Assessing fuel treatment effectiveness:

A case study of the Lytton Creek wildfire encroachment on the First Nation community of Nicomen

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On June 30, 2021, the Lytton Creek wildfire (K71086) ignited south of the Village of Lytton, British Columbia. In the first burning day, the fire destroyed numerous structures in the Village of Lytton, Lytton First Nation, and adjacent communities and continued to spread. In the following weeks, the wildfire progressed eastward along the Thompson River valley. On the morning of July 19, the wildfire was within one kilometre of the First Nation community of Nicomen and through the day spread to the drainage above the community. In the afternoon of July 19 strong winds pushed the wildfire through several harvest blocks toward the community. In the early evening hours, suppression crews conducted planned igntions to burn out fuel in fuel treatment areas above the community.

The intensity of the advancing wildfire was moderated by the planned ignitions in fuel reduction treatments to an extent that structure protection measures in the community were adequate to resist any challenges from the oncoming fire front or firebrand showers and to prevent structure ignition and loss.

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1 INTRODUCTION

On June 30, 2021, the Lytton Creek wildfire ignited and quickly spread towards the Village of Lytton. After consuming large portions of the Village of Lytton, Lytton First Nations and adjacent communities, the fire continued to spread along the Thompson River valley impacting communities and other values in its path. On the morning of July 19, the Lytton Creek wildfire was positioned along the ridge line west of the First Nation community of Nicomen. Through the day, the wildfire advanced over the ridgeline and into the drainage above the community. In the afternoon, south winds drove the wildfire downslope through several harvest blocks and forest fuel reduction treatments toward the community.

The approaching wildfire burned through many of the cutblocks in the drainage above the community with high-intensity fire behaviour. Given the extreme fire behaviour observed in the previous days, the poor visibility, and the limited suppression resources available (helitankers and personnel) there was little direct attack on the approaching fire. As a defensive tactic, planned ignitions were conducted in the fuel treatments above the community to create a buffer to the approaching fire and improve the chances for protecting values in the community.

Nicomen Indian Band has adopted a pro-active forest fuel reduction treatment program as part of a wildfire risk reduction strategy. Fuel reduced areas include motor-manual fuel treatments in areas adjacent to the community with harvested areas in the drainage above the community.

This case study forms a component of a larger research initiative to assess the effectiveness of fuel treatments in moderating fire behaviour and/or improving the potential for successful suppression operations. More specifically, this case study addresses the following key questions developed by fuels management specialists within the British Columbia Wildfire Service (BCWS):

1. Was there a change in fire behaviour resulting from the wildfire moving into the fuel treatment area?
2. What factors contributed to a change in fire behaviour?
3. Was there a change in suppression strategy and tactics based on the presence of the fuel treatment or a change in fire behaviour? Did the fuel treatment provide a strategic or tactical advantage in suppression operations?

In the initial stages of this larger research initiative, ongoing consultation with the BCWS helped refine the data collection and analysis processes to develop a framework for a provincial fuel treatment evaluation protocol that can be applied by a larger group of researchers and wildfire specialists. FPInnovations has collaborated with personnel from the BCWS and British Columbia Ministry of Forests to collect data from multiple sources, including:

- BCWS records (incident action plans, fire progression maps, weather forecasts, notes)
- field observations in areas of wildfire-fuel treatment encounters
- eyewitness accounts
- photographs from suppression personnel
- fuel treatment maps and prescriptions from fuels management specialists

2 SITE DESCRIPTION

Lytton, British Columbia is situated in the Fraser Canyon at the confluence of the Fraser and Thompson Rivers. Approximately 17 km northeast of Lytton, the First Nation community of Nicomen is located on the south side of the Thompson River on a bench of land 100 m above the river. Above the community a large drainage containing several harvest blocks can be accessed by the Nicomen River Road (Figure 1).

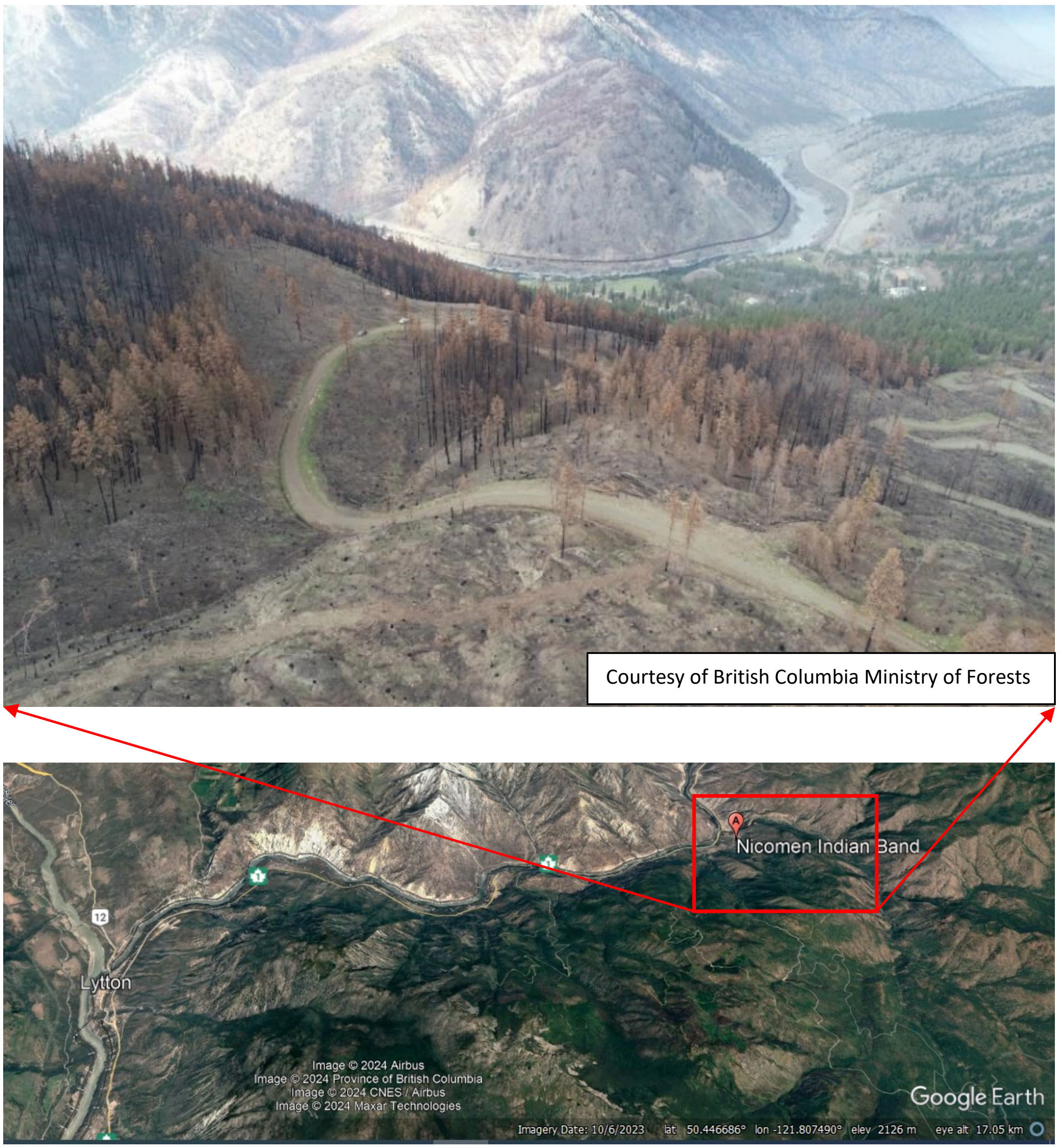

Figure 1. General area overview (below) with community of Nicomen (above).

