Assessing the Effectiveness of Stand Management for Increased Huckleberry Production – 2011 monitoring report

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Background: Huckleberries are an important resource that supports wildlife, recreation, and cultural sustainability. However, anecdotal reports suggest that huckleberry production at the landscape level has declined over the past 50-70 years as second growth forests have encroached into berry patches that were likely established following large burns. In response to this decline, and in compliance with the cultural foods obligations of the Treaty of 1855, the Mt. Hood National Forest is testing an approach to enhance huckleberry production by thinning overstory trees to open up the canopy and allow more sunlight to the huckleberry plants. This management project, known as the "Huckleberry Thin" EA is located in the Clackamas River Ranger District and the Zigzag Ranger District, Mt. Hood National Forest, Oregon.

Monitoring Project Goals: The overall goal of this monitoring effort is to determine the effectiveness of silvicultural treatments conducted within the "Huckleberry Thin" project area. Specifically, the project seeks to:
- Evaluate and compare the effectiveness of different silvicultural treatments on huckleberry production.
- Determine the "response timeline" of changes to huckleberry production following different treatments (i.e., How does berry production 1 year after treatment compare to 3 years, 5 years, etc…?)

Methods: Data on huckleberry plant abundance, size, and productivity were collected from 40 m² circular monitoring plots located in four units of the "Abbott Burn" area of the Huckleberry Enhancement EA project area. To distinguish thinning treatment affects from year to year variations in huckleberry production, plots within the thinning units were paired with plots in similar forest outside the units (Fig. 1, Appendix). Between 2 -4 pairs of plots were located in each unit with higher numbers of plots used for larger units resulting in a total of 24 plots. To avoid selection bias in plot location, coordinated of plot centers were established using GIS maps of the project area and located in the field using a Garmin Oregon 450 GPS unit. Each plot center was established at the location were the GPS unit first registered that I was within 1 m of the coordinates selected using the GIS maps. Plot centers were marked with orange painted pvc tubing and labeled with aluminum tags.

The following data were collected for each circular plot:
1) Percent cover for all plant species.
2) Number of stems > 1 m tall for *Vaccinium membranaceum* and *Vaccinium ovatum.*
3) Height of tallest stem in plot for *V. membranaceum* and *V. ovatum.*

