 for further discussion)
        i. Establish criteria for essential and approved activities, based on commodity specific essential needs (i.e., critical crop management, irrigation management, harvest, haying, livestock care, health and relocation)
        ii. Recognize producer capacity and resources, including potential contributions to public safety and fire response (i.e., irrigation to maintain wet fuelbreaks, fields for staging, haying to reduce fuel, livestock fencing along highway corridors to maintain safe travel corridors). Confirm and agree how producers can provide resources. An inventory of resources (e.g., water, equipment) could potentially be connected to the permit.

   b. Ensure continuity - the permit protocol is implemented efficiently and consistently at all levels from EOC through on-the-ground control by RCMP and others, regardless of shift and personnel changes (pass options include paper pass or wrist band pass)
   c. Acknowledge that individuals can enter at their own peril and risk
   d. Ensure applicability to a broad range of situations
5. *Regular engagement of producers during wildfire events* – to provide updates on emergency and wildfire status, planned suppression operations, and allow producers to prepare and provide local knowledge to inform suppression operations, including understanding of value of assets that need protection. Standardized protocols to ensure consistency throughout a wildfire event include:
   a. *Regular, scheduled stakeholder meetings* (and/or liaison calls) – BCWS facilitated and regularly scheduled at a frequency subject to local wildfire situation, values at risk, and needs of local producers (see Section 3.2, Issue #14 for further discussion)
   b. *Community meetings* – EOC or PREOC facilitated at a frequency subject to individual wildfire emergency. Critical times, where information needs are greatest, tend to be before evacuation (as time and situation allows) and after evacuation prior to return.
   c. *Recognize and link with local community groups and agriculture association representatives* as conduits for information sharing and liaison with producers
6. *Formalized inclusion of agriculture specialists in EOC/PREOC*– wherever agriculture values are at risk (especially in agriculture/ranching areas in the province), formalize the inclusion of Ministry of Agriculture staff (regarding private land agriculture values, livestock protection/relocation), Range staff (regarding range tenures and livestock relocation), and agriculture industry representatives. These individuals collectively bring local and systems knowledge, industry and commodity specific knowledge, values in need of protection, local wildfire experience, and connections with producers on the land.
7. *Standardized and consistent protocols for BCWS incident command/incident management team consultation with Range staff (where range values are at risk)* – ensure engagement in early stages and ongoing through a wildfire event.
8. *Practical processes (led by regional districts) to acquire producer-supplied data* that will support identification of the full spectrum of agriculture producers and values on the land as well as agriculture resources available to support wildfire response (see section 3.3).

It is recognized that local governments have varying capacity and approaches to emergency management. Furthermore, regional districts are often made up of many municipalities which adds further complexity in dealing with cross-jurisdictional emergencies.

APPENDIX B – MAPPING LAYER AND DATABASE

Setting the Stage – Wildfire Threat and Fuel Types on the Landscape

Two pilot areas were selected in consultation with the POC to be representative of a range of agriculture producers on the Okanagan landscape (private land and Range Tenure holders on Crown land) in areas of high wildfire threat. The areas were selected to include range tenures. One pilot area was located in the RDCO (Kelowna) and one in the RDOS (Naramata). The following maps illustrate the wildfire threat and fuel types present in the pilot areas:

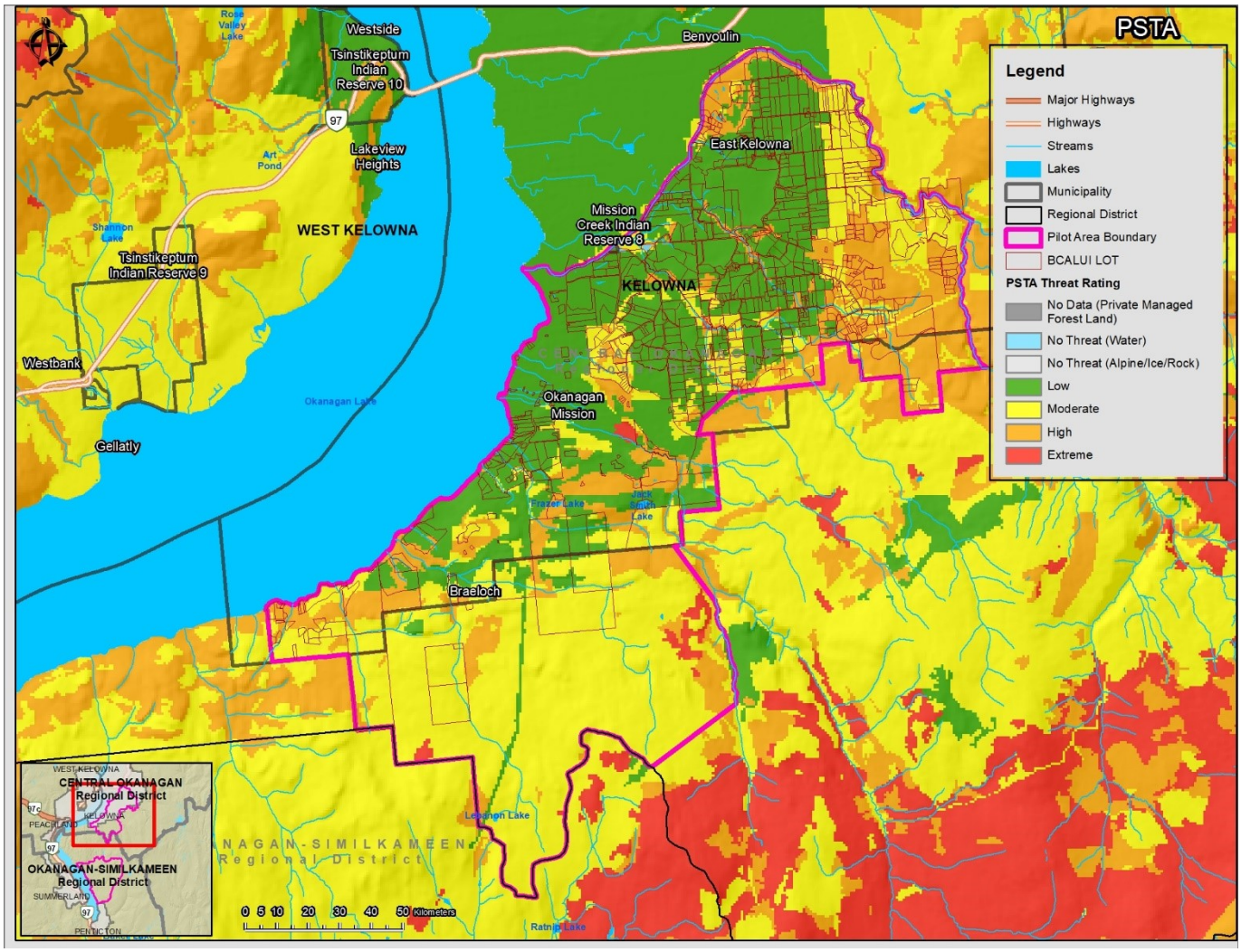
Provincial Strategic Threat Analysis (PSTA) Maps

