RESTORING ELK HABITAT THROUGH PRESCRIBED FIRE IN LYTTON, B.C.

Project Summary by Robin Strong, R.F.T.
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The Mill Yard prescribed burn was conducted on March 30, 2016, in an effort to reduce forest fuels and monitor the effects of prescribed fire on wildlife habitat values near Lytton, B.C. The project was undertaken jointly between the Lillooet Fire Zone, Wildfire Management Branch (Ministry of Forests, Lands and Natural Resource Operations) and myself, Robin Strong, RFT, as my final project for the Restoration of Natural Systems diploma at University of Victoria.

The 11.5 hectare study area is located on crown land, 3 km south of Lytton on Highway 1, on a fluvial terrace of the Fraser River. The natural disturbance regime of the forested ecosystems near Lytton was described by Wong (1999) as a mixed-severity fire regime, with forest structure and function predominantly influenced by frequent, low-intensity fires. Fire suppression has altered these forests to include more dense young stands. At the landscape level this has lead to changes in hydrology, decreased biodiversity, and increased fire frequency, intensity and size.

At the stand level, two problems have arisen from changes to forest structure. First, there is an increased threat of wildfire to the Village of Lytton. In response to this, the Village of Lytton completed mechanical fuel-management treatments in 2014 in the study area, including thinning and pruning trees and burning the resulting slash in small piles. Secondly, there is a loss of habitat value to a local population of Rocky Mountain Elk (*Cervus elaphus*). In 1973, a herd of 39 elk was introduced to Lytton Mountain, transplanted from Jasper National Park. At the time, Lytton Mountain provided productive habitat for game due to a large wildfire that had occurred there. The elk population increased to nearly 150 animals by the early 1990s, but eventually declined to approximately 30 animals that exist there now. The decline has been attributed to habitat becoming unproductive and the dispersal of individuals. Regular habitat enhancement is required to keep the land in a productive state for the elk (Chris Proctor, pers. Comm., March 7 2016).

The goals of the prescribed burn arose from the undesirable stand changes described above. The first goal was to increase wildfire protection to the Village of Lytton. Second, we aimed to monitor the changes in elk browse species after the reintroduction of low-intensity fire to the site. The third goal was to provide training in prescribed fire to Ministry wildfire crews, and to provide an educational opportunity for myself as part of the Restoration of Natural Systems program.

The site was divided into three polygons based on ecosystem structure: a low shrub/herb ecosystem (0.54ha), a mature *Pinus ponderosa* forest mechanically treated in 2014 (6.96ha), and a dense maturing *Pseudotsuga menziesii* forest that had not received fuel management treatments (3.15ha). In addition, a 0.83ha control area was set up within the study area. The control area had been mechanically treated for fuels in 2014.

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In order to monitor the success of the burn, five 200m^2 circular plots were set up throughout the burn site. Data collected at these plots included tree mensuration (tally of live and dead-standing trees, species, height, and diameter), and understory vegetation species and percent cover. Photo points were set up at each plot, and pre-burn photos were taken.

A burn plan was developed in the spring of 2015 and included information about the desired fire effects and an ignition and holding plan. The burn plan outlined ecosystem restoration objectives, such as creating wildlife trees, retaining coarse woody debris, and diversifying forest structure by causing tree mortality.

The burn was conducted on March 30, 2016. After guarding the site, the fire was ignited with drip torches at approximately 13:00, and continued until about 18:00.

By the end of the day, 70% of the site had successfully been burned. The mature Ponderosa pine forest burned most uniformly, while the dense Douglas-fir forest at the toe of the slope didn't ignite well, except for within a few feet of the ignition strips. Post burn monitoring conducted one week after the burn showed that tree mortality was low overall, with no mortality in conifer trees over 10cm, and 43% mortality in trees under 10 cm. This mortality rate was lower than what we had aimed for, and we were therefore unable to create any wildlife trees or coarse woody debris as a result of the burn. It's unlikely that further mortality will occur in the next year, as the living trees were not severely scorched. Grasses regenerated strongly within a week, and the cover of grass species increased from the pre-burn cover by approximately 20%. Unfortunately I wasn't able to identify grass species due to the timing of the pre- and post-burn monitoring, which occurred just after grasses emerged. After the fire, I detected a number of understory species that weren't detected before the burn, including trace amounts of *Lomatium macrocarpum*, *Lithospermum ruderale*, and *Prunus pensylvanica*. *Lomatium macrocarpum* is an important food plant for the Nlaka'pamux, so it is exciting to see the response of that species to prescribed fire.

A number of valuable lessons were learned from this project. Most importantly, undertaking a prescribed burn requires at least one year of planning, especially if restoration practitioners want to monitor the response of vegetation. In this project, for a variety of reasons, vegetation monitoring was oddly timed for early spring, when plants are just emerging and nearly impossible to identify or quantify. Because of this, monitoring the effects of the burn on elk browse species was somewhat unsuccessful. Secondly, it is recommended to use 1m^2 plots to measure plant cover and fine woody debris, as using 200m^2 plots is not precise enough. Third, low-intensity fire doesn't create severe enough conditions to kill mature *Pinus ponderosa* and *Pseudotsuga menziesii*, so it is not an appropriate tool for creating wildlife trees and snags. A better approach would be girdling, which is recommended for this site as there are no dead standing trees at all. Fourth, a wildfire that occurred at the site a few months after the prescribed burn showed the benefits that the prescribed burn offered in terms of reducing the severity of summertime burns.

A wildfire ignited downwind of the Mill Yard prescribed burn in July 2016, in a similar forest that had been mechanically treated for fuels, but had not received a prescribed burn. The wildfire spread quickly through the heavy needle accumulations, but once it reached the prescribed fire guard at the Mill Yard burn site, the fire dropped and was unable to spot across the guard. The lack of spotting was due to the lack of receptive fuels as a result of the prescribed burn. The prescribed burn was successful at stopping this fire, despite winds in excess of 20km/hr. This event was a great example of how prescribed burning can complete a mechanical fuel management treatment to provide further protection to houses in the event of summertime wildfires.

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Contact Information:
Robin Strong, Registered Forest Technologist
Full Circle Ecological Services
robin@fullcircleecological.com

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Reference:
Wong, C.M. (1999). *Memories of Natural Disturbances in Ponderosa Pine - Douglas fir age structure, Southwestern British Columbia*. Masters Thesis, Simon Fraser University, Burnaby, Canada.