4) Fruiting class for *V. membranaceum* and *V. ovatum* using a modified version of the scale developed by Anzinger 2002 (Table 1).
5) Mass of all ripe fruit in plot for *V. membranaceum* and *V. ovatum* from a complete harvest.
6) Percent canopy closure using a modified version of the spherical densitometer estimation (Strickler 1959).
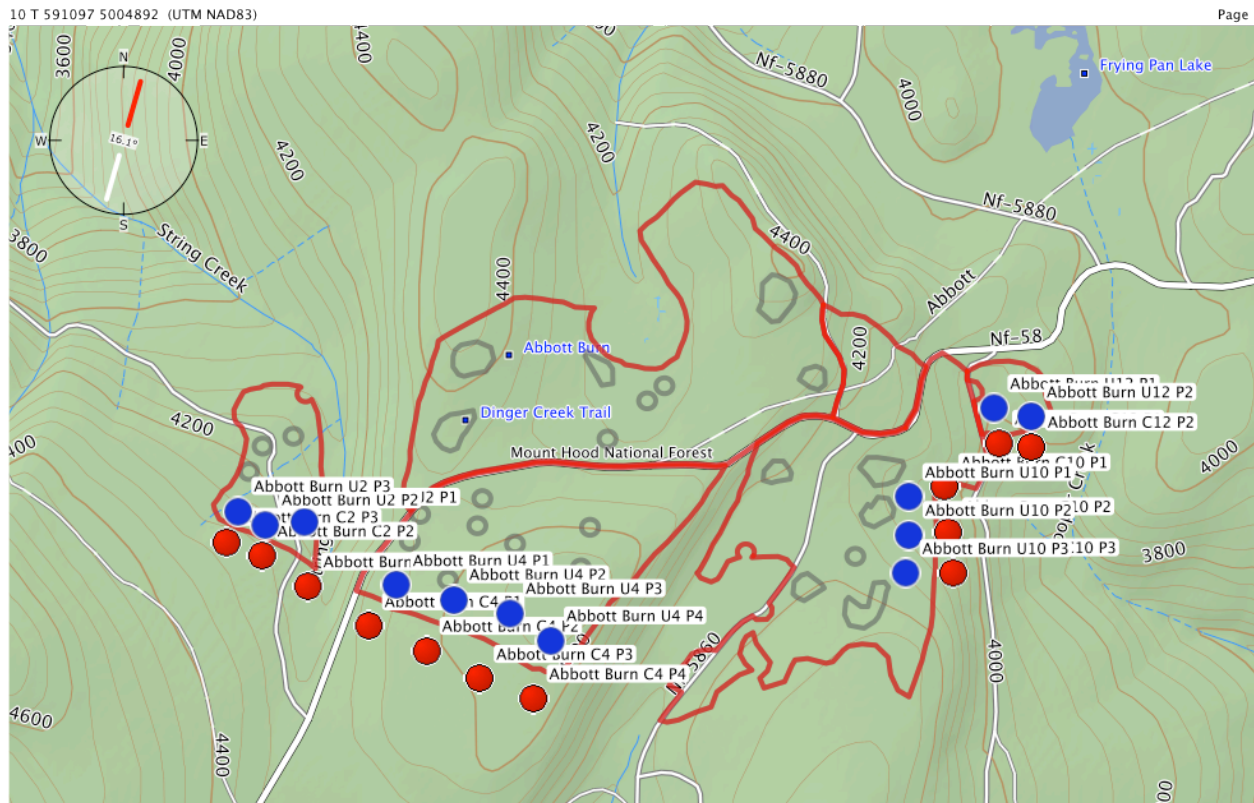7) Photo monitoring point taken from the edge of each plot at magnetic North toward the plot center (Fig. 2).

Figure 1. Locations of Huckleberry Ehancement monitoring plots (blue circles) and paired control plots (red circles) in units 2, 4, 10, & 12 of the Abbot Burn area of the Huckleberry Enhancement EA project area.

Fruit production class	Class Definition
0	**No huckleberry plants** in plot.
1	Huckleberry plants in plot, **no fruit.**
1.5	**Sparse** (< 5 fruits/stem on some stems in plot, no fruits on most of stems in plot).
2	**Low** (< 5 fruits per stem on ½ of stems in plot).
2.5	**Medium – Low** (< 5 fruits per stem on > ½ of stems in plot).
3	**Medium** (< 5 fruits per stem on most of stems in plot, between 5 – 10 fruits on others).
4	**Medium - High** (< 10 fruits per stem on most of stems in plot, between 10 –

		15 fruits on others).
5	**High** (< 15 fruits per stem on most of stems in plot, between 15 – 20 fruits on others).	
6	**Very High** (> 20 fruits per stem on most of stems in plot).	

Table 1. Definitions of Huckleberry fruiting classes (modified from Anzinger 2002).

Figure 2. Monitoring photo point taken in Unit 10 of the Abbott Burn area of the Huckleberry Enhancement project area.

Results: Overall *V. membranaceum* was widespread in the study area and occurred in all of the study plots in both thin units and control areas. Ripe fruit was, however, rare (Table 2) and most plants had no fruit or sparse green fruit.   *V. ovatum*, on the other hand, was only found in plots associated with one of thinning units (Unit 12). Where it occurred, it was fruiting at low to medium high levels resulting in higher average fruit abundance (kg/ha) than *V. membranaceum* (Table 2). However, mean values for the occurrence of *V. ovatum* (Table 2) can be misleading as it was only found in 3 of 24 total plots. Canopy closure averaged 88% across treatment units and control plots.