These maps illustrate the relative fire threat in the study areas, based on the PSTA (Map 1 for the Kelowna pilot area, and Map 2 for the Naramata pilot area). Any area in the vicinity of orange or red threat classes on the map should be considered an area of high threat to property and human safety. The PSTA is a provincial level assessment of relative fire threats across the land base based on analysis (at a course scale) of many different factors that contribute to fire threats.

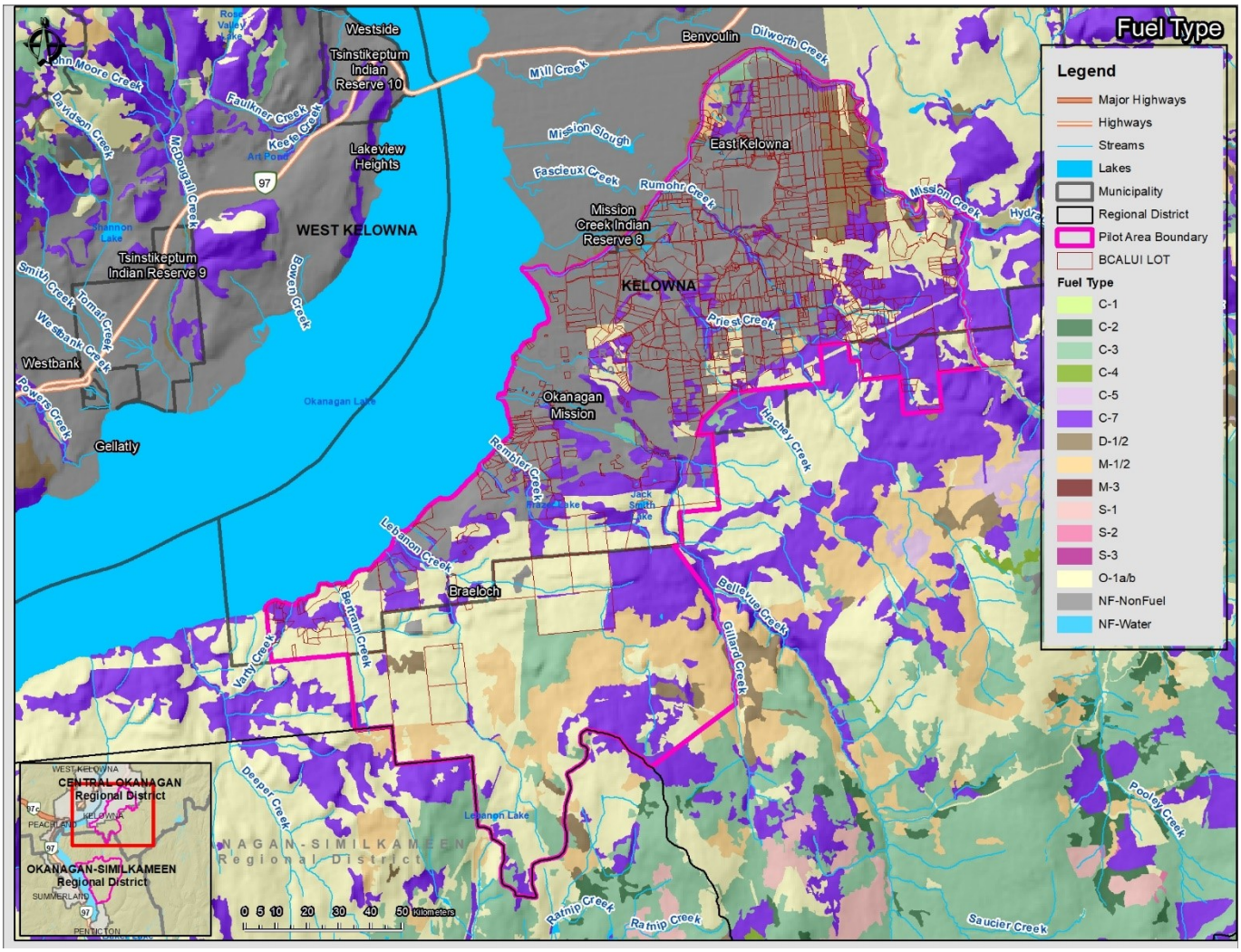
Fuel Type Maps

These maps illustrate the different types of fuels present in the pilot area (Map 3 for the Kelowna pilot area, and Map 4 for the Naramata pilot area). The fuel types (following the *Canadian Forest Fire Behaviour Prediction System*[5]) are described in Table 2.

