

# NATIONAL SURVEY ON SPRINKLER USE

*A FIRST STEP IN DETERMINING HOW EFFECTIVE EXISTING  
SPRINKLER EQUIPMENT IS AND WHAT TECHNOLOGY GAPS  
NEED TO BE ADDRESSED.*

Ray Ault

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This survey report is not restricted.

This national survey contributes to the state-of-practice review of water delivery systems (sprinklers) in the wildland-urban interface (WUI). Funding for this review was provided by the Forest Resource Improvement Association of Alberta (FRIAA).

Sprinklers are used to protect structures from wildfire during wildland-urban interface (WUI) events across Canada. Traditionally, standard forestry equipment has been used in conjunction with impact sprinklers. FPInnovations is reviewing common practices and equipment used during sprinkler deployments, in Canada, to determine if they are the most appropriate for community structure protection, or if alternative approaches should be considered.

This report documents the results of a survey developed and administered by FPInnovations, to help identify the equipment that is currently used for structure protection in Canada. The survey was distributed to the 13 wildfire agencies (including Parks Canada and all provinces and territories except Nunavut) that are members with the Canadian Interagency Forest Fire Centre (CIFFC).

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SURVEY REPORT

**ACKNOWLEDGEMENTS**

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# 1. SURVEY – EXECUTIVE SUMMARY

FPIInnovations contacted all the wildfire agencies that are members of the Canadian Interagency Forest Fire Centre (CIFFC) Fire Equipment Working Group. All 13 members completed the survey.

The results of the national survey indicated that all the agencies are or have been involved, at some point, in protecting structure from wildfire. While 31% of the agencies are not responsible for structure protection, 77% indicated that they may, depending on the situation, be involved in the deployment of sprinklers for structure protection. For those agencies that are not responsible for structure protection from wildfire, the responsibility rests with either the provincial Office of the Fire Commissioner or Fire Marshall, which may deploy sprinklers or coordinate structure protection response.

Clearly, the survey indicated that Canadian agencies are using sprinklers and that sprinklers are an important component in structure protection during wildfire events.

Respondents were asked about the usefulness of sprinklers for structure protection and wildfire containment lines. Responses were as follows:

Regarding structure protection:

Not very useful: 0%  
Useful: 15.4%  
Very useful: 30.8%  
Extremely useful: 30.8%  
I have no experience: 23.1%

Regarding wildfire containment:

Not very useful: 23.1%  
Useful: 8.0%  
Very useful: 30.8%  
Extremely useful: 0%  
I have no experience: 38.5%

Based on these answers, it would appear that agencies are more confident about the usefulness of sprinklers for structure protection than for wildfire containment.

Agencies were then asked about the estimated average number of annual sprinkler deployments in the Wildland–Urban Interface (WUI) over the past five years. Responses were divided into four categories (Saskatchewan did not provide a response):

0–5 deployments: P.E.I., N.S., Nfld., Que., B.C., Alta., N.B.

6–10 deployments: N.W.T., Y.T.

11–20 deployments: Man.

> 20 deployments: Ontario Ministry of Natural Resources and Forestry and Parks Canada

FPIInnovations then asked about the sprinkler kit inventory for the 2018 fire season and the numbers of sprinklers in each kit. The survey results indicated that the 2018 national inventory for sprinkler kits was 1878, which is approximately 11 320 sprinklers. Sixty-six percent of the kits had five sprinklers; the rest had eight sprinklers. The manufacturers of the sprinklers in the kits included Rain Bird, Royal Coachman, and Buckner. The development of structure protection

trailers also added to the inventory available for the WUI and structure protection, given that many of the agencies were using or developing trailers for rapid response and to have a more comprehensive inventory.

When asked about the sources for sprinkler information, 66% of respondents said they rely on internal documents. However, internal documents are not easily viewed by other agencies, which limits knowledge exchange. Thirty-three percent of respondents said that FPInnovations and FireSmart were sources of sprinkler information, while 11% noted the National Fire Protection Association (NFPA) and the International Journal of Wildfire.