The major values in this area are the First Nations community of Nicomen (hereafter Nicomen) which consists of homes and administration buildings, and the watershed which has merchantable timber in the drainage above the community. Other values in this area include the Trans Canada Highway and two rail lines on either side of the Thompson River.

3 FIRE ENVIRONMENT

3.1 Fuels

The fuels surrounding Nicomen are a mix of ponderosa pine (*Pinus ponderosa*) and Douglas-fir (*Pseudotsuga menziesii*) overstorey with pinegrass (*Calamagrostis rubescens*), woody debris, and needle litter as the predominant surface fuels. This fuel environment aligns with the C-7 (ponderosa pine/Douglas-fir) Fire Behaviour Prediction (FBP) System fuel type (Forestry Canada Fire Danger Group, 1992).

The biogeoclimatic ecological classification (BEC) assigned to lower elevations in this area is PPxh2 (Ponderosa Pine, very dry hot) and at higher elevations the BEC shifts to the IDFxh (Interior Douglas-fir, very dry hot) (Meidinger and Pohar, 1991). The natural disturbance type for this area is NDT4 (frequent, stand maintaining fires). This fire regime has been disrupted by decades of successful fire suppression. Few fires have occurred, which has resulted in a buildup of forest fuels due to ingrowth of understorey and the deposition of woody debris and litter.

Several fuel reduction treatments have been conducted in the lower elevations of the drainage above the community of Nicomen. In the middle and upper sections of the drainage above the community, fuel reduction has been achieved through harvest operations.

3.2 Fuel treatments

Motor-manual fuel treatments have been conducted adjacent to Nicomen (Figure 2) with basic principles of forest fuel reduction treatments applied (Agee and Skinner 2005). These principles are further described in Landscope Consulting Corporation (2016a) as:

- removing hazard trees
- brushing, thinning, pruning and debris disposal
- reducing inter-tree competition and crown connectivity
- eliminating ladder fuels
- reducing fine fuel surface fuel loading to reduce the potential for crown fire initiation

The green polygons in Figure 2 were treated in 2014 and 2015. Other fuel treatment units above Nicomen were treated between 2017 and 2020. The pre-treatment crown closure (as detailed in individual fuel management prescriptions) for the fuel treatment areas ranged between 5 and 45%. A reduction in crown closure of 0 to 10% was prescribed resulting in a target crown closure for the fuel treatments of 5 to 35% (Table 1).

The fuel management prescriptions prescribed retention of sound stems greater than 17.5 cm with an increasing percentage of stem removal through the smaller size classes.

Table 1. Fuel treatment forest stand characteristics.

Fuel treatment polygon	Completion Date	Crown Closure (%)		Stems per hectare					
		Pre-treatment	Target		Layer 1 (>12.5 cm)		Layer 2 (7.5 – 12.5 cm)		Overall target density
					Pre-treatment	Target density	Pre-treatment	Target density	
5A TUA	2018	25	20	all species	612	212	236	63	275
				conifers	47	46	24	21	67
5B TUA	2018	20	15	all species	440	336	190	97	433
				conifers	440	336	190	97	433
5C TUA	2017	20	15	all species	440	336	190	97	433
				conifers	440	336	190	97	433
6A TUA	2020	35	30	all species	430	360	300	150	510
				conifers	430	360	300	150	510
6A TUB	2020	45	35	all species	600	296	800	150	446
				conifers	600	296	800	150	446
7A TUA	2018	15	10	all species	215	206	100	50	256
				conifers	215	206	100	50	256
7A TUB	2018	5	5	all species	50	49	100	50	99
				conifers	50	49	100	50	99
7B TUA	2018	25	20	all species	580	511	100	50	561
				conifers	580	506	100	50	556
7B TUB	2018	35	30	all species	200	199	800	200	399
				conifers	200	199	800	200	399

The understory component (layers 3 and 4) was predominantly conifer and the pre-treatment density of this layer ranged from 400 to 1000 stems/ha. The overall target density for these layers was prescribed at 200 to 350 stems/ha.

Surface fuel load data for the fuel treatment areas was not available; however, using post-treatment photos and pre-igntion photos (Appendix B), the loading was assessed as light.

The fuel treatment areas have a north-facing aspect and slope ranging between 10 and 80%. Some of the treatment areas had previously experienced disturbances including mountain pine beetle attack and logging. To mitigate the fuel hazards of dead standing stems and high surface fuel loading, motor-manual treatment tactics (thinning and pruning with piling and burning) were prescribed. The fuel treatment areas near the community are shown in Figure 3.

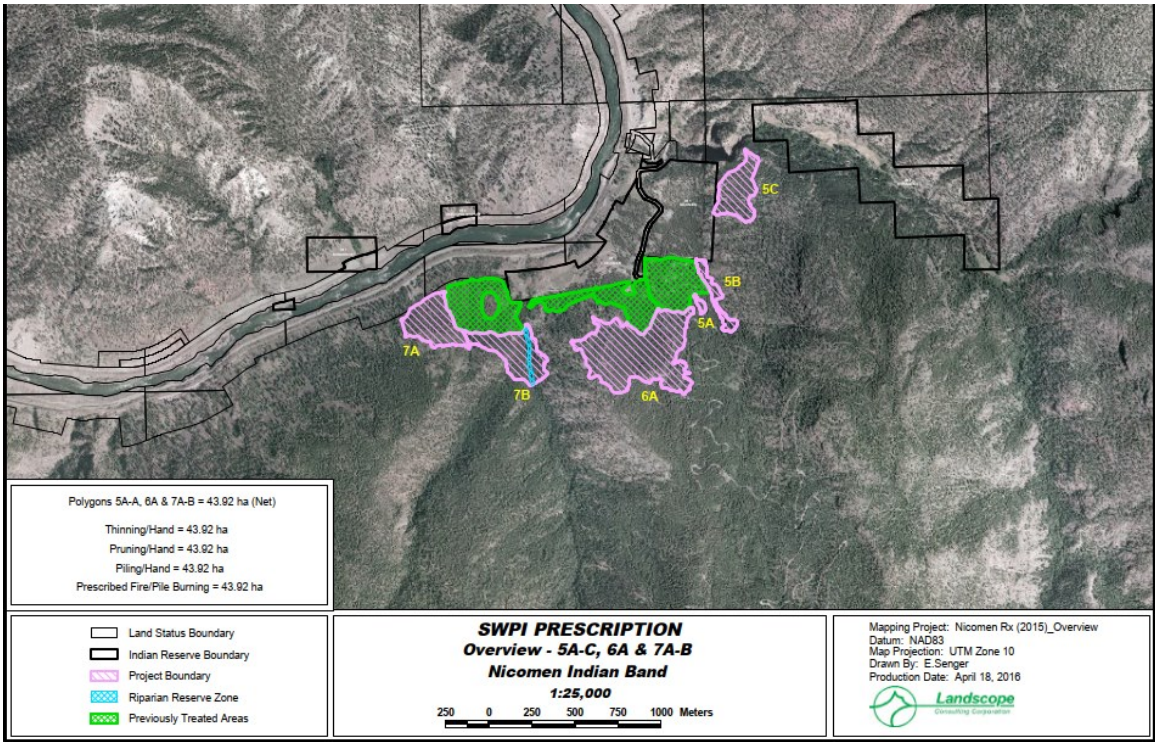

Figure 2. Fuel treatment polygons adjacent to the community of Nicomen.

