Friends of the Bitterroot (FOB) submits the following comments on the Lick Creek Demonstration/Research Forest Project, proposed under a categorical exclusion.

In general, FOB supports research projects like this, and we urge Bitterroot National Forest to use valid results from this local study to design and plan forest management activities. We do have some questions, comments, and suggestions that we hope you will consider.

It appears that ecosystem restoration, not just fuels reduction, was the primary goal of the research project initially. Smith et al. (1999) stated: *"The silvicultural cutting and prescribed burning treatments would be designed to benefit wildlife habitat (especially forage production), esthetics and recreation, timber production, and forest protection (fire, insects, and disease) by complementing the natural ecological processes."* In fact, the first post-treatment study in 1998 examined *"fuel reduction, tree mortality and growth response, undergrowth species response, tree regeneration, soil nutrients, and response of wildlife browse shrubs. Associated studies measured human visual preferences for different restoration treatments. Also, bird abundance and foraging behavior was measured in relation to shelterwood and underburning treatment, as was the comparative quality (for wildlife habitat) of snags created by fire versus mechanical girdling"* (Smith et al 1999). Effects on soil nutrients, soil microbes, Scouler's willow, and antelope bitterbrush were also examined. We note that the most recent Lick Creek studies in 2015 did not include evaluation of soils, birds, snags, visual quality/aesthetics, or willow and bitterbrush. We do appreciate that the 2015 studies did add the effects on biomass (carbon storage), which are discussed below, and we suggest adding studies of soil carbon and mycorrhizae.

Although the scoping document states that the research aligns with the needs identified in the Wildfire Crisis Strategy, those needs were only a part of the original research project. We hope that you modify this project so it and future research activities address and evaluate all of the initial goals of the research project, not just fuels reduction. The conclusion in the NRFCN Lick Creek brief (2021) states: "Our research shows that fuel treatments aimed at reducing potential wildfire severity can also have the added benefits of sequestering carbon, increasing resistance to mountain pine beetle outbreaks, and improving resilience to drought stress**",** when, in fact, these other benefits were equal goals to fuel reduction in the initial study and may conflict with a fuel reduction focus.

A significant omission in the study is the lack of control area data from study initiation in 1992 until 2007, 15 years later, meaning that other, non-studied, variables could have influenced the outcomes and conclusions. Other serious omissions in the study included the lack of any burn-only units and the lack of any non-commercial harvest-only units. We suggest adding these units to the study, especially because non-commercial thin-and-burn and burn-only activities are proposed on many future BNF projects.

Also, scoping did not disclose if and when more commercial harvest is planned for the commercial thin study, only that prescribed fire was planned 2033-2038. Does this mean no more commercial harvests are planned?

A fuels reduction focus may conflict with some of the other research goals. Jang et al. (2021) state:

"Our results indicate that non-native plant responses were still fairly strong 15-years post treatment (Fig. 1), suggesting that retreating this early could exacerbate noxious weed invasions in these forest stands by increasing the frequency of disturbances that seem to benefit non-native more than native taxa. This outcome complicates the manager's role in restoring forests adapted to frequent, low-severity fire by creating a tradeoff between management of fuels (to reduce fire risk) and invasive plant management."

For example, while Hood et al. (2020) found that cut-and-burns treatments were most effective at fuel reduction, Jang et al. (2021) found that burned units increased invasive plants and decreased understory health, especially in the fall burn units. This demonstrates that the conclusions in the NRFCN (2021) Lick Creek brief are complex and nuanced. We comment and question some more of those below.

NRFCN (2021) states that "*treatment units showed non-native understory species cover similar to pretreatment levels (<5% cover), despite a large spike 3-5 years post-treatment."* However, Jang et al. (2021) found that non-native forbs, mostly knapweed, were still at increased levels 23 years later in all treated units, and non-native graminoids were still increased in all burned units. Fall burns caused the worst conditions, but all treated areas had more invasives than the controls, except for non-native graminoids in no-burn treatments. These results are similar to those Dodson and Fielder (2006) found in nearby Lubrecht forest. Jang et al. (2021), for Lick Creek, concluded:

"disturbance from overstory restoration treatments can substantially disrupt understory plant communities and facilitate non-native species invasions…. The stronger responses of non-native species, particularly to higher-intensity treatments, indicate a degree of susceptibility to invasion that should be considered when applying forest restoration treatments, particularly if re-entry maintenance treatments occur on short time scales… This research suggests that managers consider a wider array of restoration maintenance options to best achieve specific management objectives"

NRFCN (2021) also states that "*treatment units showed reduced tree mortality from mountain pine beetle."* But total mortality was greater when the 1992 and 2015 commercial harvests are included. Six et al (2014) pointed out similar deficiencies in other MPB studies: treated areas had fewer live trees than untreated areas. In other words, if all the trees are cut down, not a single one will die from MPB. We conclude that NRFCN's conclusion is invalid.

NRFCN (2021) states that "*treatment units showed aboveground tree biomass (i.e., carbon storage) recovered to pre-harvest levels."* However, Clayatt et al. (2017) found that total biomass 23 years later was still 25-30% lower than the control area in the commercial thin treatment units, and 40-50% less in the burn units of the shelterwood study, although there, because of saplings the no-burn treatments were similar to the control. Therefore, the conclusion should be that, 23 years after implementation, treated areas still contained 25-50% less biomass (carbon storage) than the control areas.

NRFCN (2021) states that "*treatment units showed surface and canopy fuel characteristics and crowning and torching indices similar to untreated units."* This was due to the presence of increased ladder fuels in the treated areas. In fact, the shelterwood cut-and-no-burn units actually had higher crown fire potential than the control units (Hood et al, 2020). All of these data show that fuel treatment longevity is less than 23 years, but detrimental effects described above may last longer.

In summary, the Lick Creek Research project is providing some valuable information to inform BNF projects, but it must be interpreted carefully and viewed with caution. We find that some NRFCN key research findings (2021) are not supported by the scientific papers, particularly the findings that treatments have benefits for MPB mortality, that treated areas are resilient to non-native invasive plants, and that carbon storage has recovered. We also suggest adding burn-only and non-commercial harvest-only treatments in both the shelterwood and commercial thin study areas. In this and future research, we recommend that you include the full range of studies conducted 5 years after initial treatment, including bird surveys, willow and bitterbrush abundance, recreation/aesthetics, snags, and soil nutrition, microbes, and mycorrhizae. Finally, the focus on fuel reduction was not the original intent of the research, and may conflict with other goals of forest restoration.

We do hope that you will use the valid results to design and inform all future and ongoing BNF projects.

Sincerely.

Jim Miller
President, Friends of the Bitterroot
millerfobmt@gmail.com

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