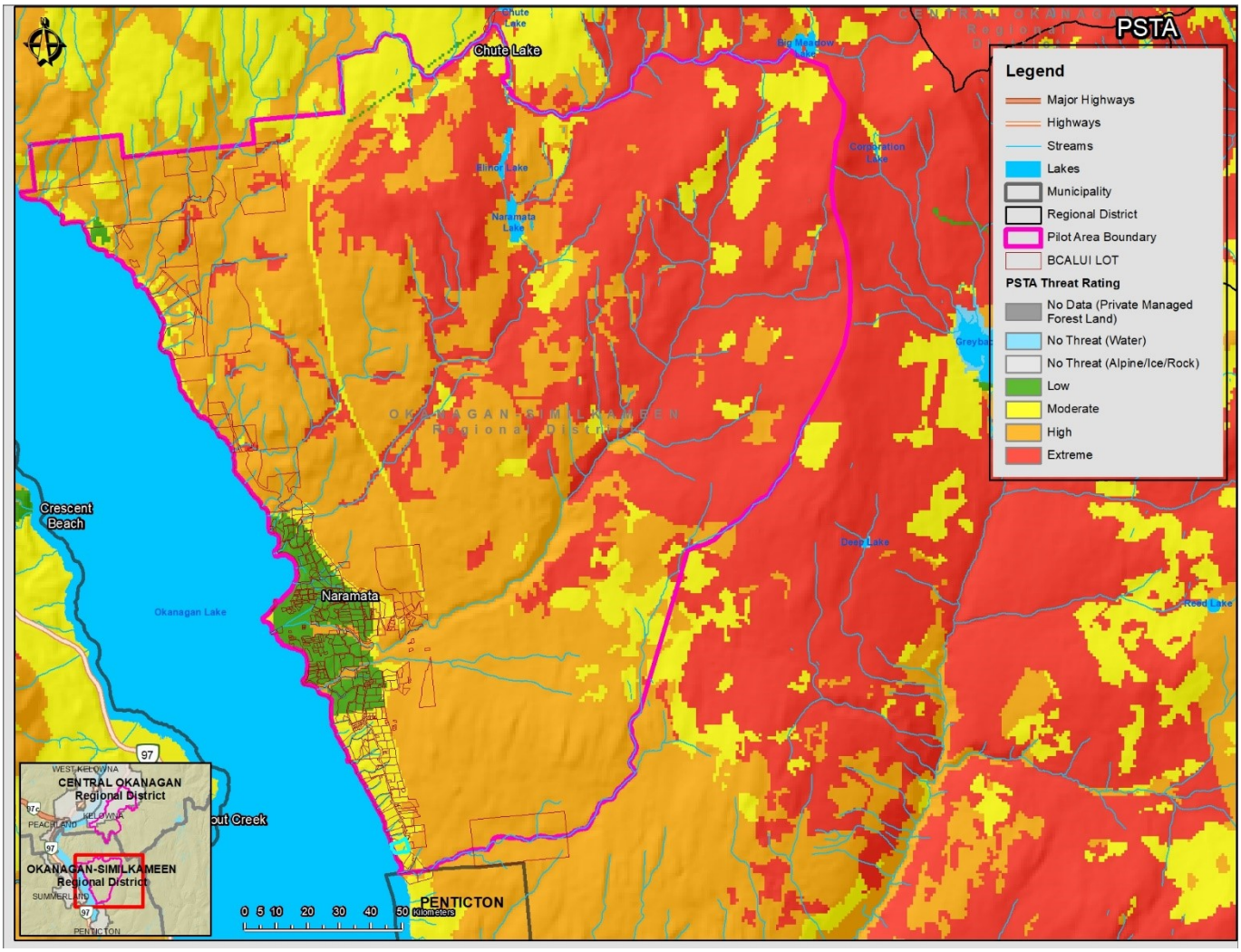
[5]Forestry Canada Fire Danger Group. 1992. Development and Structure of the Canadian Forest Fire Behavior Prediction System: Information Report ST-X-3.



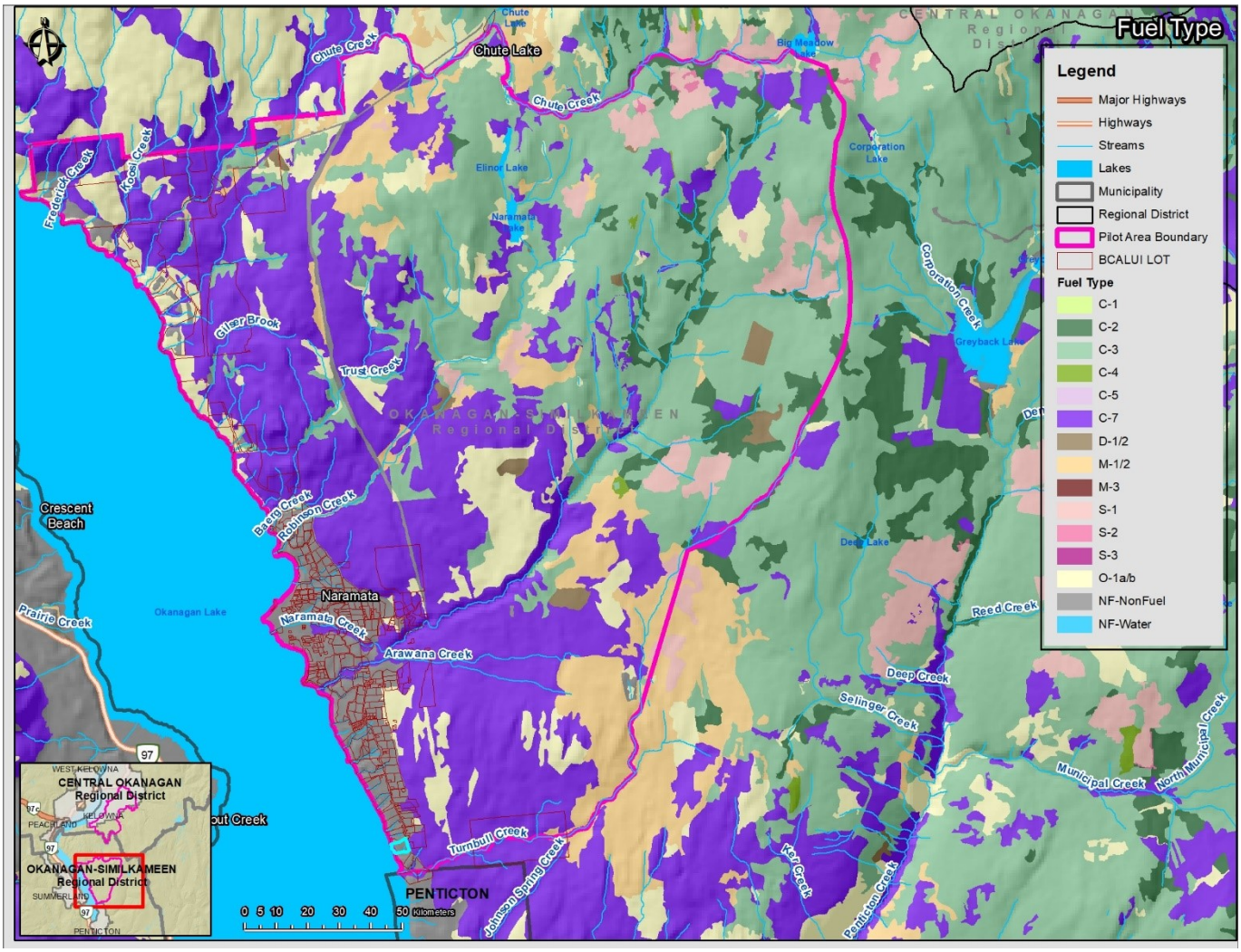
Map 1. Provincial Strategic Threat Assessment for the Kelowna Pilot Area



Map 2. Fuel Types in the Kelowna Pilot Area



Map 3. Provincial Strategic Threat Assessment for the Naramata Pilot Area



Map 4. Fuel Types in the Naramata Pilot Area

Table 2. Fuel type descriptions.