Figure 3. Fuel treatment areas adjacent to the community, looking south (left) and north (right).

Pre-treatment plot photos indicate a buildup of hazard fuels (surface and ladder) that required treatment in polygon 7B (Figure 4). Stand density and species, surface fuel composition, and loading are variable across the treatment areas. Plot photos from an adjacent treatment area 300 m away in polygon 7A show a different fuel composition with lower overstory density (predominately ponderosa pine) and a surface fuel composed of grass and coarse woody debris (Figure 5).

From Landscope Consulting Corporation (2016b)

Figure 4. Fuel hazards identified southwest of Nicomen in polygon 7B.

Figure 5. Low-density overstorey in the treatment area and a higher loading of grass and coarse woody debris in surface layer.

3.3 Weather

The BCWS Splintlum weather station is approximately 20 km northwest of Nicomen (Figure 6). Hourly weather and Fire Weather Index (FWI) System values (Van Wagner, 1987) recorded at the Splintlum station for July 19 are shown in Table 1. The Duff Moisture Code, Drought Code, and Buildup Index for July 19, 2021 were 111, 807, and 165, respectively.

Wind recorded at the Splintlum station was consistently from the southeast through the later part of the burning day with a wind speed of approximately 20 km/h.

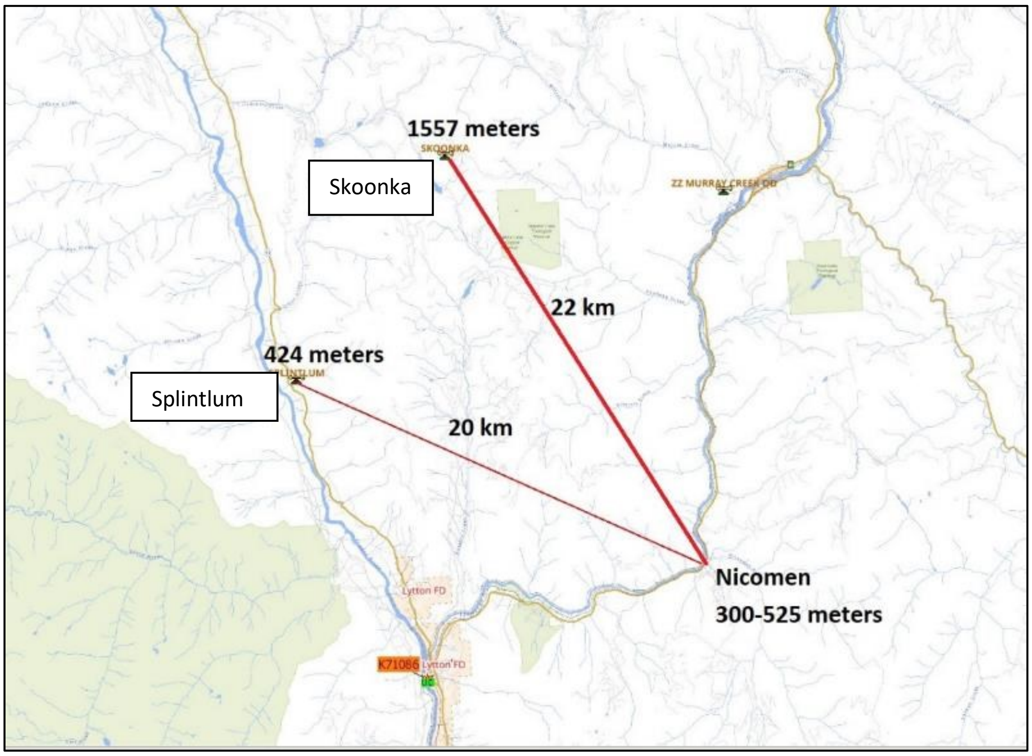

Figure 6. BC Wildfire Service weather stations in the Nicomen area.

Table 2. Weather and Fire Weather Index values from Splintlum weather station on July 19, 2021

Time	Weather values				FWI values		
	Temperature (ºC)	Relative humidity (%)	Wind speed (km/h)	Wind direction (degrees)	FFMC	ISI	FWI
1100	27.6	25	8	184	92.1	8.4	33.3
1200	31.5	19	9	194	92.9	10.4	38.2
1300	33.4	16	12	178	93.8	13.5	45.6
1400	35.2	12	13	182	94.9	16.2	51.3
1500	33.9	11	21	143	95.7	26.9	69.8
1600	33.4	12	21	151	96.2	29.1	73.2

1700	32.1	15	22	149	96.3	31.3	76.3
1800	31.2	17	22	143	96.4	32.3	77.8
1900	29.2	18	19	141	96.4	27.8	71.2
2000	28.1	19	13	129	96.5	20.7	59.6
2100	26.7	23	19	129	96.3	27.2	70.3
2200	25.7	26	20	123	96.3	26.9	69.8

FFMC, ISI, and BUI values on July 19 exceeded the calculated[1] 90th percentile FWI conditions for the Splintlum and Skoonka weather stations (Table 3).

Table 3. 90th percentile FWI conditions (10 year average).

Station	FWI values		
	FFMC	ISI	BUI
Splintlum	95	17.6	233
Skoonka	93	11.6	128

The BC Wildfire Service spot forecast issued on July 17 (Appendix A) indicated that "an upper low remains off Haida Gwaii giving the fire centre region a southwesterly flow today and tomorrow and the airmass will remain stable." Predicted wind for Monday, July 19 was SE 10 – 20 G 30 km/h. The forecast predicted a morning inversion at 1500 - 1800 metres with breakdown temperature of 17C and winds above the inversion SW 20 km/h.

On the morning of Monday, July 19 an inversion layer (Figure 7) had set up over southern B.C., which inhibited mixing roughly below 545 m above ground level. Winds above the inversion were southwest at 20 km/h but later in the afternoon had shifted to a more southerly direction. The atmospheric sounding for 1700 on July 19 indicates the inversion layer had lifted, and the lower air mass (below 12000 m) had become very unstable but there was greater stability above 12000 m.

