Wildfire Resilience Workshop Summary: November 20th, 2024

Purpose

As part of a Wildfire Resilience Knowledge Workshop held in Smithers, BC, on November 20, 2024, three core topics were discussed in small groups – proactive fire management, fire ecology and forest fuels. Each participant group rotated through the facilitated discussion topics. Participants read a two-page primer on each topic, and then responded to a set of prepared questions to prompt discussion - *what surprises you*, *what implications do you see*, and *what gaps do you see in the summarized knowledge*?

This document is a summary of discussion and post workshop reflections. This is not a synthesis, and there was not necessarily agreement amongst the participants on these points. The outcomes from this workshop will be used by the project team to guide research into existing information that will fill knowledge gaps, and in the development of modelling scenarios.

Terminology

Jargon develops in any field. In relation to wildfire, workshop participants questioned how to define beneficial fire, wildfire resilience and a desirable future forest.

Beneficial fire – yet to be defined for the project.

Wildfire resilience - the project has adopted the following definition – *the ability of a system (ecosystems + communities) to react to perturbations, internal failures, and environmental events by absorbing the disturbance and/or reorganizing to maintain its functions, including the capacity of ecosystems, people, and communities to adapt, persist, develop, or even transform into new development pathways in the face of dynamic change*.

It encompasses resistance (e.g., low fire hazard) and resilience (e.g., recovery from wildfire).

The Wildfire Resilience project is evaluating indicators of wildfire resilience including, for example fire frequency, spread rate, intensity and severity. Wildfires also provide an opportunity to transform ecosystems for example by facilitating climate-adapted species following fire.

Desirable future forest - reflects society's values and risk tolerance. Wildfire resilience needs to be integrated with other goals, such as biodiversity and timber. Participants noted that fuel management may affect other values (e.g., increase invasive species).

Proactive Fire Management Summary

Our collective understanding around proactive fire management is that a better understanding of the scope and scale of historic fire management would support feasibility assessments and planning for proactive fire management (prescribed, cultural and managed wildfire) in the Bulkley-Morice project area. Workshop discussions with participants centered around where historic fire most likely occurred, and what legacies of past fire management remain in places today, including some of our older forests and protected areas. Although empirical western scientific research is scarce on historic fire management and practices, Indigenous-led discussions on cultural and lightning ignitions could support increased use of proactive fire leading to improved wildfire resilience and recognition of cultural values. Together with western scientific research this knowledge can contribute to a more comprehensive understanding of wildfire risk and would help contextualize the current fire regime (fire frequency, fire severity, fire pattern) and the relevant hazard.

Social buy-in and wildfire risk

Workshop discussion highlighted that integrating wildfire risk reduction and resilience into practice must involve changing commonly held public views about proactive fire and smoke. This includes concerns about managing risk, smoke and health impacts and a lack of understanding of wildfire resilience. Decision-makers require up to date information that is contextualized for specific actions such as making risk-based decisions with support in place to strengthen communication with affected Nations, communities and stakeholders.

Decision-makers, the general public, researchers and practitioners (in both fire and forestry) are concerned about wildfire risk and how their decisions consider where and why fire suppression and managed wildfire response occur. To support effective responses to wildfire risk, landscape level plans must include clear pathways to ensure public buy-in regrading increased seasonal smoke, potential values gained and lost, and adaptive decision-making from agencies that may be external to unfolding situations (in an office and not on the fire-line). In addition, empowering people on the front lines to make decisions with their place-based expertise is critical to moving towards proactive solutions such as monitoring a wildfire while it burns. Wildfire risk assessments will be more successful in supporting critical change if their methods and processes are more transparent and the public is aware of steps to adaptive decision making.

Indigenous and western science research

Workshop conversations brought up critical reflections on the type of knowledge that has been considered and valued. Indigenous communities have millennia of knowledge about changes, impacts to the land and water. Many Indigenous communities have continually adapted to environmental changes and resilience is part of their culture and identity. Indigenous communities have knowledge and wisdom that are central to proactive fire management but have not historically been valued in the context of western science, forest policies and land management.

Participants were concerned about the limitations of research including not enough information, not in the right places, not co-led with Indigenous partners, and there was some tension surrounding whether there was a need to examine past management to understand the future of wildfire. Data-driven assessments might not capture the nuance of risk and resilience in a comprehensive manner with consideration of cultural values, community values, wildlife and habitat values, recreation values, etc. It was noted that it is difficult to quantify values that are intangible and not something that can be fed into a model.

Knowledge Gaps

The groups were asked to define current gaps in research and our understanding of wildfire resilience and proactive fire management. Some of the main gaps identified included:

1. Engagement with communities about the benefits of prescribed, cultural and managed fire.
2. Lack of information to understand what the wildfire risk is.
3. Scope and scale - how extensive (landscape pattern and size) historic cultural fire and lightning ignited wildfire was?
4. What is the current fire deficit?
5. How far have we departed from the historic range of variability?
6. How do we decide which fires should burn and under what conditions?
7. Forest tenure system on public forest land (e.g. volume-based forestry practices) do not incentivise proactive fire management.
8. Area-specific knowledge of the trade-offs of proactive fire management?
9. Knowledge of the ecological fire effects of different types of fire (severity, frequency, size).
10. Knowledge of cumulative disturbance effects, and at different scales - including fire and other disturbance agents such as bark beetles, wind, drought, etc.
11. Spatially explicit data on fuels and associated fire weather to support decision making.

