

Original Upland Forest Permanent Sample Plots
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Introduction

A series of twenty one permanent sample plots was established in the lower portion of the Cedar River Municipal Watershed (CRMW) during the 1940's to the 1970's to provide watershed managers with long term, site specific data on timber growth and yield. Installation of most of the original permanent sample plots (PSP) occurred in the middle 1950's. Exceptions include the first two plots, for which initial measurements were completed in 1946, and two final plots, which were added to the network in 1978 and 1979, respectively. All except one of the PSP's were most recently remeasured in 1986. Nearly fifty years of forest structural and compositional change would be captured on most plots if another remeasure were undertaken.

Prior to 2003, the PSP dataset existed only on hardcopy, paper records: field notes and summary sheets. This report represents the first time the data have been entered into a modern computer system for analysis and storage. The plots described in this document are not part of the systematic, permanent sample plot program currently being implemented in old-growth forests of the CRMW. The purpose of this document is to present a brief summary of the PSP network, provide a status update on the ongoing PSP data entry and analysis effort and evaluate data quality. This report provides a summary of the original PSP program, which should aid CRMW managers in determining the utility of the dataset, and the appropriateness of continued periodic original PSP measurement, for meeting forest management objectives under the HCP.

Plot Summaries

General Information

The original PSP network is a medley of plot sizes, plot shapes, measurements, and treatments. Measurements are, except for a few exceptions, limited to timber production parameters. Stem densities, species composition (with some exceptions), tree heights and ages typify the measurements taken on the original PSP's. In general, data quality and record keeping is reasonably high. Initial measurements are almost always well documented and of high quality. Some of the periodic remeasurement data cannot be used due to poor record keeping or period-to-period changes in sampling techniques (e.g. different plot size). Records are too poor to permit analysis on three of the plots. One of the plots has been harvested.

PSP 1 & 2

These plots comprise a treatment-control pair and are the oldest PSP's in the CRMW. The stand originated apparently by natural regeneration following logging by the Pacific States Logging Company. The area was accidentally burned by slash fire in 1918. PSP 1

was thinned in 1946, 1953, and 1966. The data are of high quality; all thinning treatments are well documented. The data have not yet been entered. Earlier analysis assumed PSP 1 had been fertilized in 1954. This investigation found that notes from PSP 15, a fertilizer trial, had been incorrectly filed with PSP 1 & 2 field notes.

PSP 3

The stand in which this plot is located originated from planting in 1925 with 1-1 Wind River Nursery Douglas-fir stock. According to a 1955 summary, the area was planted to an average of 632 stems per acre. However, no data exist to support this statement. Plot records indicate that the area was burned several times (actual number unknown) prior to 1925. This plot is an interesting case, unique from the other PSPs. All trees were tagged on a half-acre plot. Growth and survival has been tracked since 1953 on an individual tree basis; ingrowth has not been characterized. This plot was remeasured, with all ingrowth greater than 2" dbh tagged, in 2004.

PSP 4, 5, 7, 8, 9, 10, 11 & 12

These plots form a subset within the original PSP's. None of the plots in this group have experienced a silvicultural treatment since stand establishment. All of the plots are circular; some plots are 0.20-acre and the remainder 0.25-acre in size. The plots span a range of age classes and species compositions. These stands originated between 1875 and 1932 following logging (and likely burning in many cases). Species composition varies from almost exclusively Douglas-fir on some plots, to mixed western hemlock, western red cedar, Douglas-fir, and other combinations, on the remaining plots. Data quality is generally acceptable for all of these plots. The initial measurements are well documented. Some of the remeasurement data are unacceptable, however. PSP's 10 and 12 have been remeasured in 2003. Data entry is complete for this set of plots.

PSP 6

Originally, PSP 6 was a 1-acre, rectangular, thinning trial plot installed in 1953, in a stand established in 1903. The plot was harvested in 1985. The plot was last measured in 1979. The data have not been entered.

PSP 14

This PSP is actually a cluster of 4, 0.20 acre plots established in 1954. Two of the plots were thinned in 1955, while the other two act as controls. Unfortunately, the thinning was inadequately recorded and the treatment cannot be quantitatively characterized. Some of the data have been entered.

PSP 15

This rectangular, 0.50 acre plot was split in two, with each half receiving a unique fertilizer application in 1954, at the time of plot establishment. No reference or control

plot was established concurrent with PSP 15. Data quality appears to be acceptable, however the data have not been entered.

Table 1. Summary information for original Lower CRMW PSPs. Adapted from B. Richards 2-26-02.