Fuel Type	Description	Wildfire Behaviour Under High Wildfire Danger Level
C-2	Plantations older than 20 years. High density with high canopy and low crowns.	Almost always crown fire, high to very high fire intensity and rate of spread.
C-3	Fully stocked, mature forest, crowns separated from ground	Surface and crown fire, low to very high fire intensity and rate of spread
C-4	Dense pole-sapling forest, heavy dead and down, dead woody fuel, vertical crown fuel continuity	Almost always crown fire, high to very high fire intensity and rate of spread.
C-5	Well-stocked mature forest, crowns separated from ground	Low to moderately fast spreading, low to moderate intensity surface fire.
C-7	Open, mature forest, understorey of discontinuous grasses, herbs.	Surface fire spread, torching of individual trees, rarely crowning (usually limited to slopes > 30%), moderate to high intensity and rate of spread

Fuel Type	Description	Wildfire Behaviour Under High Wildfire Danger Level
D-1/2	Moderately well-stocked deciduous stands (D1 leafless or D2 green)	Always a surface fire, low to moderate rate of spread and fire intensity
M-1/2	Moderately well-stocked mixed stand of conifer and deciduous species, low to moderate dead, down woody fuels, crowns nearly to ground (M1 – leafless, M2 – in leaf)	Surface, torching and crowning, moderate to very high intensity and spread rate (depending on slope and percent conifer and season (in leaf vs leafless)
M-3	Moderately well-stocked mixed stands of conifer and deciduous species, where the conifer species may be dead, in varying percentage. Not typically used In BC except as red-phase mountain pine beetle-attacked pine stand.	Rapid spreading, high to very high fire intensity and rate of spread (M3)
O1a/b	Short grass/ Sparse or scattered shrubs, long grass, and down woody fuels.	Rapid spreading, intense surface fire
S1/S2/S3	Continuous and uncompacted slash type with large fuel loads and deep slash depth. Varies depending on species composition of slash.	Ranges from surface fire, low to moderate intensity to moderate to high rate of spread and high to very high intensity surface fire.
W	Water	N/A
NF	Non-fuel	N/A

Agriculture Data Sources and Maps

Data Sources

The following table illustrates the key source datasets, the spatial geometry (spatial data source) and associated attributes (tables of specific agriculture features or values) and the information provided in each. The associated ownership information that is available in the spatial data, or that may be linked to the spatial data is also indicated. The attribute tables are illustrated in the map samples that follow.

These three key data sources to assist emergency responders in identifying and locating agricultural values on the landscape are in the domain of the following agencies:

- Ministry of Forests, Lands, Natural Resource Operations and Rural Development
    - Range Tenure data
- Ministry of Agriculture
    - BC Agriculture Land Use Lots Survey – for farm/agriculture operation lands
    - Premises ID – for private home livestock producer lands (as opposed to range tenure on crown land).

	Dataset Name	Spatial Geometry	Associated Tables	Information Provided	Ownership or Licensee information
1	Range Tenure	Range Tenure polygons	Attribute table	Tenure boundaries	Tenure Licensee contact
		Range improvement point features	Attribute table	Structures as points	
		Range improvement line features	Attribute table	Structures as lines	
2	BC Agriculture Land Use Lots Survey	BCALUI Lots	BCALUI_AgLivestock	Livestock Type - linked by BC_LOTLNK to lots	Linked to the Integrated Cadastral Fabric contact by PID
				Livestock Structures - linked by BC_LOTLNK to lots	
			BCALUI_Covers_Survey	Agriculture Use, Irrigation Type - linked by BC_LOTLNK to lots	
			BCALUI_AgStructures	Agriculture Structures - linked by BC_LOTLNK to lots	
			BCALUI_AgValueAdded	Activity that adds value - linked by BC_LOTLNK to lots	
			BCALUI_AgPractices	Agricultural crop protection and crop production method - linked by BC_LOTLNK to lots	
			BCALUI_AgApiAqua	Apiculture or bee keeping on the parcel - linked by BC_LOTLNK to lots	
3	Premises ID database	Table records converted to points by geographic coordinate	Attribute table	Number of livestock	Geografic coordinates (lat & long) linked to Integrated Cadastral Fabric contact by PID and spatial join

Access to data is variable; some is publicly available through the government's provincial DataBC warehouse (Range Tenure data), some is available only within government ministries (Agriculture Land Use Inventory) and some is confidential and only available by request, on an incident by incident basis, for emergency response use by authorized users (Premises ID).

The key to maintaining accuracy is that the data be current and updated regularly. The updating systems and frequency of the three key datasets is summarized as follows:

- *ALUI* – data for the pilot areas is current as of 2014 (Kelowna) and 2015 (Naramata). The next update will be in 2020/21, subject to availability of funding (uses photo-interpretation of current imagery and windshield survey for parcels where confidence is low).
- *Premises ID* – data is updated constantly as registrations are received (approximately 50 registrations per month, processed within 48 business hours). There is no system to remind registrants to update their data (e.g., contact, premises information) and no access to land titles to verify when/if farms change ownership. The onus is on registrants to keep information current.
- *Range Tenures* – Range staff/ District GIS are custodians for range tenure data updates related to Range Use Plan updates (every 5 years or as needed for interim updates). These updates are processed as resources allow. Tenure boundary changes (legal boundary changes or mapping corrections) are updated centrally by the Range Branch as they occur.