[1] https://wps-prod.apps.silver.devops.gov.bc.ca/percentile-calculator

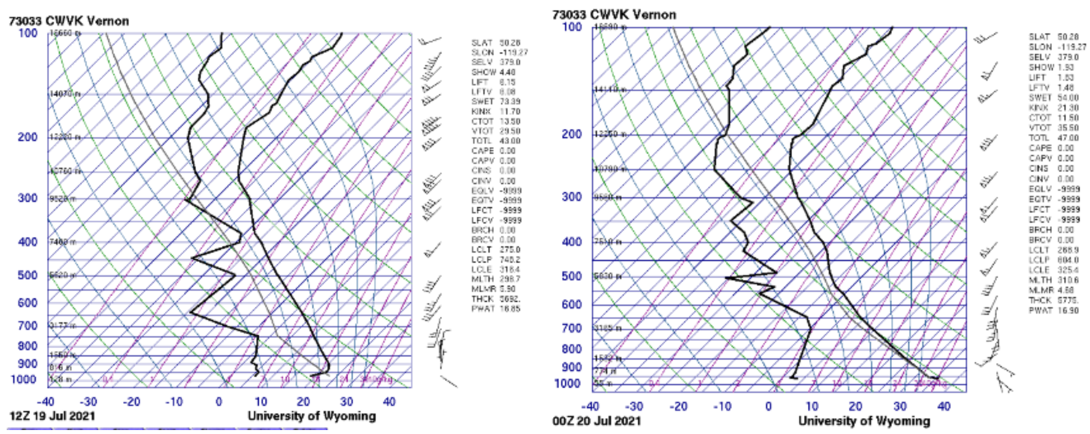

Figure 7. Atmospheric soundings for 0500 PDT (left) and 1700 PDT (right).

500 Mb maps for July 19 (Figure 8) shows the ridge building over Saskatchewan and the upper low shifting toward Haida Gwaii.

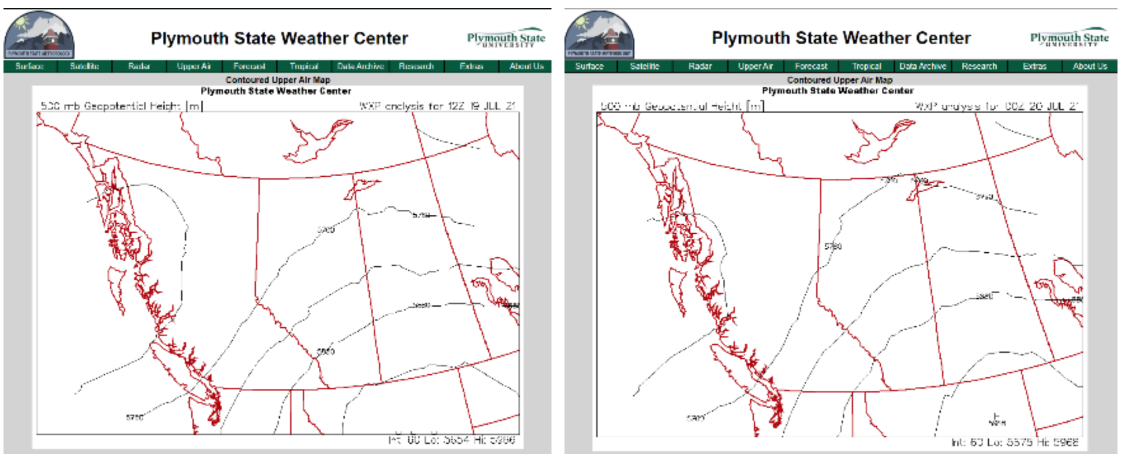

Figure 8. 500 Mb maps for July 19, 0500 PDT (left) and 1700 PDT (right).

3.4 Topography

Nicomen is located on the south side of the Thompson River, on a bench of land approximately 100 m above the river (Figure 9). Between Lytton and Nicomen, the Thompson River is situated roughly in roughly an east/west orientation; at Nicomen it turns northward. The narrow, steep-walled Thompson River valley contains numerous tributaries (Figure 10) which create a complex interaction of topographic features that create erratic wind flow and potentially volatile fire behaviour. The drainage above Nicomen is oriented in a north/south direction and has an average slope of 25%.

Figure 9. Community of Nicomen and burned sections of treatment units above.

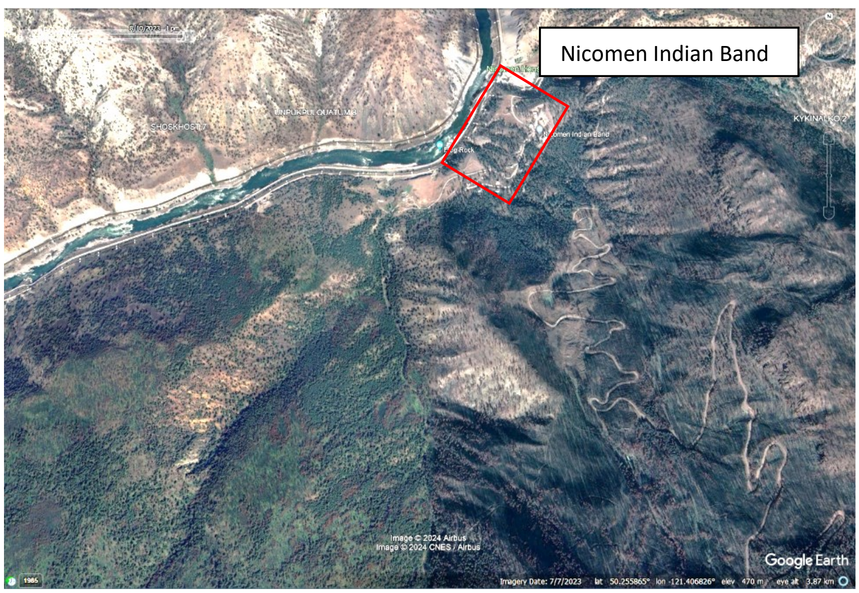

Figure 10. Thompson River valley, with the community of Nicomen and the drainage above.

4 FIRE BEHAVIOUR ANALYSIS

4.1 Fire chronology

- At 1638 h on June 30, 2021, the Lytton Creek wildfire was reported south of the Village of Lytton (Cohen & Westhaver, 2022). Over the next 19 days the wildfire progressed along the Thompson River valley toward Nicomen.
- On the morning of July 19, the wildfire was positioned along the ridge west of Nicomen.

- Through the afternoon of July 19, the wildfire crossed the ridgeline (Figure 11) and entered the drainage above Nicomen. The fire front pushed across the top of the drainage and into the upper sections of it.
- In the late afternoon of July 19, south winds pushed the fire front down-slope in the drainage toward Nicomen.
- By 1800, the smoke column collapsed, and the drainage and community were smoked in.
- At 1900, planned ignitions were initiated to burn out fuels in fuel treatments adjacent to the community.

Figure 11. Ridge line west of Nicomen (looking west along the Thompson River valley).

4.2 Fire progression

July 17 - The Lytton Creek fire front was approximately 1.5 km to the west of the ridgeline above the drainage above the community of Nicomen (Figure 12).