Fire Ecology Summary

The role of historic disturbance regimes

Participants wondered about how knowledge of historic disturbance regimes informs our understanding of wildfire resilience. We discussed the following: historic disturbance is not considered as a target but rather as a way of learning about the interaction of fire with climate and vegetation patterns. For example, learning about wildfire/vegetation interactions in a historic setting can provide clues for future fuel management, wildfire resilience and managing for future resilience. To address climate change, one participant suggested learning from fire regimes that match future climate projections.

We discussed the need to correct misconceptions about our knowledge of historic disturbance. In land-use planning, disturbance frequency is often presented as a single number. This presentation is a helpful simplification, but ignores a wide range of variability; understanding is further limited by a high level of uncertainty, which depends on assumptions, research methods and time frames. Indigenous burning has not been included explicitly; emerging information suggests that Indigenous fire management had a significant influence on vegetation in some areas.

Influence of climate vs. forest fuels

The interaction between climate and forest fuels in determining fire behaviour varies by region and the patterns are not yet well understood. This lack of knowledge leads to uncertainty about the effectiveness of fuel modification for wildfire risk reduction. In a given region, a fire regime can be described as mostly climate-driven or mostly fuel-driven. Under a fuel-driven fire regime, the amount, type and arrangement of vegetation strongly influence fire hazard; in these regions, fuel management can be a useful tool. In a climate-driven fire regime, however, fires are driven more by extreme weather patterns such as heat waves or droughts.

We hypothesized that Sub-Boreal Spruce (SBS) ecosystems of the Bulkley-Morice are likely more climate driven - burning mostly during extreme fire weather, while Interior Douglas Fir (IDF) ecosystems (e.g. near Williams Lake) are more fuel driven and burning over a wider range of fire weather. The importance of fuel conditions varies with daily wind and temperature and humidity fluctuations. Fuel management can potentially lower fire intensity, and facilitate suppression—when weather permits.

It is believed that fire suppression may mask the interacting effects of fuel and weather, by suppressing fires in less extreme weather conditions.

Future climate in the Bulkley-Morice is uncertain: it may become more like Burns Lake or more like Hazelton.

It is likely that fuel loads matter somewhat in any climate, but will vary in importance by climate zone. We hypothesized that the transition from a ground fire to a more intense crown fire depends on both fuel load and fire weather, with fuels varying by forest stand attributes and fuel treatment, and with fuel treatment becoming ineffective during extreme fire weather.

Influence of fuel type

In general, fuel discontinuity affects fire hazard on a landscape. Breaks in forest fuels such as roads, wetlands, agricultural fields and fields managed with Indigenous burns can impede spread. It is widely believed that deciduous forests often slow fire spread.

The influence of different coniferous forest fuel types on fire is less certain. Beetle-killed stands affect fire hazard in complex ways that vary with time since disturbance. For example – it is unclear how beetle-impacted riparian corridors may—or may not—act as fire wicks. The role of stand structure, as affected by site series, tree species and stand age, is complex and not well understood. Dense juvenile stands with limited understory vegetation can slow fire spread in some situations.

Landscape- vs. Community-Level Wildfire Resilience

Participants recognized that managing for community wildfire resilience might differ from managing for forest-scale wildfire resilience. For example, managed response of a large fire may be a strategy to reduce future fire hazard over the landscape, which includes a situational trade-off of risks and may not be an acceptable risk near a community.

Future direction

Uncertainty about whether fuel treatments are effective in SBS and the Engelmann Spruce Subalpine Fir (ESSF) forests calls for improved understanding through research, as well as improved communication of this uncertainty with the public. Recognizing scarce resources and efficacy of treatments will be a critical factor in resource allocation decisions amongst actions towards fuel treatment, suppression, emergency preparedness and hazard management in the built environment. Adaptive management can help to address uncertain actions.

The consequences of fuel management need to be considered over time. For example, near-term successful fuel treatments with the objective to keep fires small could lead to a build up of fuels elsewhere and larger fires in the future, similar to the effects of fire suppression. Stand- and landscape-scale fuel management prescriptions need to consider ongoing maintenance requirements to sustain the desired fuel conditions.

Participants noted the paucity of fuel data and identified opportunities to collect information via RESULTs[1] reporting and timber cruising. Sampling should cover the back reaches of cutblocks, often left untreated.

We discussed the need to highlight the roles that different institutions can play in shaping both landscape and community wildfire resilience. We discussed the challenge of gaining social license for fuel management and proactive fire. This challenge involves explaining costly treatments that influence the chance of fire, a situation akin to insurance.

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[1] The Reporting Silviculture Updates and Land Status Tracking System (RESULTS) application tracks silviculture information by managing the submission of openings, disturbances, silviculture activities and obligation declarations as required by the Forest and Range Practices Act.