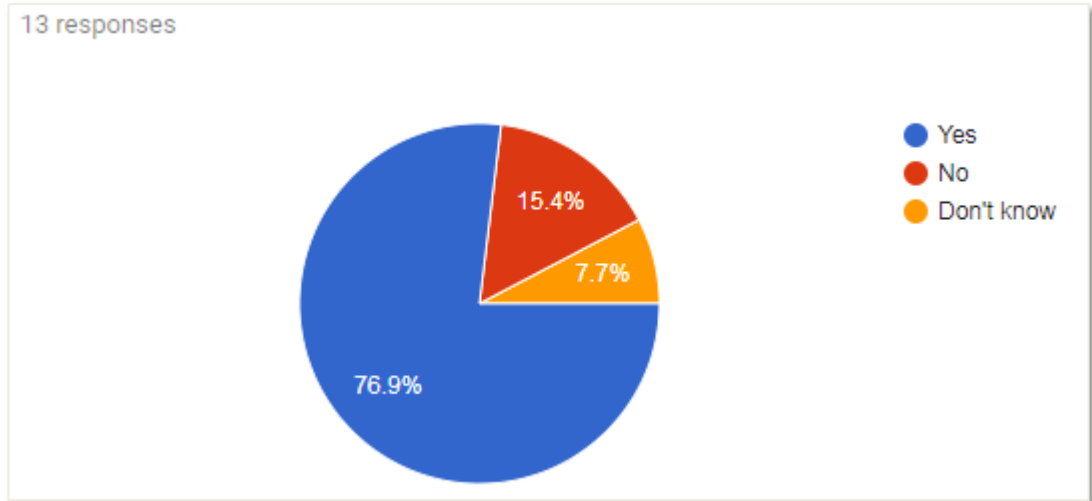
Agencies were also asked about future plans or changes needed regarding sprinklers. Modest additions to inventory were planned, but none of the agencies indicated that they were planning for a shift in equipment or dramatic change in sprinkler tactics.

This survey focused primarily on wildfire organizations because we could identify the individuals through membership in the Wildfire Equipment Working Group. Not included in the survey were the contractors and structural fire organizations that had Structure Protection Unit (SPU) trailers. For the 2018 fire season, the British Columbia Office of the Fire Commissioner (OFC) had 15 SPU type 2 trailers available through contractors or municipal fire departments. The British Columbia OFC also maintains type 1 and type 2 trailers. In Alberta, the OFC has one type 1 trailer and four type 2 trailers, and 15 County Fire Departments may be building sprinkler capacity for local emergency needs. Ontario has a 16 m (53 ft.) trailer operating as a mobile structure protection warehouse, and Manitoba is in the process of building a type 1 SPU trailer. All the structure protection equipment and sprinklers noted above are based on a wildfire model of pressure pumps, 38-mm hose, and impact sprinklers. None of the OFC or Fire Department sprinkler inventories or equipment were included in the national survey results.

