

Rejuvenation of Big Huckleberry Fields to Promote Fruit Production

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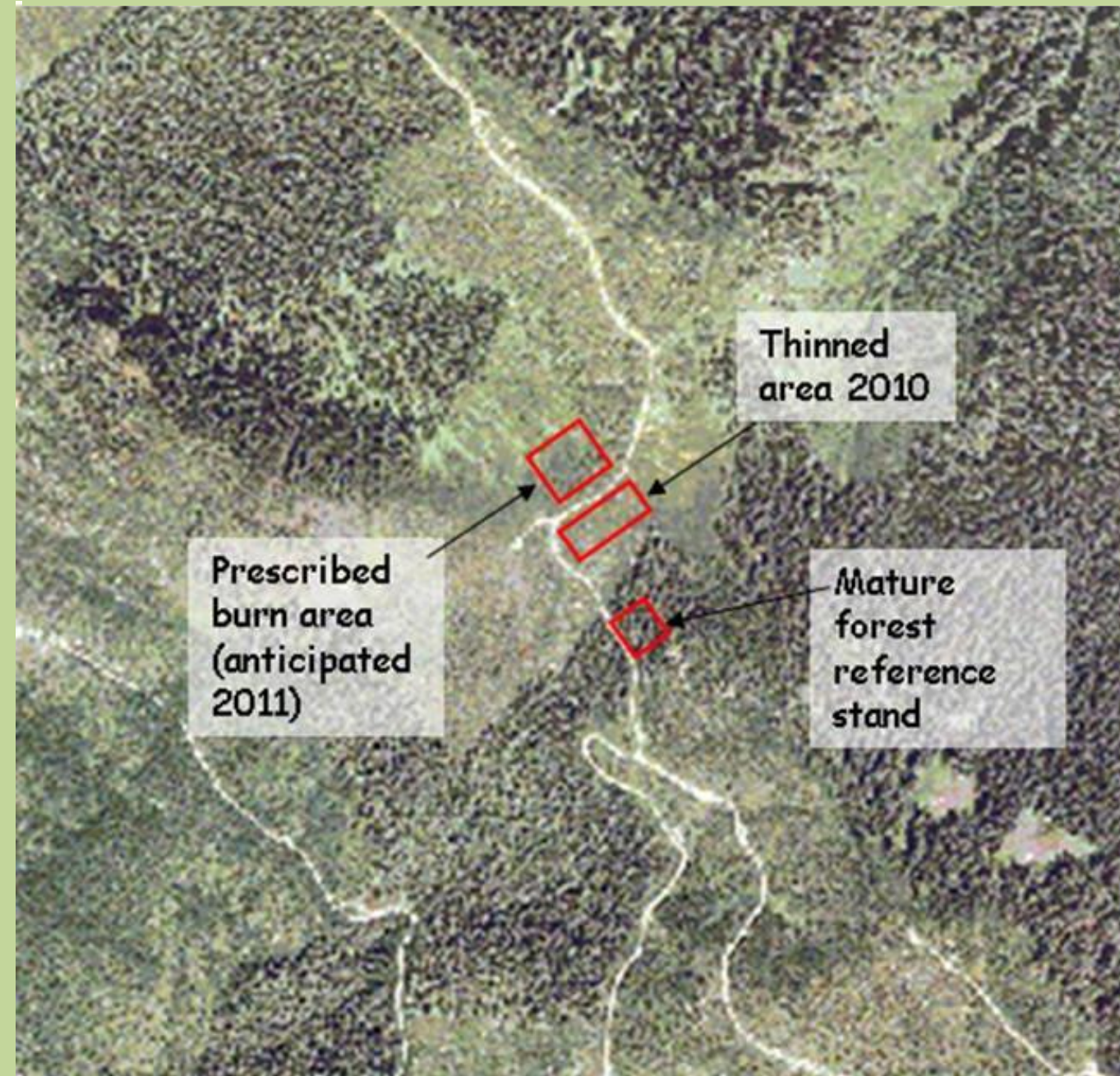
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Background

Big-leaf huckleberry (*Vaccinium membranaceum* Dougl. ex Torr., hereafter VAME) is found throughout mid-elevations in western North America. VAME fruit is a popular berry for both human and wildlife consumption and it has been and continues to be an important diet and cultural item for many American Indian tribes. VAME typically produces abundant fruit only when growing in meadows or early-seral forest stands created by fire, forest harvesting, or other disturbance (Minore 1972, Simonen 2000). Fire suppression, and changes in forest harvesting policy for higher elevation forest stands in western Washington have changed the rate at which these early-seral stands are created and maintained.