Fuel Management Summary

Surprises

- That more data was not available on the efficacy of fuel management treatments.
- That licensees stopped broadcast burning ~ 30 years ago.
- 5 and 10 tonnes/hectare of fine material on site – are not practical targets.
- That the community of practice doesn't have a better understanding of objectives and risk of fuel management treatments.

Technical and Financial Comments

Economics:

- Fuel treatments are very expensive (probably $5,000 to $20,000 per ha) – are they worth it?
- Fuel treatments should include an economic focus.
- Lack of coordination of funding programs.
- Lack of policy direction and incentives for fuel treatments in both the WUI and the landscape level.

Social License:

- Improve public education and buy-in. This may include a suite of tools such as political action, messaging about climate-driven fire weather trends, messaging about present and future health and safety risks, better collaboration with stakeholders including industry, messaging on smoke released during controlled burning versus wildfire versus wood-based home heating.

Policy Gaps:

- Enable stand-level treatments by removing unreasonable liabilities and burning restrictions. Consider the urgency of insurance industry needs and liabilities, and comment from public watchdogs like the Forest Practices Board.
- Solicited concerns of tenure holders in fire management planning.
- Require fire management objectives to be part of every planning level.

Applications:

- Harvest plans can be a fuel management plan and can provide access during suppression.
- Spatial alignment of treatments with landscape features is required.
- Better understanding of fuel continuity, not just relation to fire severity and intensity.
- Fireguards are primarily for suppression access and planned ignitions.
- Achieving fuel load targets post-harvest has consequences on logging equipment, practices and costs – this needs to be considered in planning and reflected in the appraisal system.
- A tiered approach to fuel management - Tier 1 being small scale salvage (because cost recovery reduces overall costs) primarily in the WUI, and other tiers being considered relative to location and cost such as cattle grazing, fuel removal, and fuel modification.

- Because of the risk/cost relationship and social concerns, fuel management adjacent to communities is complex.

Ecology and Fuel Treatments:

- Consider the beneficial aspects of putting fire back on the land such as improved grazing and berry production.
- More information is needed on negative or unintended ecological consequences of fuel treatments.
- Consider the benefit of risk reduction treatments that maintain or create open stands and enhance forage production.
- Can fireguards in conjunction with cattle grazing be used to achieve fire management objectives?
- Improve our understand of the impacts of converting closed stands to open stands.

Tools:

- Model scenarios starting at stand establishment and look at stand structure over time with and without fuel treatment, including a maintenance cycle.
- The B.C. data warehouse could include a section on fire and fuel information and ensure that all fire-related data is available there.
- Surface fuel loading after logging could be measured post-harvesting and captured in RESULTs.
- Can fuel loading be predicted through PEM?
- Decision support tools for suppression response and fuel management. More training on fire behaviour (fire weather indices and fire science, critical surface fire intensity, equilibrium rate of spread, fuel loading metrics, etc).
- Fuel management training and tools for land managers and decision makers including how to measure fuel treatment efficacy at the landscape and stand level.

Uncertainties And Questions

Planning:

- How is higher-level planning considered in fuel management?
- How much focus should be placed on communities versus everywhere else?
- How to ensure protected area management integrates with wildfire management outside of protected areas; and how to engage private landowners in wildfire mitigation efforts on their land and neighboring lands?
- How to effectively foster collaboration across governments and support Indigenous-led fire stewardship, specifically cultural burning practices?
- How much wildfire can/should we support?
- How much smoke is acceptable?
- What level of treatment is affordable?
- More information on the trade-off between cost and benefits is needed.
- What are the levels of treatment necessary at the landscape level?
- In considering fuel treatment efficacy, is the 95th weather percentile threshold appropriate?

- What metrics can we use to understand how to balance protecting timber when considering a modified response?
- How are cross-scale interactions (communities, landscape and stand level) considered in designing fuel treatments?

Efficacy:

- Does thinning in the sub-boreal make sense?
- At what level of fire weather (e.g. 90 vs 95th percentile or even lower) is fuel treatment ineffective?
- What is the efficacy of past fires, both prescribed and wildfire, as a fuel treatment?
- What is the basis for choosing size, shape, and width of fuel breaks?
- What is the longevity of fuel treatments in mature stands, immature stands, and areas burned in a wildfire or prescribed fire; and how will fuel loading change over time in the face of climate change?
- How effective are silviculture treatments in modifying fire behaviour?
- Are 20 to 40-year-old stands more effective than fuel modification treatments?
- To what extent does a stand's wind firmness play into fuel treatments?
- Is there a way to reduce roads through the use of fuel treatments?
- How much fuel treatment is enough? Likely a non-linear relationship between hazard level and treatment.
- How is ecosystem function considered in fuel treatment?

Ecology:

- What are the impacts of fuel treatments and wildfire on ecological function (wildlife tree patches, biodiversity, habitat)?
- Landscape heterogeneity is required for fuel objectives but when does this become habitat fragmentation with negative consequences for wildlife?