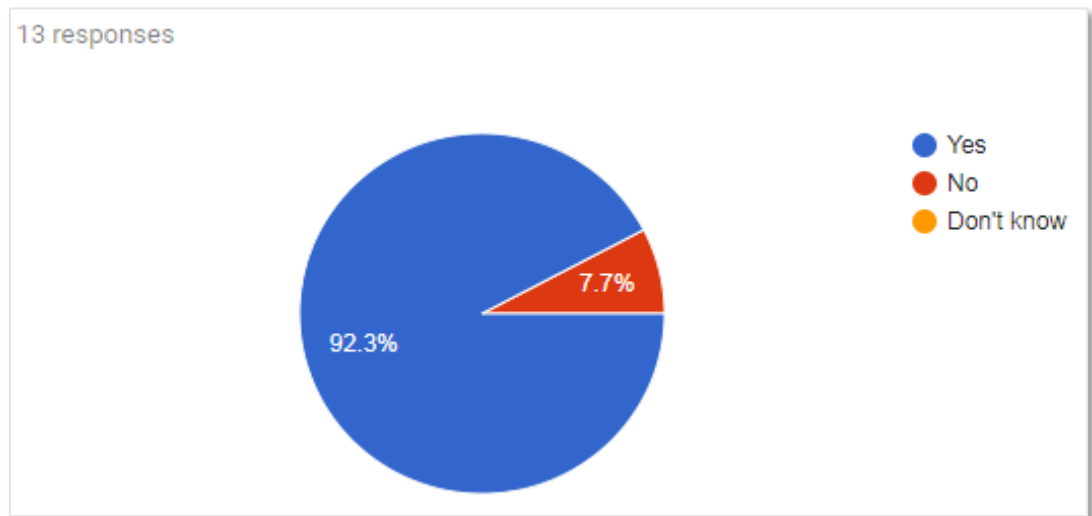
Agencies across Canada have adopted sprinklers as a tool for structure protection from wildfire in a substantial way, and the broad acceptance of, and commitment to using sprinklers has been further encouraged by the interprovincial exchange of fire crew and incident management teams. Many Canadian firefighters, regardless of jurisdiction, have been involved in values protection in some degree.

## 2. SURVEY RESULTS

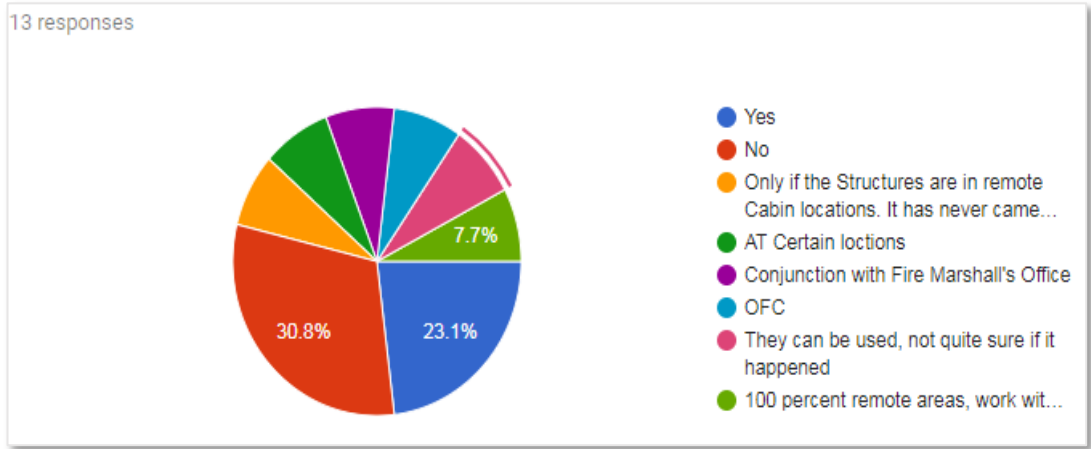
1. In your province, are sprinkler systems used in wildfire suppression operations for wildfire containment?



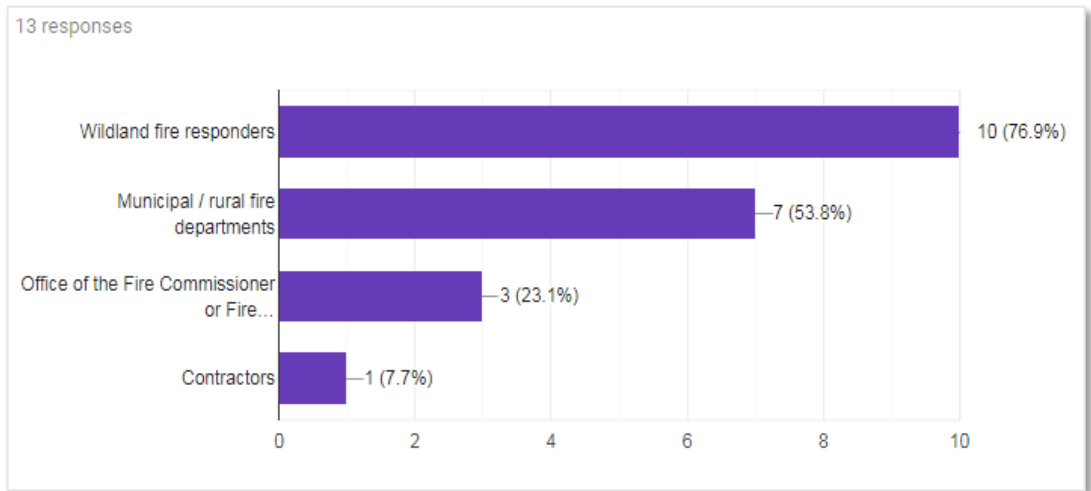
2. In your agency, are sprinklers used for structure protection?