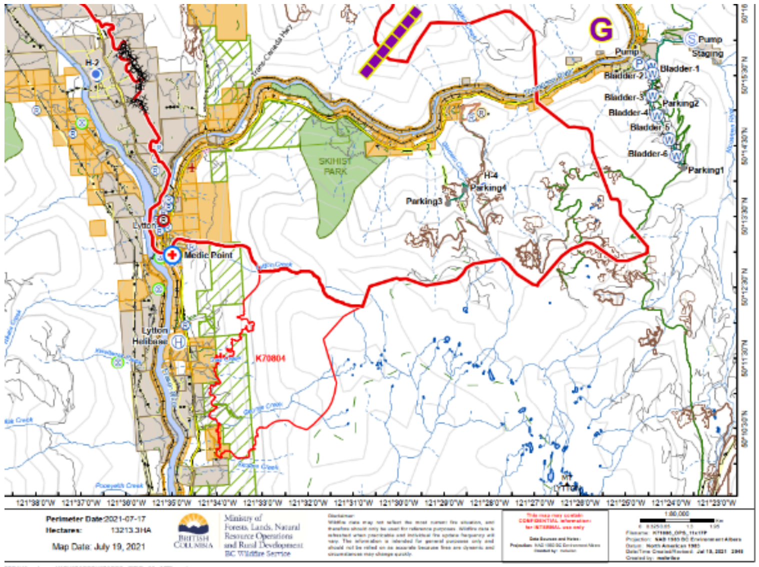

Figure 12. Location of the fire front on July 17.

July 18 – The fire front had advanced closer to the drainage, and hotspots were detected along the ridge top (Figure 13).

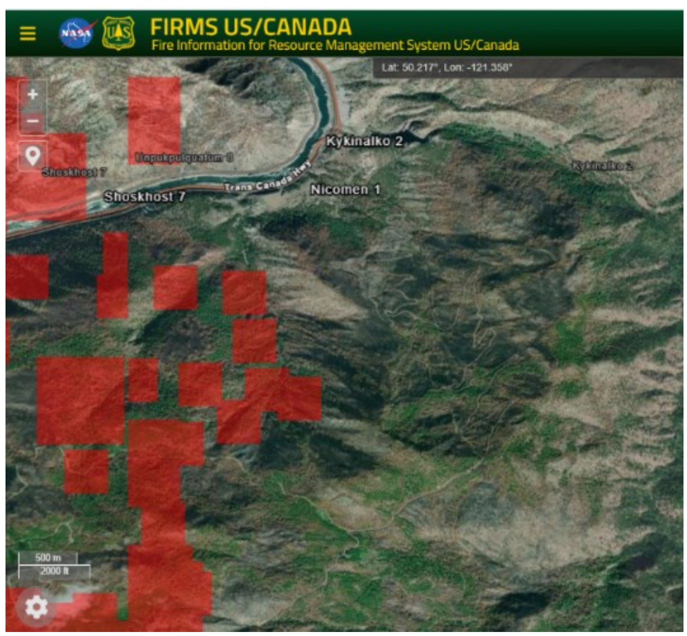

Figure 13. Active thermal anomalies detected by MODIS at 1318 PDT, July 18.

July 19 - Through the morning, the fire advanced eastward toward the drainage. By mid-afternoon, the fire crossed the top of the west ridge (Figure 14) and exhibited Rank 5 fire behaviour with a well developed smoke column. Later in the afternoon, as wind speeds increased, the fire was driven northward and downslope through the drainage toward the community (Figure 15).

Figure 14. Fire advancing into the top of the drainage at 1413

The BCWS Advanced Planning Unit prepared a fire behaviour projection for July 19, which closely mirrored the fire's actual spread through the drainage toward the community of Nicomen (personal communication; Rory Colwell October 20, 2021) with a daily perimeter as shown in Figure 15.

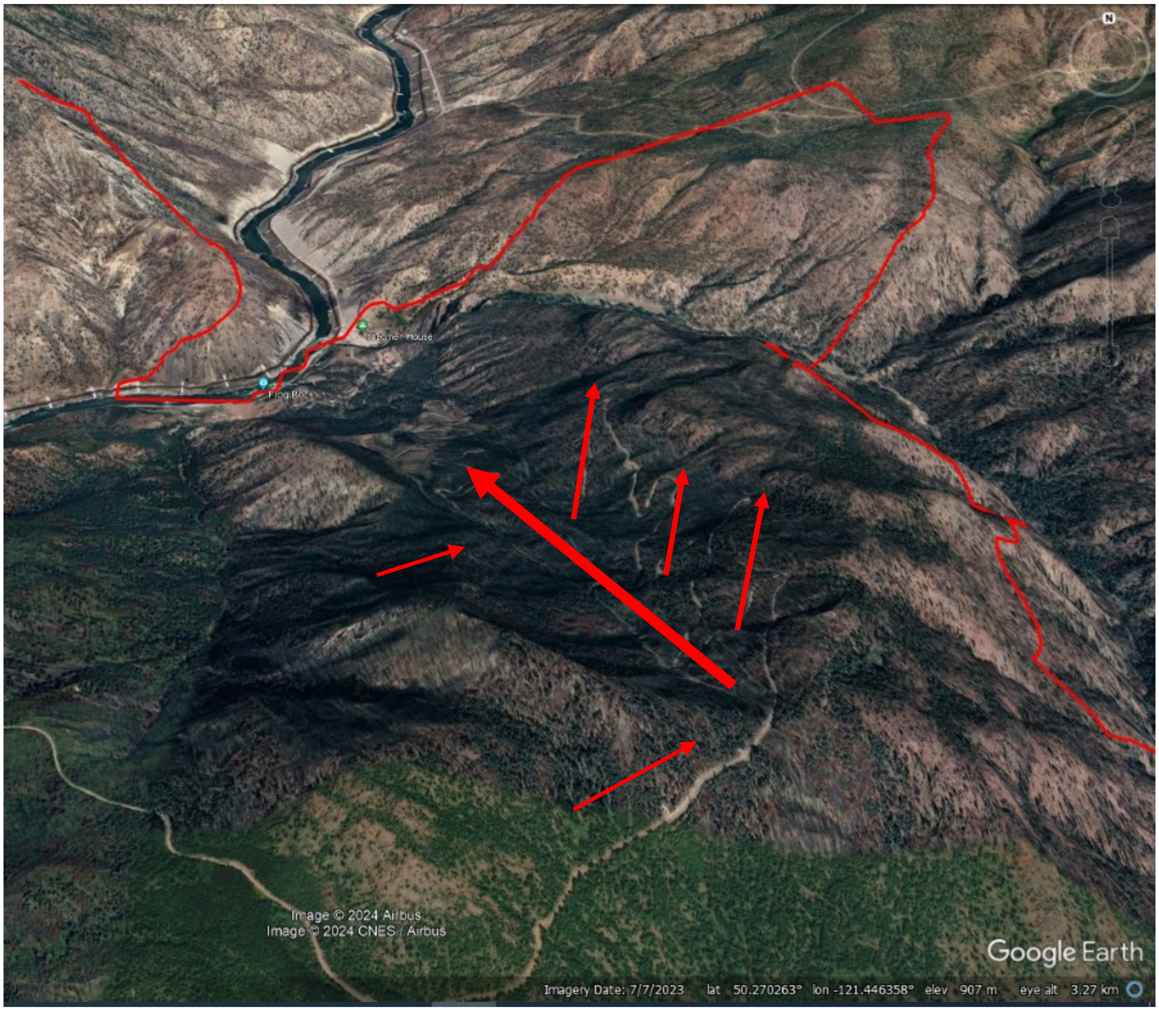

Figure 15. Fire growth toward Nicomen with the daily fire projection perimeter for July 19.