Premises ID

Premises ID has value for the purposes of permitting (as a filter) and as a data source during fire response (producer contacts, verifies the producer's legitimacy, reason for entry and affirms the fact that the producer has

a premise to go to). However; Premises ID is subject to limitations and caveats: enrollment is voluntary, historically low buy-in, some critical information may not be included, small scale livestock and non-livestock agricultural operations are not captured; data must be requested on an incident by incident basis and converted to spatial data.

Existing and New Data and Mapping Tools

The province's *iMap*[6] tool is publicly available and allows users to view and analyze hundreds of map data layers compiled from across the BC Government and other public-sector agencies. This tool is widely used by a range of users including internal government ministries.

A number of new tools are being developed that could help to support improved integration of agricultural values/knowledge:

- BCWS Tool "Wildfire 1" – in development, possible roll out in 2018. It provides an overhaul and integration of systems (e.g. finance, aviation, dispatch, etc.); updates are dynamic and can be seen by all users in system. This tool could provide access to other important layers such as values at risk, tenure holders, etc.
- FLNRORD Range Tool - The Forest Tenures Administration System (FTA) application/platform has been upgraded and will incorporate current range data (non-spatial). A new database specific to range is also under development.

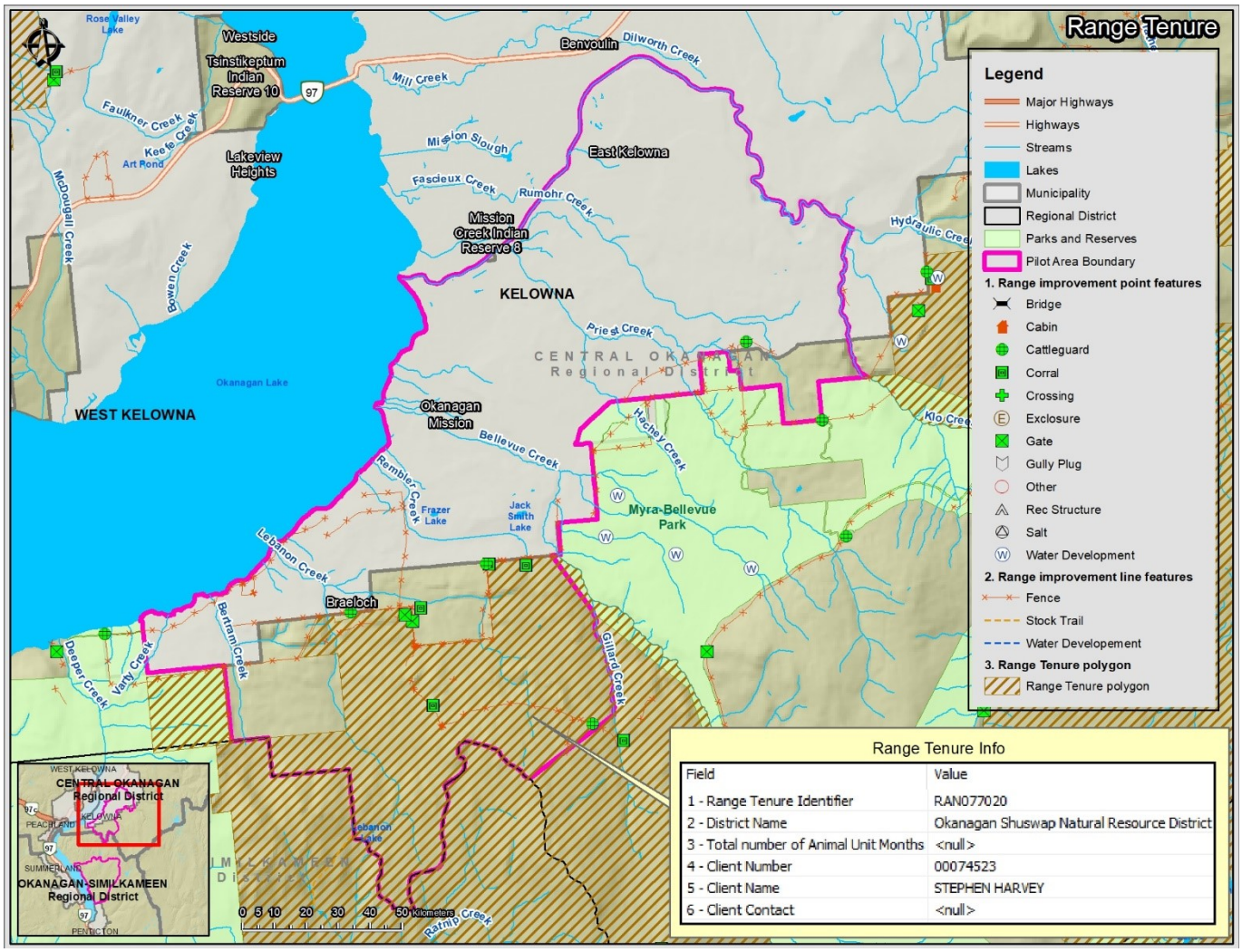
Agriculture Mapping Layers

The following maps illustrate the spatial outputs (map) of the data sources listed above, with "call-out boxes" illustrating the specific data attributes for selected sample properties. In the case of the Premises ID map, the information displayed is 'dummy data' due to the confidentiality restrictions.