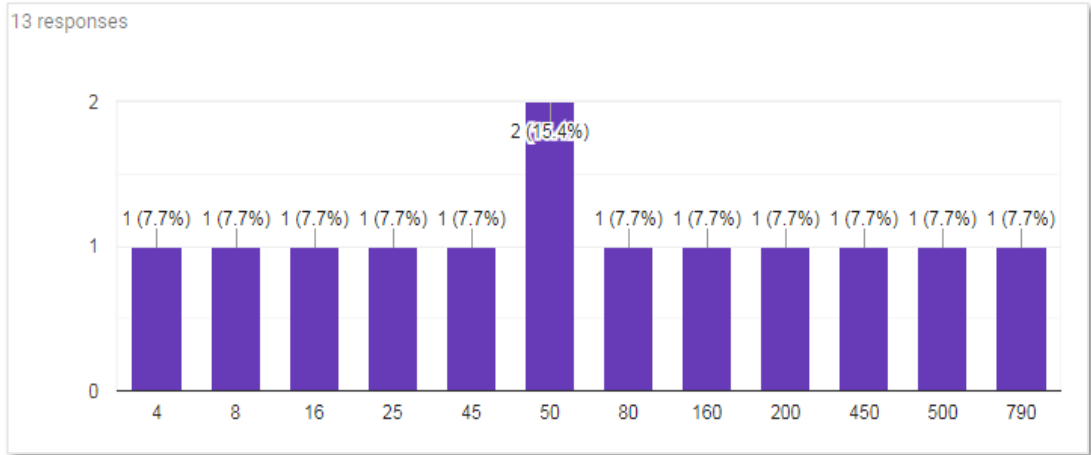
3. In your province, is your agency responsible for structure protection during wildland-urban interface events?



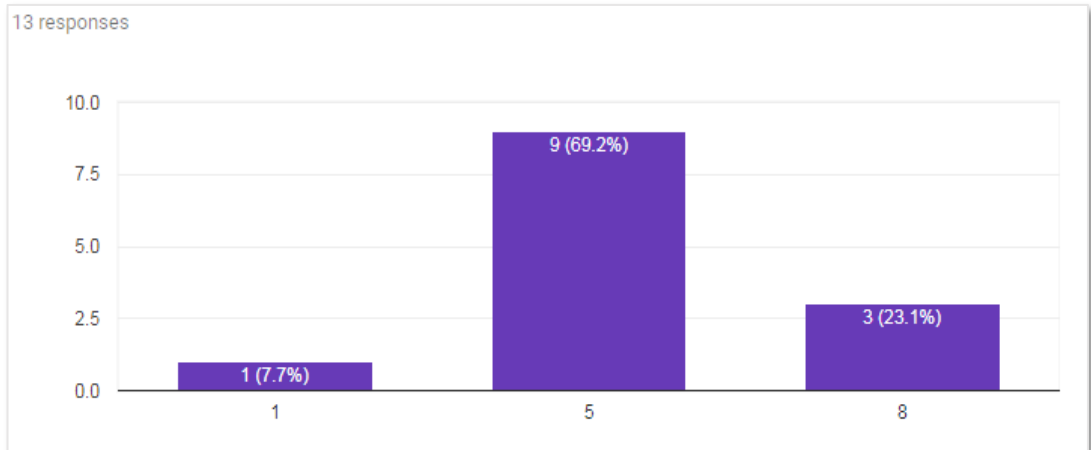
4. In your province, generally, who deploys sprinklers for structure protection or the protection of values at risk?