4.3 Fire severity

The forested area surrounding the community of Nicomen is a combination of fuel treatment areas, harvest blocks, and natural forest stands. Variations in fire severity were noted across these fuel environments in the drainage above the community.

The greatest contrast in fire severity was observed in the lower sections of the drainage where the natural forest stands meet the fuel treatment areas below (Figure 16). As high-intensity crown fire in the untreated forest advanced toward the fuel treatment areas above the community, planned ignitions were conducted in the fuel treatment areas.

The lower density fuel treatment areas with increased crown base height and reduced surface fuel load created fuel conditions that promoted moderate fire intensity applied to remove surface fuels with minor crown involvement.

Figure 16. Low scorch height in a fuel treatment area (left) with patches of higher fire severity in untreated areas (right).

The harvest blocks may have had a moderating influence on fire behaviour which resulted in reduced fire intensity impacting adjacent natural forest stands. In the mid-section of the drainage (Figure 17), complete crown scorch with some crown retention in the harvested areas was an indicator of high fire severity. Minimal crown scorch in the forest stands below the harvested area suggested a reduction in fire severity as the fire passed through the harvested area.

Figure 17. Changes in fire severity as the fire progressed down-slope through harvested areas.

However, slash residue in the harvest blocks may have contributed to greater firebrand generation, with spot fire development downslope.

5 FIRE MANAGEMENT APPROACH

5.1 Suppression

Smoke was a limiting factor for aerial attack on July 19, and helitanker operation was restricted to two Kamov helitankers delivering water to the west side of the drainage where the fire front was approaching.

In the lower slopes along the west side of the drainage, a fuel free had been cut which linked numerous switchbacks on the Nicomen River Road and created a control line that was to be used for a planned ignition to burn out fuels on the west side of the drainage. An extensive water delivery system had been installed to support the ignition operation (Figure 18).

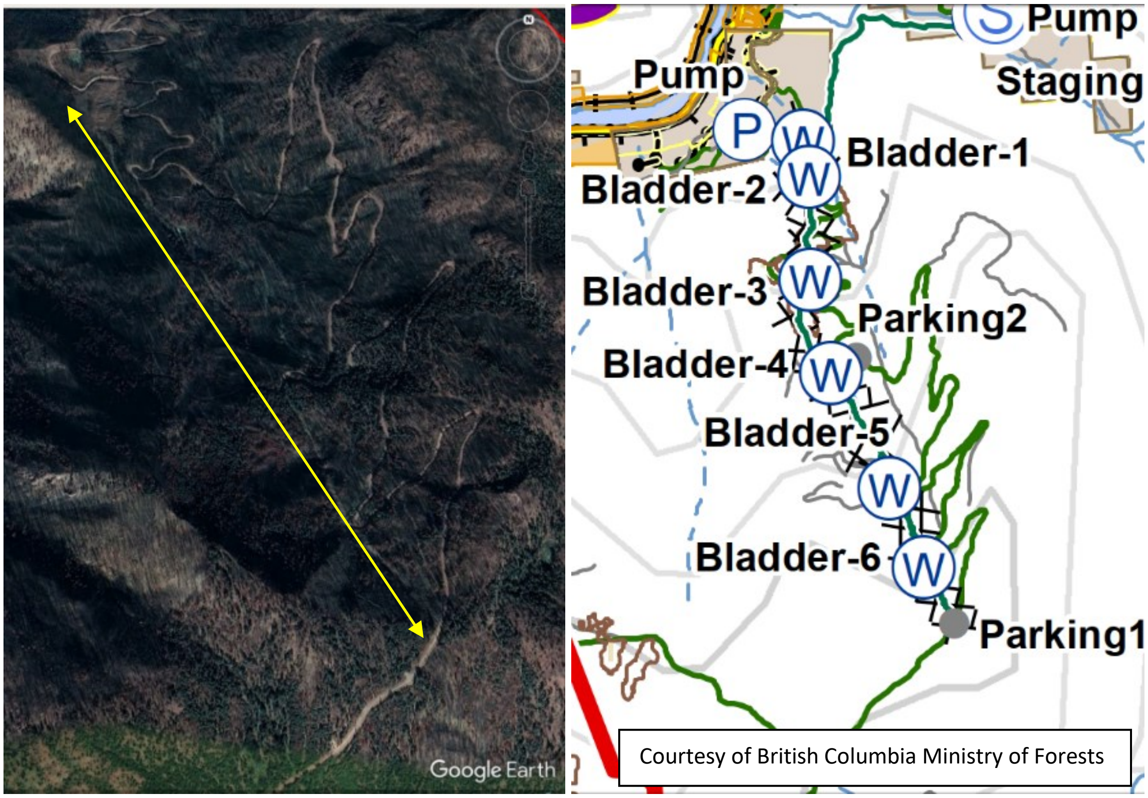

Figure 18. Fuel free (yellow line) and water delivery system (right) installed in preparation for ignition operations along west side of the drainage

On the afternoon of July 19, there was insufficient personnel to conduct the planned ignition from the ground, and the wind and smoke conditions did not permit aerial ignition. Another limiting factor was the fire's rapid spread and proximity to the control line which precluded safe ignition operations.

5.2 Community protection

In the two days prior to the wildfire entering the drainage above Nicomen, proactive fuel reduction activities on the green side of the control line were conducted in the community. A focus on fuel reduction in the Immediate (0 - 1.5 m) and Intermediate (1.5 - 10 m) Zones[2] surrounding structures included removal of knee-high grass with weed whippers and rakes or with burning (Figure 19). Also, non-vegetative fuels were moved away from buildings.

[2] https://firesmartcanada.ca/about-firesmart/the-home-ignition-zone/

Figure 19. Structural firefighters supporting ignition operations around structures.

The large grassy field below a steep road was recognized as a potential risk during egress (especially for large engines), so a planned ignition was conducted to remove those fuels below the community (Figure 20).

Figure 20. Ignition of the grassy field below steep road.

In each of the fuel removal operations, BCWS crews conducted the ignition operations while structural fire crews supported the operations with water delivery (pre-wetting fuels to create control lines and extinguishing spot fires).