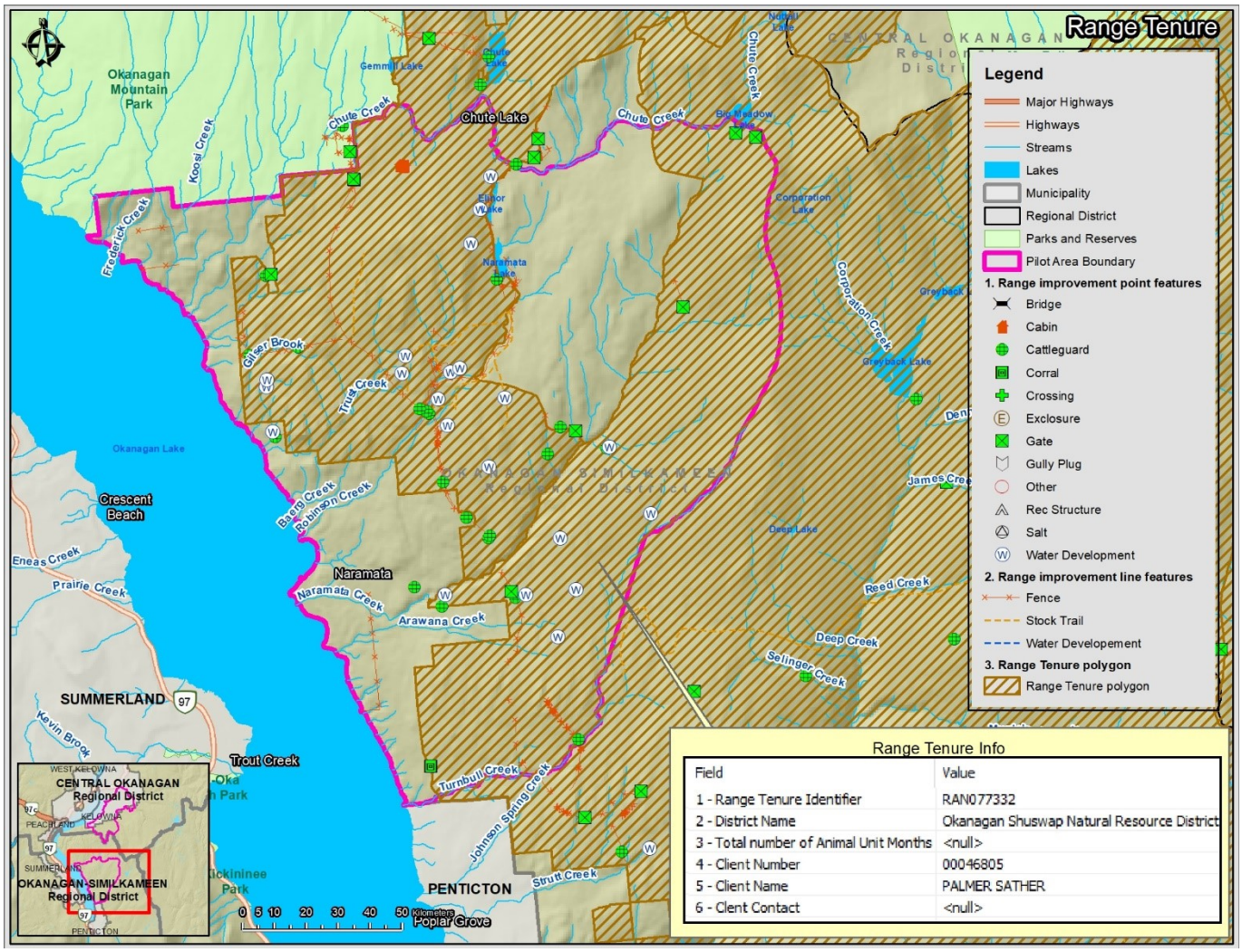
The following maps illustrate the map layers for each of the three key data sources as follows:

- Range Tenure map layer for both the Kelowna and Naramata pilot areas (maps 5 and 6)
- BCALUI map layer for both the Kelowna and Naramata pilot areas (maps 7 and 8)
- Premises ID map layer for the Kelowna pilot area (map 9).

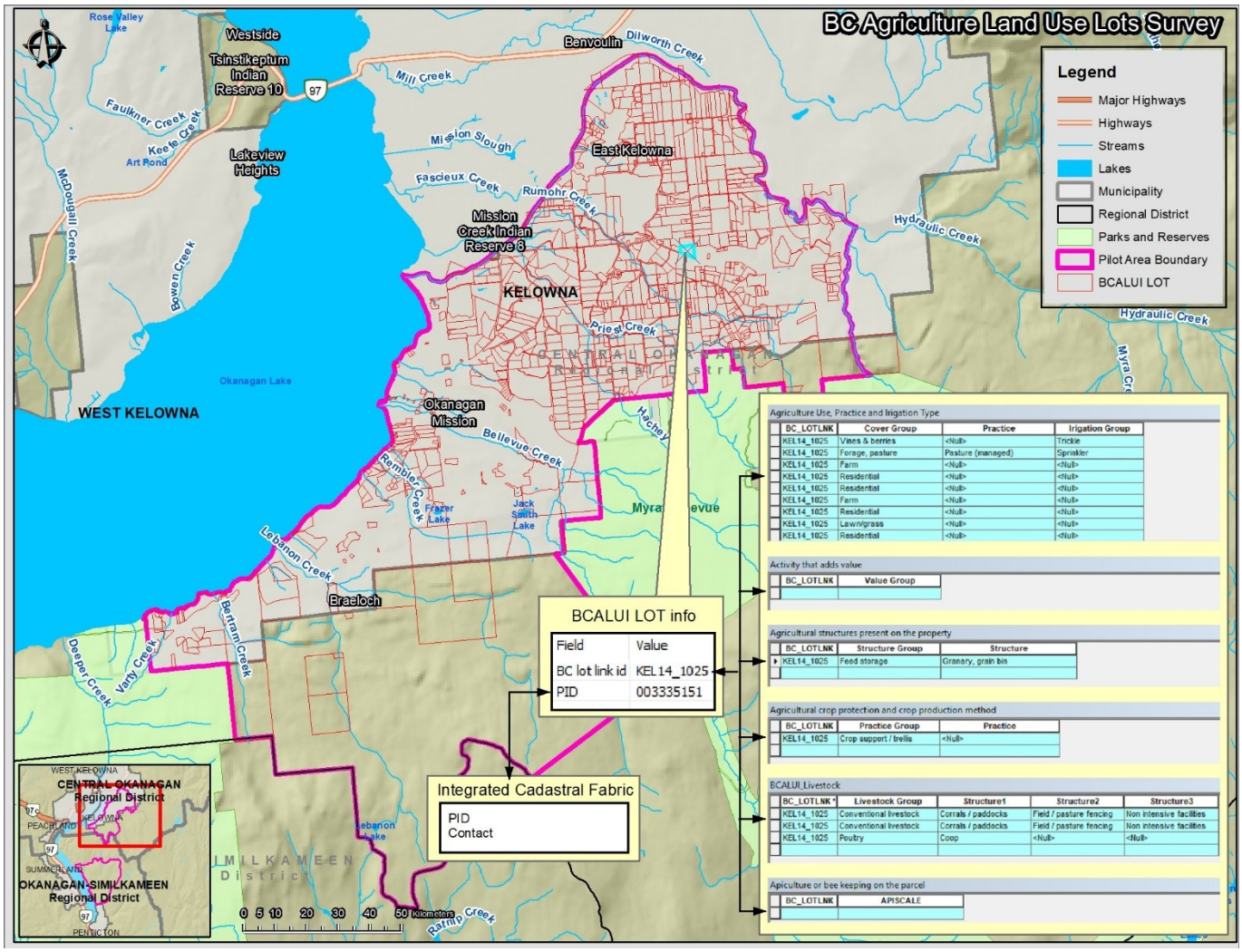
[6] https://www2.gov.bc.ca/gov/content/data/geographic-data-services/web-based-mapping/imapbc