One VAME field of particular concern is found in the Darrington Ranger District Stillaguamish River Drainage of Washington. These early-seral fields were created by timber harvesting in the 1980s; this is a popular and accessible berry-picking site, but fruit production is declining as these fields become dominated by older trees which compete for light, water and soil resources with VAME. Based on the hypothesis that huckleberry fruit production will increase if conifer species competing for light and soil resources are removed, the USFS and Tulalip tribe set a goal to reduce forest overstory cover in these 30 year old fields in the Darrington Ranger District Stillaguamish River Drainage and to monitor the project to determine VAME fruit production increases. The USFS and Tulalip tribe have used two techniques so far to rejuvenate VAME fruit production.

Aerial photo of project area showing the area thinned in 2010, the area to be prescribed burned in 2011 and a nearby mature forest reference stand



Rejuvenation Through Mechanical Thinning

Methodology

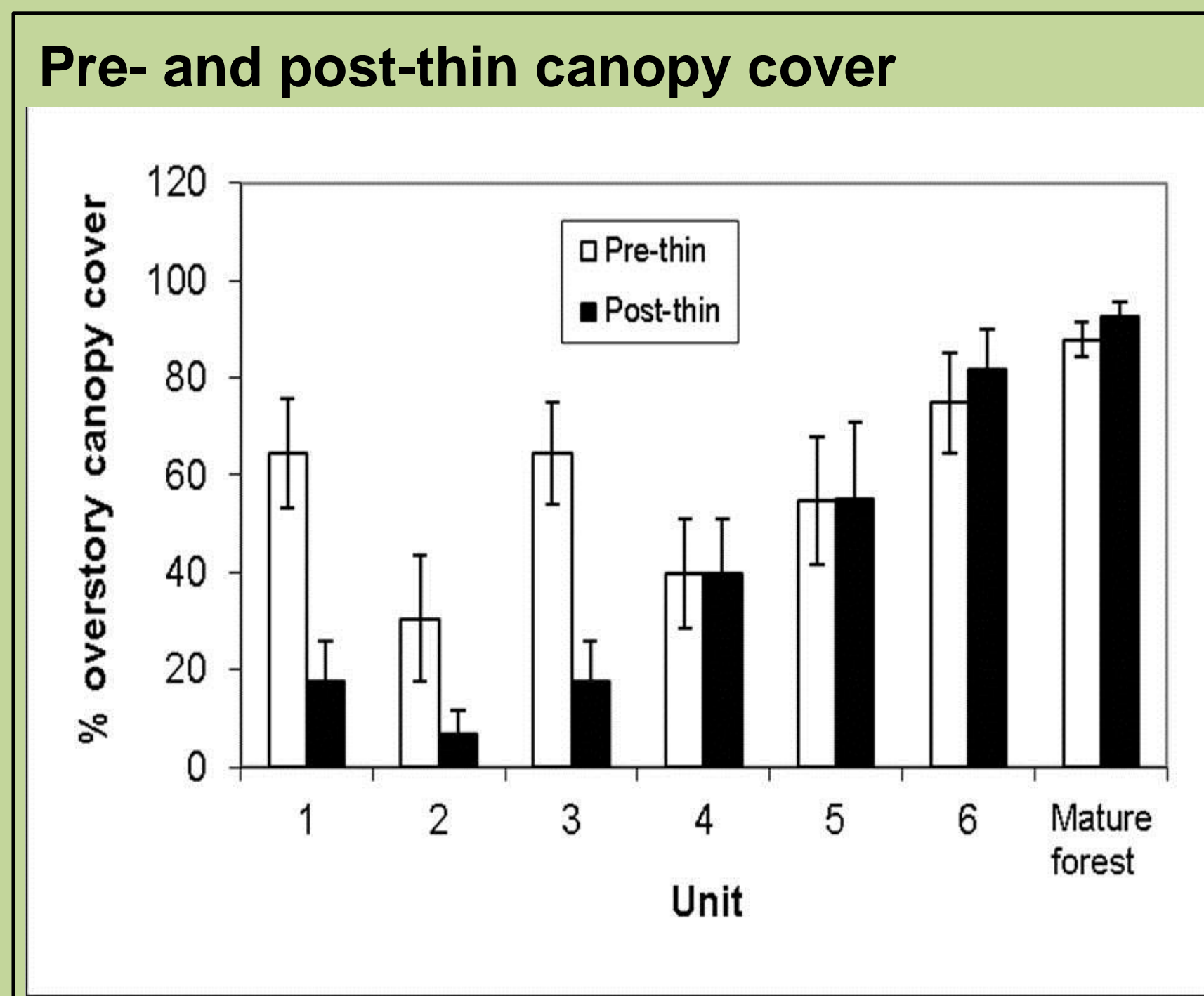
The area to be thinned was divided into three units of approximately equal size. An equivalent adjacent area was also divided into three units and a nearby mature forest was used as a reference stand. Within each unit, nine 1m³ quadrats were used to measure VAME height, percent VAME canopy cover, percent overstory tree cover, and VAME fruiting (using a fruiting index developed by Anzinger 2002). Measurements were taken before the units were thinned, immediately after the units were thinned, and one year following thinning.