5.3 Ignition operations in the fuel treatments

In the weeks prior to the wildfire/fuel treatment encounter at the community of Nicomen, the Lytton Creek fire advanced along the Thompson River valley with encroachments on other communities. During the site visit at Nicomen, the fire behaviour analyst (Rory Colwell) discussed valuable learnings from these previous encounters. At the community of Gladwin, suppression personnel realized that fire behaviour was beyond expectations and that there was little chance of success in direct attack at upper elevations due, in part, to limited and/or difficult access associated with the rugged terrain. Under these extreme fire behaviour conditions, suppression personnel recognized that a better strategy with greater chance of success was to let the fire burn down slope and to protect communities at lower levels in the valley bottoms through the use of planned ignitions as one of the primary tactics.

This strategy was applied at Nicomen with two teams starting ignition operations from opposite ends of the community, burning out fuels in the treatment areas above the community and working towards a central location where the teams met. The ignition operations were applied to take advantage of the thinned forest stands with reduced surface fuel loading in the fuel treatment areas. (Figure 21)

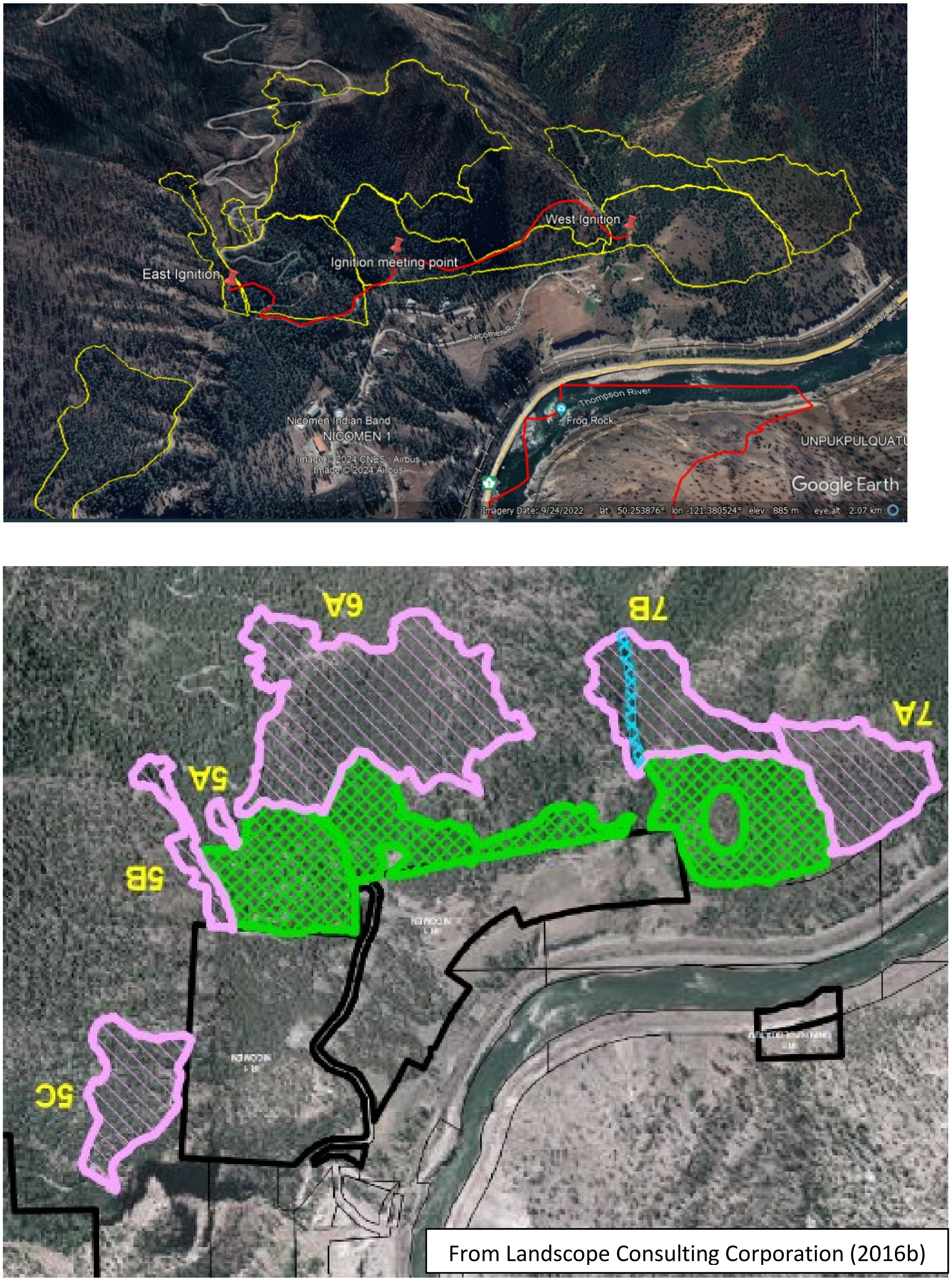

Figure 21. Ignition patterns (above) in relation to fuel treatment areas (below).

The ignition operations took advantage of the roads as control lines and applied three or four ignition lines in tandem (Figure 22). The ignitions in the fuel treatment areas resulted in Rank 2 and 3 fire behaviour (Figure 23). After the initial ignition lines were completed, the squad on the eastern ignition returned to ignite fuel between the community and the initial ignition line.

At the time of ignition, fire behaviour in the main fire approaching downslope was Rank 3+ with spotting. The ignition operations were conducted between 1900 and 2200.

Figure 22. Ignition operations in fuel treatments above Nicomen.

Figure 23. Rank 2 and 3 fire behaviour during ignition operations at 2103 h.

6 DISCUSSION

6.1 Proactive fuel reduction

Fuel reduction treatments above the community of Nicomen were critical to the success of the ignition operations in slowing the rate of spread and reducing the intensity of the wildfire before it reached the community. However, these treatments should not be relied on as a stand-alone preventative measure. A wholistic approach to community protection could have been implemented in the community more proactively under low fire hazard conditions to address fuel hazards around structures and in large open areas in the community.

More preparation could have been done earlier in the season with fuel removal (grasses and non-vegetative fuels) around buildings. The fuel reduction work that was conducted in the community during the wildfire incident was done under extreme fire hazard conditions. A much more cautious approach to firing patterns and structure protection was required under these fire hazard conditions. This resulted in a very time-consuming operation with a higher risk of values loss. Furthermore, conducting these fuel reduction operations under conditions of extreme heat would have been exhausting for personnel. From a resource allocation perspective, these personnel could have been deployed in other critical suppression operations.

6.2 Value of fuel treatments

The fuel reduction treatments above Nicomen that were anchored to the Nicomen River Road provided a good opportunity to conduct planned ignitions and create a barrier to fire spread toward the community. The road network and the thinned fuel treatment areas with the cleaned surface layer provided improved access while water delivery systems were being prepared and the igntion operation was being conducted.

Fuel reduction in the surface layer with removal of ladder fuels contributed to lower fire intensity, reduced potential for crown fire initiation, and a reduction in firebrand production. The lower fire intensity would have allowed the igntion team to move through the igntion zone more quickly with reduced chance of flareups. The reduction in firebrand production in the treatment areas reduced the potential for airborne embers igniting spot fires in the community below.

Suppression personnel indicated that without the fuel treatments on the lower slopes above the community, the community protection operations would have been challenged to a greater extent.