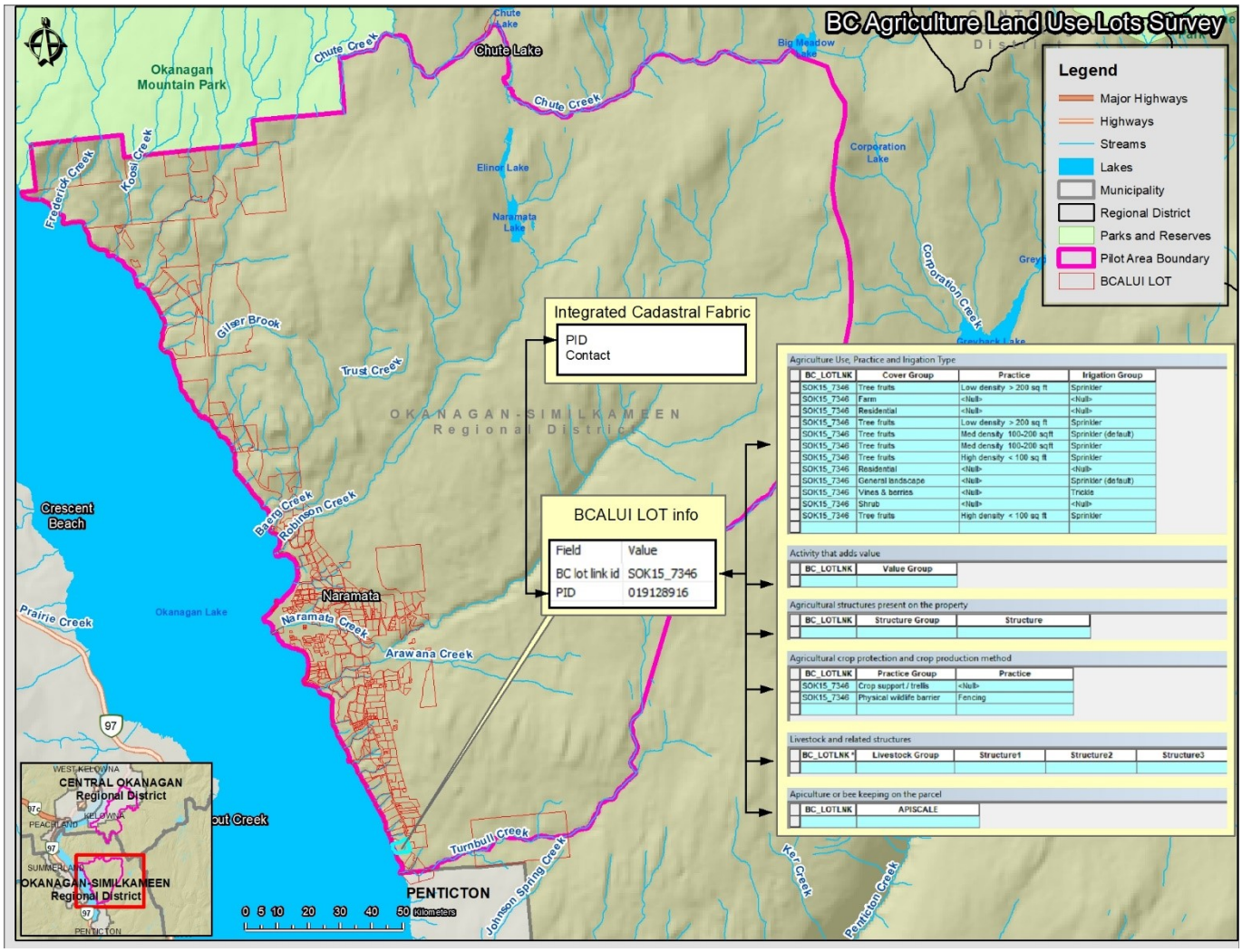
Map 5. Range Tenure map layer for the Kelowna pilot area.