PSP #	Plot Size (acres)	Plot Shape	Stand Origin	Year Established	Years Thinned	Data Entered
1	1.00	rectangle	1922	1946	1946, 1953, 1966	No
2	1.00	rectangle	1922	1946	Not thinned	No
3	0.50	rectangle	1923	1953	Not thinned	Yes
4	0.20	circle	1932	1953	Not thinned	Yes
5	0.20	circle	1922	1953	Not thinned	Yes
6	1.00	rectangle	1903	1953	1953	No
7	0.25	circle	1913	1954	Not thinned	Yes
8	0.25	circle	1893	1954	Not thinned	Yes
9	0.25	circle	1908	1954	Not thinned	Yes
10	0.20	circle	1927	1954	Not thinned	Yes
11	0.25	circle	1875	1954	Not thinned	Yes
12	0.25	circle	1900	1954	Not thinned	Yes
13	0.20	circle	1914	1954	1976	Yes
14	0.20	4 circles	1920	1954	1955	Yes
15	0.50	rectangle	1922	1954	Fertilized-1954	No
16	0.20	circle	1929	1957	Not thinned	No
17	0.20	circle	1929	1957	?	No
18	0.20	circle	1922	1957	1974	Yes
19	0.25	circle	1921	1957	1973	Yes
20	0.20	circle	1919	1978	1969	Yes
21	0.20	circle	1919	1979	1975	Yes

PSP 16 & 17

These plots also comprise a thinning-control pair. However, there are insufficient records to allow reconstruction of the thinning prescription. The plots were installed in 1957, and PSP 17 was apparently thinned in the same year. The data have not been entered.

PSP 13, 18, 19, 20, & 21

These five plots form another subset within the original PSP's. This set includes the youngest plots (most recent plot installation) and the most detailed plot measurements of any of the original PSP's. The plots were installed in 1954, 1957, 1957, 1978, and 1979, respectively. All of the plots were thinned sometime between 1969 and 1975 (varies for each plot). The thinning was well documented through a reconstruction process completed in 1979. In addition to normal plot measurements, the locations of all live stems and stumps were surveyed and mapped. Three of the plots (13, 18, and 19) have circa 20 years of baseline data prior to thinning. Data entry is complete for this set of plots. Additionally, the spatial and attribute data have been entered into a GIS computer program.

Conclusion

Record keeping for at least 16 of the original PSP's is probably sufficient to allow reliable analysis. However, the available data may not meet any of the CRMW information needs. Continued measurement of all or some of the original Permanent Sample Plots may be warranted if the data will be used to meet management objectives under the HCP. A critical evaluation of the original PSP program may indicate the data do not meet any of the HCP driven CRMW forest ecology information needs and periodic measurements may cease. In this scenario, the dataset and plot location markers should still be preserved for potential future use, in light of the dynamic nature of public land management objectives.

Appendix 1

Dataset Locations

Paper Records and Field Notes

The original paper records for the PSP project are currently stored in an expandable, portable file folder. Records for each plot are sorted and stored in individual files within the larger expandable folder. This collection of field notes and summary tables is currently housed in the office of Andrew J. Larson in Snoqualmie House at Cedar Falls. The original records should be safely stored in a secure location after data entry is complete. An inventory of the records should be completed and a check out system implemented in order to ensure preservation of these records for future use.

Digital Records

All PSP data entered into a modern computer system as of September, 2003 are stored on the “J” drive under the path: J:\SpuComm\wshed\Forest Ecology unit\Original PSP\Original data. The data for each plot are stored on multiple sheets in plot specific MS Excel files. Original survey data from PSP’s 13, 18, 19, 20, and 21 are stored as plot specific ESRI shapefiles. These data are stored in an unprojected coordinate. These data can be reached via the path: J:\SpuComm\wshed\Forest Ecology unit\Original PSP\Original data\stem_maps. An Arc View project called “stem_maps.apr” has been created for viewing these data and is stored under the same path.

Data from the 2003 measurement of PSP’s 10 and 12 are stored in separate Excel files under the path: J:\SpuComm\wshed\Forest Ecology unit\Original PSP\Remeasure data. These data have not yet been linked to the historical records in a single file.

GPS data has been acquired for three PSP’s: 9, 10, and 12. This spatial data is stored in ESRI shapefile format at the path: J:\SpuComm\wshed\Forest Ecology unit\Original PSP\GPS_Data. The spatial data are stored in the North American Datum of 1983 (NAD 83), US State Plane 1983 coordinate system, Zone Washington North 4601. Map and coordinate units are feet.

Watch for a reorganization of the file/folder structure with in the Forest Ecology folder soon. The paths to the original PSP data described above will be changing.

Appendix 2

Plot Locations

Plot locations are delineated on paper maps stored with the other original paper records and field notes in a separate file marked "Plot Location Info". Distance and direction information from known, monumented points is provided for each plot. In most cases, the point of beginning is a square concrete post set along the nearest road. Plot centers are marked with iron pipes.

PSP's 4, 5, 11, and 7 have been visited in 2003 and routes flagged from the nearest road. Plots 9, 10, and 12 have also been visited in 2003. The locations of these plots were recorded with a GPS unit. GPS data storage is described in Appendix 1.