Results and Discussion

Thinning in 2010 resulted in a greater than 70% reduction in overstory tree canopy cover in the thinned units (Riley2010). Analysis of Variance (two-way ANOVA using only thinned and unthinned data) indicated no significant difference between average fruiting in any of the study units. The thinning treatment has not yet made a significant difference in VAME fruiting ($F_{(1,8)} = 3.75$, $P = 0.08$). There has not been a significant change of VAME fruiting within the thinned nor the unthinned units in the past year ($F_{(1,8)} = 0.279$, $P = 0.61$). Nor is there any evidence yet of differentiation between the thinned and unthinned units over time (interaction $F_{(1,8)} = 0.031$, $P = 0.87$). We anticipate that eventually VAME fruiting in the thinned units will increase, VAME fruiting in the unthinned units will decrease, and VAME fruiting in the mature forest will remain unchanged. Other studies suggest significant VAME response to tree removal may take several years (Minore 1972, Anzinger 2002).

Future Monitoring

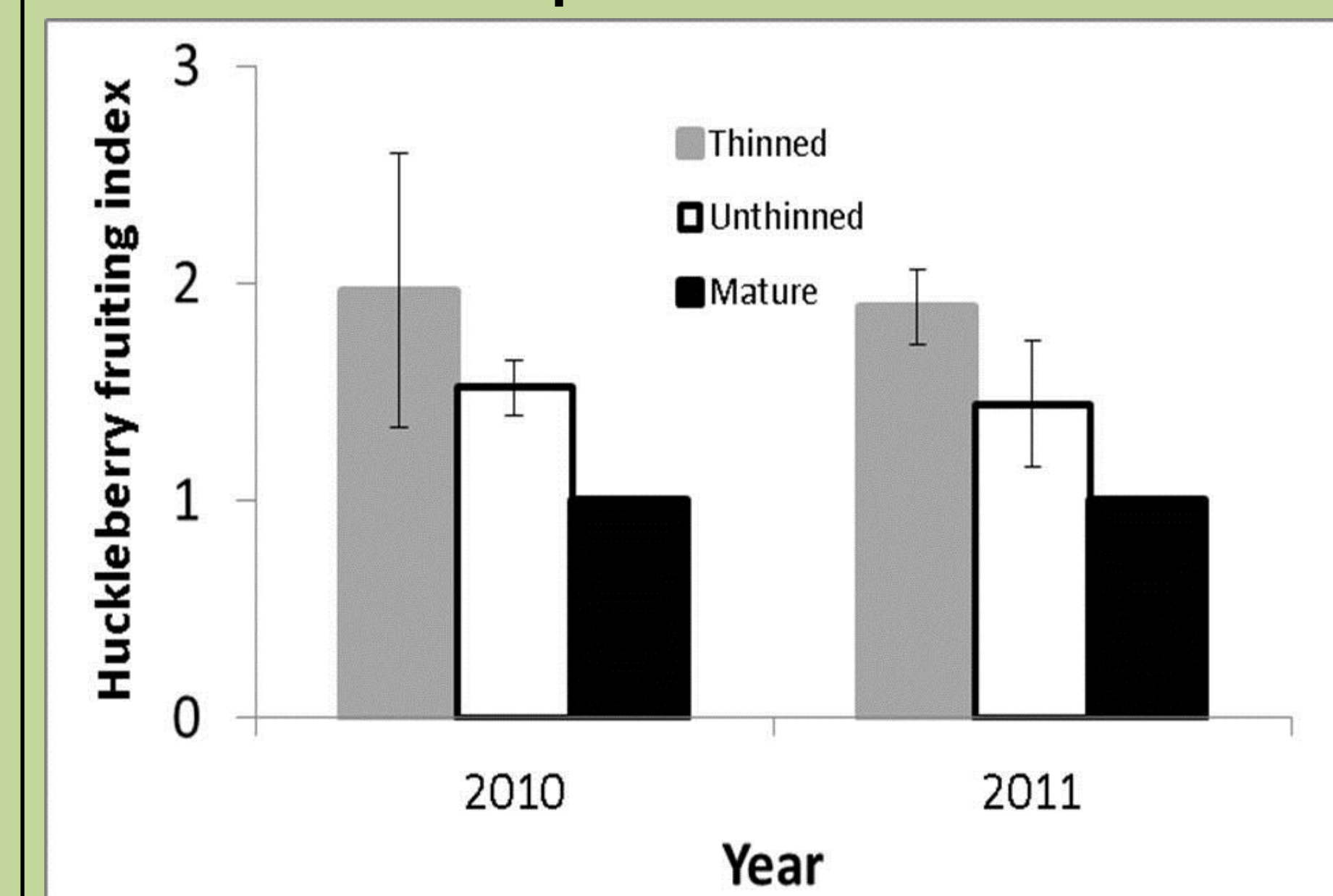
Monitoring of the units will continue periodically into the future.