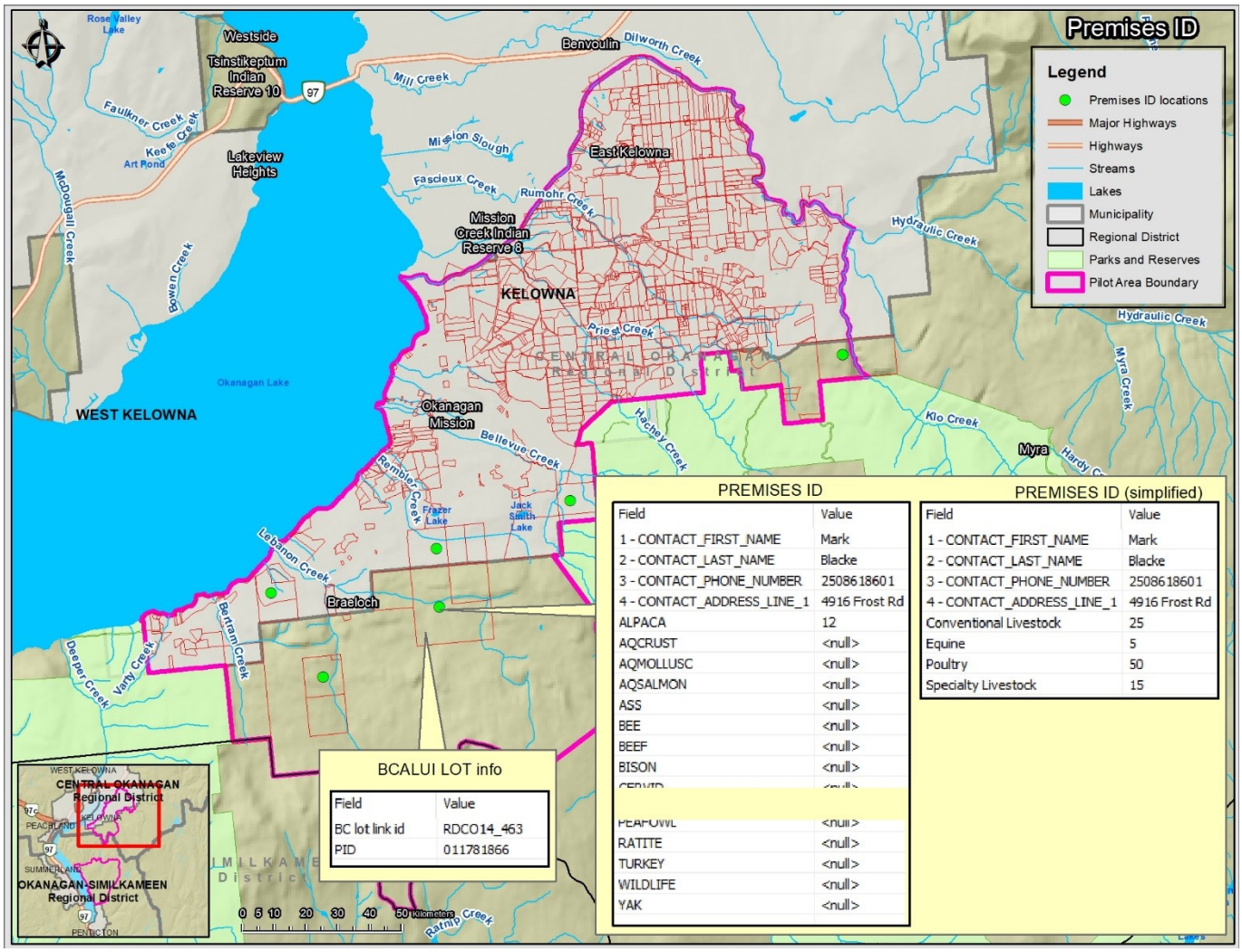
Map 6. Range Tenure map layer for the Naramata pilot area.



Map 7. BC Agriculture Lands Use Lots Survey map layer for the Kelowna pilot area.



Map 8. BC Agriculture Lands Use Lots Survey map layer for the Naramata pilot area.



Map 9. Premises ID map layer for the Kelowna pilot area.

APPENDIX C – DESIRABLE ATTRIBUTES FOR INCLUSION IN BASE EMERGENCY RESPONSE MAPPING

Producer information useful to emergency responders (besides contact information) includes available resources such as equipment, water sources, stand pipes, skilled personnel, sprinklers, access points to crown land, as well as values and hazards on site. Below is a long list of features or attributes determined by producers to be important information for inclusion in base emergency. While some of these features can be (or are already) centrally mapped in provincial datasets, many will most appropriately be identified through other forms of communication or possibly on individual producer maps. Much of this information (inventory and/or mapping of private property farm-level assets and resources) must be producer supplied and includes values that are unrealistic to include in a centralized mapping resource.

Table 3. Attributes or features identified by the focus group as desirable for including in base wildfire response mapping.

Feature	Applicable Provincial Dataset
Water storage, assets and systems –available for use in suppression and protection of property and requiring protection from suppression impacts, including: • Private reservoirs • Irrigation lines • Standpipes • Underground irrigation lines (some go on to Crown land) • Consider utilization of water licensing data and mapping (well registration, high flow ground pump) • Gravity versus pump fed water sources	*Private property* – ALUI map layer only indicates presence of absence of irrigation and the type of irrigation (i.e., sprinkler, trickle). Note: irrigation type (drip vs overhead) was deemed to be useful information *Range Tenures on Crown land* – Range Tenure map layer includes water developments (structures as points and lines). *Water License Data* - Map layer includes license location, license type (e.g., domestic, industrial), and various point features (trough, pump, tank, water supply fixture, etc.) and line features (dam, conduit, flume, pipeline, pond, reservoir, etc.)
Fences Gates Access points to Crown land	*Private property* – ALUI map layer only indicates potential presence of pasture fencing, paddocks, corrals, wildlife barrier fencing, etc. *Range Tenures on Crown land* – Range Tenure map layer includes fences, gates, cattleguards, crossings, exclosures, corrals, etc. (structures as points and lines).
Areas actively irrigated	Not available, must be producer supplied
Number of livestock (for livestock producers that are not Premises ID holders)	*Private property* – not available outside of the Premises ID program. The ALUI map layer only indicates the livestock type. *Range Tenures on Crown land* – Licensed number of livestock included in Range Tenure map layer. Actual number not included and is held (subject to current Range Use Plan) in internal FLNRORD Range data

Feature	Applicable Provincial Dataset
Powerlines (critical to irrigation and crop preservation), including private power lines to pump houses	Transmission lines spatial layers (not distribution lines) are centrally located in DataBC. Power lines spatial data included in BCWS infrastructure data. Private lines may need to be producer suppled
Equipment available for suppression	Not available, must be producer supplied
Cell service towers (generally these are already identified on BCWS map layers as critical infrastructure)	Included in BCWS infrastructure data
Community/neighbourhood emergency groups, stakeholder contact list (liaisons to be consulted regarding emergency notifications and BCWS operations)	Not available, must be producer supplied
Hazards such as fuel, pesticide storage	Not available on private land, must be producer supplied
Property owner contact	Generally not available, must be producer supplied. Available in Premises ID, subject to voluntary registration and confidentiality.
Range tenure holder contact	Not included in the Range Tenure map layer, it is held in internal FLNRORD Range data and Forest Tenures Agreement system
Deactivated roads (old or private roads), access points on or across private property – the condition of these will be important to know	Some private roads are mapped in the BC Digital Road Atlas, most are not
Culverts (require protection from suppression activities)	Not available on private land, must be producer supplied
Hobby farms	Not available, must be producer supplied. Local government held BC Assessment land classification does not provide sufficient information to determine size/scope of operation
Agritourism operations	Not available, must be producer supplied