7 CONCLUSION

In October 2021, FPInnovations and the BC Wildfire Service conducted an on-site post-fire analysis of the Lytton Creek wildfire's progression as it approached the community through the mountainous terrain and drainage above the community of Nicomen. Suppression personnel provided first-hand observations of how the wildfire advanced through fuel treatments, harvest blocks, and natural forest stands and toward the community of Nicomen.

The extreme fuel hazard conditions in the three weeks prior to the encroachment and the strong south winds on July 19 contributed to fire behaviour that was beyond the capabilities of direct attack with available suppression resources. As the wildfire advanced down the drainage toward the community, suppression personnel conducted a successful burnout operation in fuel treatments above the community. The ultimate outcome of these operations was no structure loss.

The success of the burnout operation in the fuel treatments can be qualified in different ways. Firstly, the thinned overstorey with reduced surface fuel loading allowed for easier and safer movement through the fuel treatments while conducting the burnout operation.

Secondly, lower fire intensity in the fuel-reduced treatment areas reduced the potential for firebrand generation. With a reduced potential for spot fire development in the community below, structure protection was easier to coordinate and execute.

Several proactive fuel reduction measures were applied below the fuel treatments within the community of Nicomen in the days prior to the fire encroachment. The reduction in hazardous fuels in the structure ignition zone provided additional security in community protection and provided a good demonstration of measures that should be taken by community members under less hazardous conditions (British Columbia FireSmart 2023).

The extreme fire behaviour exhibited in this topographic arena of the Thompson River valley was not unique in the 2021 fire season. In other similar wildfire/fuel treatment encounters, planned ignitions were successfully applied in fuel treatment areas to reinforce the fuel treatments' resistance to fire spread and to reduce fire intensity. Reviewing and recognizing the changing fire behaviour and environmental conditions that permitted the successful execution of each operation will be important in applying these techniques in other similar scenarios.

8 ACKNOWLEDGEMENTS

Thanks to those who participated in the field visit to view the site of this wildfire/fuel treatment encounter and shared many valuable insights. Special thanks to Rory Colwell and Steffyn Hunt for continued correspondence and sharing further information and photos. Thanks to Landscope Consulting for providing fuel treatment maps and photos.

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10 APPENDIX A: BC WILDFIRE SERVICE SPOT FORECAST

This is not a substitute for direct discussions with the fire weather forecaster!

Date Issued: 17 July 2021 **Valid: 18 July 2021**

BC Wildfire Service Spot Forecast

REQUEST *(Don't request preparation for early in the morning unless you need it then!)*

Fire/Proj #	K71086	Request by: Rory Colwell	Date: July 10
Location Name:	Lytton Creek		
Representative Wx Stn		Splintlum	
Coordinates: dd mm.mmm		50 18.291/121 38.256	
Slope% 100	Aspect W	Valley Orientation	N-S
Elevation(s) for forecast	700	Other?	
Date/Times Required (discuss additional needs with forecaster)	**Date: July 18**	**Select (PDT)**	1300 1700 2100 0100 0500 0900

SYNOPSIS
An upper low remains off Haida Gwaii giving the fire centre region a southwesterly flow today and tomorrow and the airmass will remain stable. A ridge starting to build to the east tomorrow will begin a warming trend. Light inflow winds are expected today and tomorrow.

TONIGHT/TOMORROW/SUNDAY
TONIGHT: A few clouds. Low temperature 14 C and RH recovery to 70%. Winds becoming light and variable by midnight.
TOMORROW: A few cloudy periods. High temperature 30 C and minimum RH 23%. Winds SE 10 to 20 G 30 km/h.
MONDAY: A few cloudy periods. High temperature 32 C and minimum RH 21%. Winds SE 10 to 20 G 30 km/h.

OUTLOOK: *(include confidence)*
As the ridge to the east builds and the low remains off Haida Gwaii the flow backs to the south giving the possibility of subtropical moisture Monday night and Tuesday. By Tuesday night the flow veers to the southwest as the low moves over Haida Gwaii. The low opens into a trough Wednesday and moves inland bringing a more unstable airmass and cooler temperatures. There will be a risk of thunderstorms with dry lightning Monday night and Tuesday. Temperatures Tuesday will cool to near 30 C with light to moderate southeast winds. As the low rotates through Wednesday, some showers may occur. Temperatures will cool to near 27 C with light to moderate southeast winds.

SPOT FORECAST *(default times, expand for additional times and elevations as required)*

TOMORROW

13:00	TEMP	28	RH	28%	WIND	SE 5-15 km/h	% CHANCE RAIN	0
17:00	TEMP	30	RH	23%	WIND	SE 10-20 G 30 km/h	% CHANCE RAIN	0

DISCUSSION: *(include stability, upper winds at 3? levels, inversion break time & temp, cloud cover, visibility, etc…)*
A dry and stable airmass. With light winds and fair venting, smoke may again begin to thicken over the area, but should improve tomorrow with good venting.

Morning inversion 1500 to 1800 metres with breakdown temperature 17 C. Winds above inversion SW 20 km/h.

Forecaster: Paul Emmett 250-554-7247 paul.emmett@gov.bc.ca
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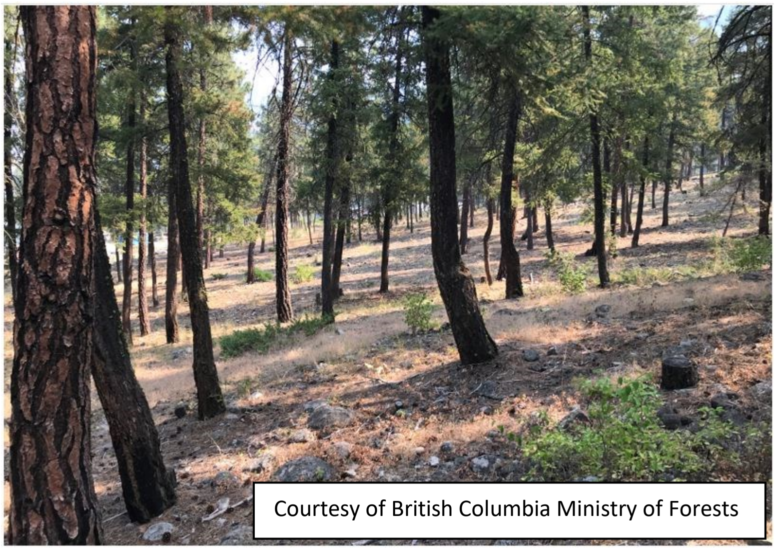
11 APPENDIX B: SURFACE FUEL LOAD ASSESSMENT PHOTOS


Courtesy of British Columbia Ministry of Forests

Unit 7

Pre-ignition July 2021

The following pictures are courtesy of Landscope Consulting.

Unit 6A

Post-treatment April 2020.

Unit 6A

Post-treatment April 2020

Unit 6A

Post-treatment April 2020

Unit 5A

Post-treatment April 2017

Unit 5B

Post-treatment April 2018

Unit 7B

Post-treatment April 2018

Unit 7B

Post-treatment April 2018

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