Before- and after-thinning photos



VAME fruiting in 2010 and 2011 (means \pm SE). A fruiting index value of 1 indicates VAME plants were present but were not fruiting on average, while a 3 indicates VAME plants had fewer than 5 fruits per stem on most stems.



Rejuvenation Through Controlled Burning

Introduction

The use of fire to maintain huckleberry fields was a historically widespread and culturally important practice for Northwest Native American tribes (Anzinger 2002). After a century of fire suppression and reduction of productive berry fields through ecological succession, this practice is being considered as a management tool to rejuvenate VAME fields in the North Cascades. It is anticipated that it may take multiple years post-burn to record measurable differences in fruit production as a result of fire.

Objective

The objective of this study is to measure the effect of prescribed fire on VAME fruit production

Methodology

Within each plot (treatment and control), the following measurements were collected on 22 VAME plants:

- Live VAME canopy dimensions of height, long axis, and short axis(pre- and post-fire) (Riley 2010). The difference between pre- and post-fire data will be an indicator of aboveground VAME biomass consumed in the fire (Martin 1979).
- Canopy density above ground surface using a spherical densiometer held at the base of each VAME plant (pre- and post-fire) (Riley 2010).
- Overstory canopy density using a spherical densiometer held at the top of each VAME plant (pre- and post-fire) (Riley 2010).
- VAME berry production (Anzinger 2002).

The following measurements are also recorded in the treatment plot:

- The amount of soil consumed by fire using duff spikes to provide a measure of fire severity at ground level (Davies 2010). (The duff layer is used to assess fire severity as opposed to using a thermometer or other measurement tool because this method will provide additional information concerning what is consumed by the fire in terms of soil content including belowground huckleberry biomass, soil organic matter, and soil nutrients).
- The nitrogen content of the duff layer using a carbon-nitrogen analyzer.

Results

The pre-fire measurements have been recorded and the prescribed burn is scheduled to occur this October weather and forest conditions permitting. Due to weather conditions, the probability of burning this season is low; if the burn is not able to occur this year, a second year window would be considered.