	Vaccinium membranaceum			*Vaccinium ovatum*		
Treatment	Percent cover	Fruiting class	Fruit abundance (kg/ha)	Percent cover	Fruiting class	Fruit abundance (kg/ha)
Thin units	29 (9)	1.6 (0.1)	0.0004 (0.0004)	6 (11)	0.7 (1.2)	0.007 (0.01)
Control	24 (8)	1.4 (0.1)	0.002 (0.004)	2 (4)	0.7 (1.2)	0.03 (0.06)

Table 2. Abundance of two species of Huckleberry in thin units and paired control areas. For the purposes of these summary statistics individual plot values were combined to produce average values for each timber sale unit and associated control (i.e., n = 4).

Future Objectives
1. Remeasure all plots established during year 2011 and establish plots in additional units of the Huckleberry enhancement project area.
2. Locate sampling transects in the study area to determine the extent of "productive Huckleberry patches" at a larger landscape scale than is possible using small sampling plots. This would be particularly important in assessing the occurrence of *V. ovatum.*
3. Conduct interviews with Huckleberry harvesters to assess the value and utility of the project area to local populations.
4. Establish monitoring plots and transects on lands of the Confederated Tribes of the Warm Springs lands; locations to be determined in consultation with tribal forest managers.

Citations
Anzinger, Dawn. 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

Strickler, G. (1959). Use of the densiometer to estimate density of forest canopy on permanent sample plots. USDA. Forest Srvice Research Note 180.

Appendix. GPS locations of Huckleberry Ehancement monitoring plots and paired control plots (in units 2, 4, 10, & 12 of the Abbot Burn area of the Huckleberry Enhancement EA project area.

ID	Unit	Plot	Treatment	lat	lon	ele
Abbott Burn C2 P1	2	1	Control	45.172572	-121.8269	1295.7656
Abbott Burn U2 P1	2	1	Thin	45.174773	-121.827	1282.1484
Abbott Burn C2 P2	2	2	Control	45.173616	-121.8289	1305.0156
Abbott Burn U2 P2	2	2	Thin	45.174683	-121.8287	1295.1406
Abbott Burn C2 P3	2	3	Control	45.174093	-121.8305	1309.4531
Abbott Burn U2 P3	2	3	Thin	45.175143	-121.83	1296.1875
Abbott Burn C4 P1	4	1	Control	45.171215	-121.8241	1316.736
Abbott Burn U4 P1	4	1	Thin	45.172615	-121.8228	1326.0547
Abbott Burn C4 P2	4	2	Control	45.170381	-121.8215	1337.2734
Abbott Burn U4 P2	4	2	Thin	45.172139	-121.8203	1341.6016
Abbott Burn C4 P3	4	3	Control	45.169426	-121.8191	1343.5977
Abbott Burn U4 P3	4	3	Thin	45.171663	-121.8178	1353
Abbott Burn C4 P4	4	4	Control	45.168755	-121.8167	1344.7422
Abbott Burn U4 P4	4	4	Thin	45.170736	-121.8159	1353
Abbott Burn C10 P1	10	1	Control	45.175956	-121.7982	1229.7578
Abbott Burn U10 P1	10	1	Thin	45.175618	-121.7998	1247.3398
Abbott Burn C10 P2	10	2	Control	45.17445	-121.798	1236.9648
Abbott Burn U10 P2	10	2	Thin	45.174325	-121.7998	1253.668
Abbott Burn C10 P3	10	3	Control	45.173055	-121.7978	1244.418
Abbott Burn U10 P3	10	3	Thin	45.173025	-121.7999	1265.1523
Abbott Burn C12 P1	12	1	Control	45.177431	-121.7958	1209.2734
Abbott Burn U12 P1	12	1	Thin	45.178636	-121.796	1219.2
Abbott Burn C12 P2	12	2	Control	45.177324	-121.7943	1214.5195
Abbott Burn U12 P2	12	2	Thin	45.178347	-121.7943	1227.1563