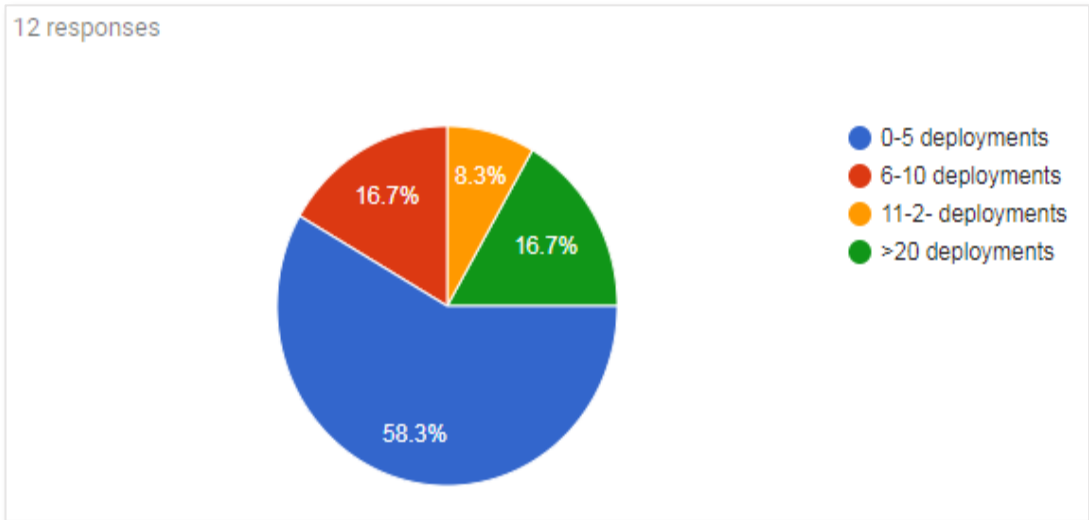
5. Within your agency, how many sprinkler kits will be available for use at the start of the 2018 fire season?



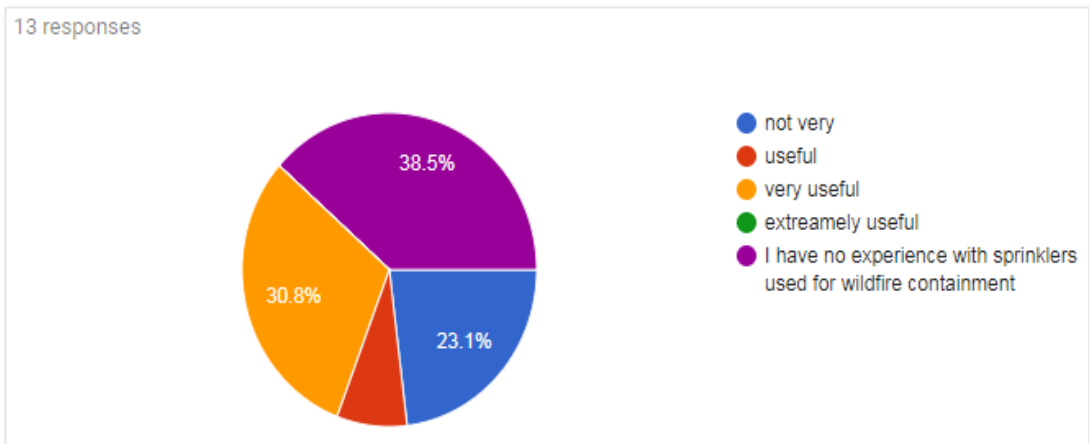
6. Based on a 2008 Canadian Interagency Forest Fire Centre national inventory of wildfire sprinkler kit contents, we understand the number of sprinklers in a kit varies by agency. How many sprinklers are currently in your agency's sprinkler kit?