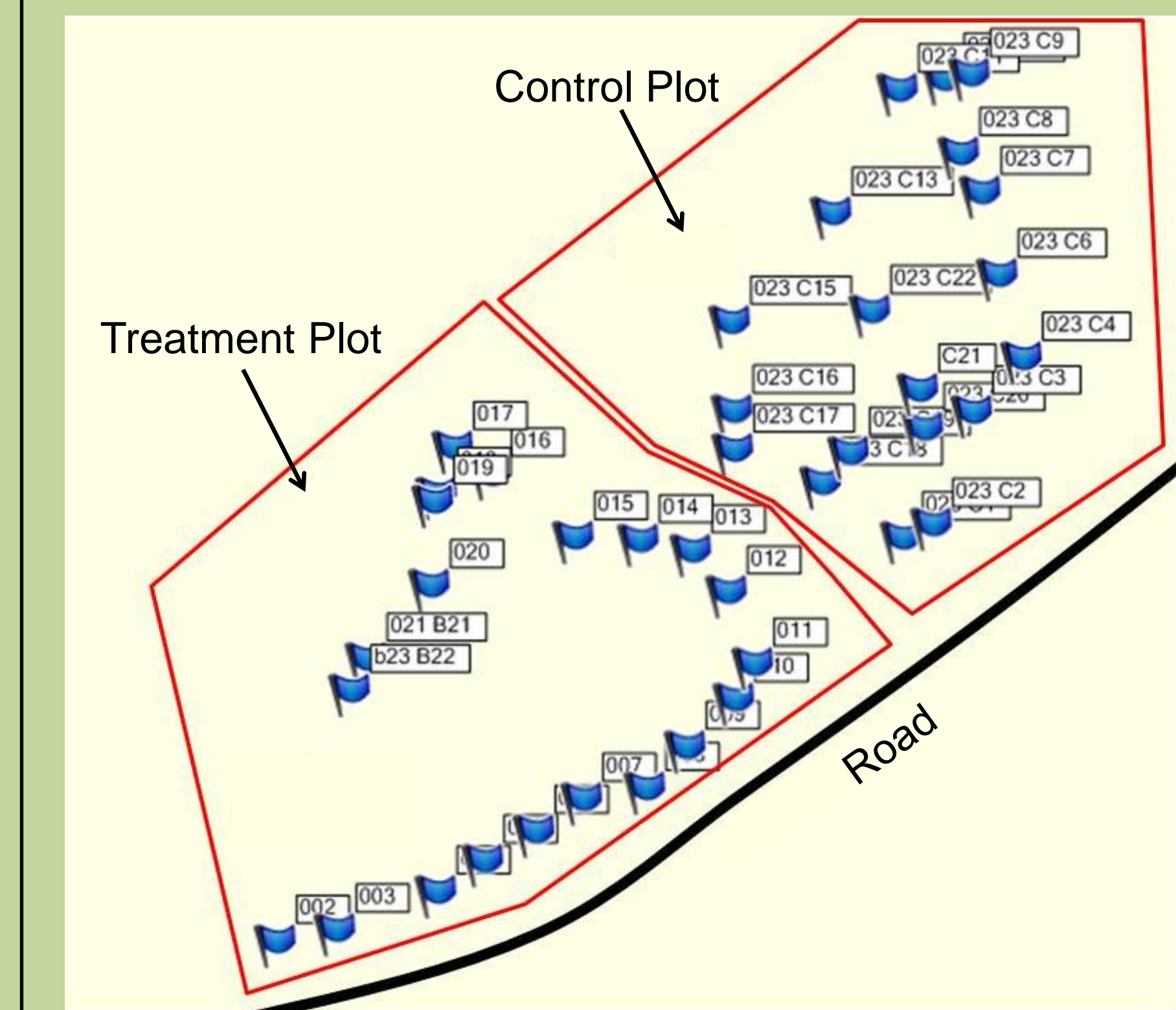
Left: Treatment Plot, Plant B19
Center: Control Plot, Plant C14
Right: Control Plot, Plant C4



Future Work & Monitoring

- The post-fire measurements will be taken immediately following the controlled burn as well as in future growing seasons to monitor VAME response; analyses of this data will occur after collection.
- Additionally, if weather conditions do not permit the controlled burn this season, an additional methodology will be added: VAME total percent coverage of both the control and treatments plots will be assessed pre- and post-fire to provide additional information. This additional measurement will allow for post-fire changes in VAME coverage to be measured and analyzed when determining effects of fire on VAME fruit production.

Study Area: Darrington Ranger District Stillaguamish River Drainage



Acknowledgements

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•Anzinger, D. 2002. Big huckleberry (*Vaccinium membranaceum* Dougl.) Ecology and Forest Succession, Mt. Hood National Forest and Warm Springs Indian Reservation, Oregon. Masters Thesis, Oregon State University, Corvallis. 121 p.
•Davies, G. M., Smith, A. A., MacDonald, A. J., Bakker, J. D., & Legg, C. J. 2010. Fire intensity, fire severity and ecosystem response in heathlands: factors affecting the regeneration of *Calluna vulgaris*. [Article]. *Journal of Applied Ecology*, 47(2), 356-365.
•Martin PAE. 1979. Productivity and taxonomy of the *Vaccinium globulare*, *Vaccinium membranaceum* complex in western Montana. Master's thesis. Missoula (MT): University of Montana. 136 p.
•Minore D. 1972. The wild huckleberries of Oregon and Washington: a dwindling resource. USDA Forest Service Research Paper PNW-143. Portland (OR): Pacific Northwest Forest and Range Experiment Station. 20 p.
•Riley, R. 2010. Segelsen Ridge Huckleberry Enhancement Response Monitoring Report. Submitted to the US Forest Service September 2010.
•Simonin, Kevin A. 2000. *Vaccinium membranaceum*. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: <http://www.fs.fed.us/database/feis/> [2011, March 18].