7. In the past five years, on average, what has been the annual frequency of sprinkler deployments in the wildland–urban interface “by your agency”?

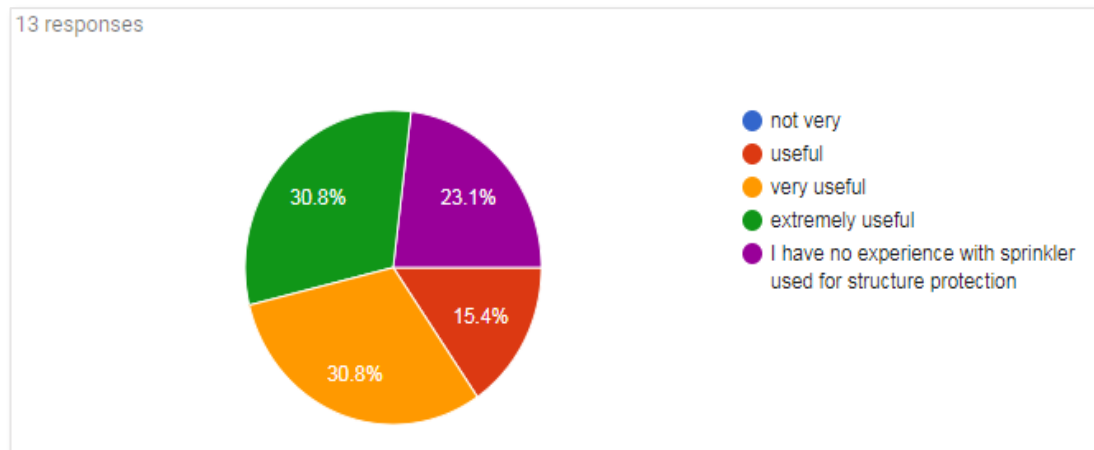


8. Based on your experience, how effective are sprinkler systems in wildfire containment?





9. Based on your experience, how effective are sprinklers in structure protection?



10. What are some of the limitations you have experienced or might expect of the sprinkler systems in a structure protection context?

Responses included:

- Access to water source
- The reach would be some limitations, getting the water mist in hard-to-reach places, on top of roofs.
- We rarely use sprinklers in our agency, so our staff are not familiar with them.
- Volume of water needed for large setups
- Usually stored at warehouse, so timing with regard to deployment might be an issue
- Distance form water source fire smarting consideration
- Ladder training is required.
- Easiness of installation, equipment available on site (ladder)
- Operating time of pumps
- High roofs when personnel not permitted or trained to walk on the roof. Land/home owners don't let you set up the sprinklers for fear of water damage; sprinklers should be set up a number of hours prior to fire arrival in order for them to be most effective; some homes that are within the forest stand have no fuel buffer and this limits sprinkler effectiveness. The number of pumps within a sprinkler system greatly reduces or enhances the amount of water a sprinkler can distribute; the diameter of hose used in the setup can greatly reduce/improve the number of sprinkler heads a system can sustain; the amount of water available for a system (can you run the systems all day; do you have to alternate sections of the systems; are you waiting for water tenders to fill up reservoirs; are you waiting for water tributaries to fill ponds, small lakes; are your pumps taking out more water than the system is putting out?). The biggest limitation is resources. If you have multiple structures to protect, setting them up is only the first step; they still have

to be maintained. If you don't have the resources (crews to fix and service setups, helicopters/boats to give you access to refuel sites daily) to support them, they aren't good past day one.

- Difficulty in getting out to remote areas to start pumps with smoke conditions. Start in morning and pumps run about 8 hours. Went to 2.5-in. hose for long hose lay on the limestone plate where 2 or 3 mile is common. Use BB4 or Mark 75 pump for unique deployment. Sprinklers are equipped with three nozzle sizes and are interchangeable.

11. In advising other agencies, what would you suggest are key considerations in the successful use of sprinkler systems?

Responses included:

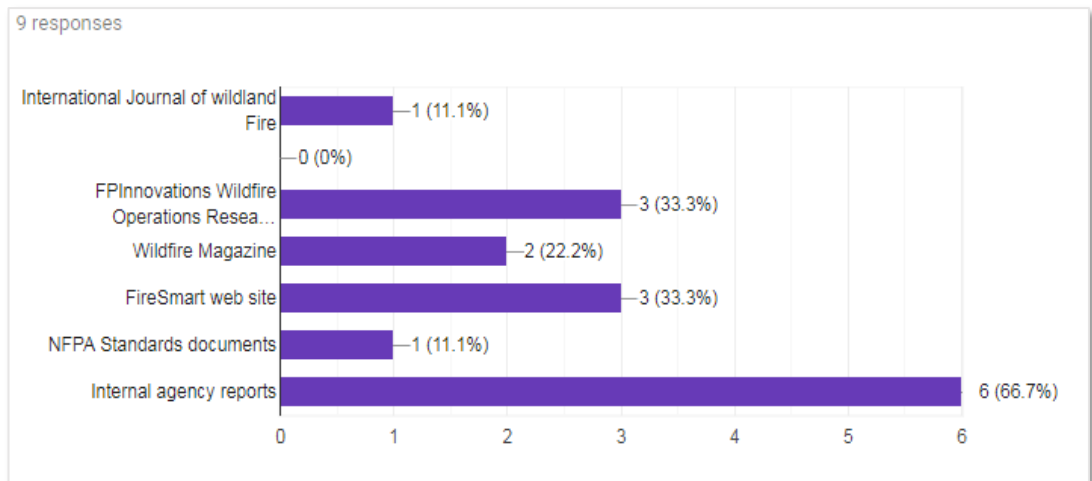
- Have a variety of sprinkler types/sizes. Various nozzle sizes. Will give you the right tool for the job and save water.
- Put the sprinklers out early and test the usefulness of them before the fire front comes through.
- Proper use of Incident Command System to incorporate structural protection resources into effective management of an incident
- Store a kit on an initial attack vehicle
- Proper deployment
- Creating a loop (closed water circuit) to increase water pressure in sprinklers
- Requires lots of sprinklers and pumps to meet the needs of multiple structures
- Continuous water source; avoid relay tanks if possible; coverage/protection of structures and hose lines; test system prior to use. Typical cause of failure is the knowledge of building the systems. Pumps can have volume and not much pressure or have pressure but not much volume—you need to be aware of what your water delivery method can do before setting up your system. Using smaller diameter hose can kill a system (1½ in. minimum as trunk lines; 2½ in. has a place in larger systems and use econo-flow sparingly—only from trunk line to sprinkler head if possible). Trying to stretch your water across too many sprinkler heads will make systems extremely ineffective—your water delivery system and hose diameter will determine number of heads.
- Staff training, rapid retrieval and repack for next fire

12. What are your agency's future plans or changing needs as they relate to sprinklers?

Responses included:

- We would like to add another Facility Protection Unit to our fleet.
- To continue using the sprinkler kits and do more training
- We have sprinklers to deploy for the protection of our structures and do not see any changing needs.
- Status quo
- Procuring a structural protection unit to protect 30 structures
- Always trying to improve our water distribution knowledge
- Converting 19-mm kits to 38 mm
- Kits were redesigned a few years back—this being said, always looking at/comparing other options
- Major growth in past five years. Three SPU trailers. OFC now has a 53-ft. sprinkler type 1 trailer. Moving away from 1-in. Rain Bird to Buckner because of weight for remote fly-in deployments.

13. What sources of sprinkler research do you access?



14. Within your province but outside of your agency is there any other organization you would recommend we contact in regard to wildfire sprinkler use?

Responses included:

- Fire and Emergency Services. Phone number 709-729-3703
- Office of the Fire Commissioner
- Alberta Fire Chiefs Association
- Not aware of any other than Waterax and Mercedes



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