WS7 VEGETATION RESEARCH

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Report stored in file cabinets in FSL 343 with the permanent forest plot network data.

Objectives of Experimental Harvesting of the Hi-15 watersheds

1. Compare volume growth for the residual stand after shelterwood harvest with pretreatment growth and concurrent growth of a nearby stand.

2. Compare survival and height growth of both planted and natural regeneration on the clearcut and shelterwood watersheds (6 and 7 respectively).

3. Correlate seedling survival and height growth with amount of light (canopy density estimate), competition from lesser vegetation, type of seedbed material, and soil-air interface temperatures on watersheds 6 and 7.

(from: Study Plan and establishment report for shelterwood harvest test by Richard L. Williamson, 1973).

History of management of the Hi-15 watersheds

1974: WS6 was clearcut, WS7 was shelterwood cut (approximately 60% of basal area was removed, 30 to 40 trees per acre were left as overstory), WS8 was left alone as the control. WS7 was tractor logged above the road and cable logged below the road. Tractor skidding was straight downhill in WS7.

1975: WS6 was entirely broadcast burned. WS7 was broadcast burned just below the road.

1976: District planted all of WS6 and 7 in June of 1976. Additionally a "test" seedling was planted near every milacre plot in 1975. Apparently, every year through ??, yearly surveys were taken of planted, natural, and advanced regeneration, seed traps were monitored, and cover was taken of "lesser vegetation."

1984: The rest of the canopy in WS7 was removed.

2001: WS7 was thinned to 14 foot spacing, which leaves about 220 trees per acre.

Vegetation measurements in Hi-15 watersheds

1969: Initial stand basal area was sampled in WS6 and 7 and in the buffer area between WS7 and 8.

1971: Milacre plot centers were established systematically throughout WS6 and 7 and in most of the buffer area between WS7 and 8. There were 65 plots in WS7, 64 plots in WS6.

1972: Advanced regeneration and lesser vegetation were surveyed in each plot.

1973: DBHs taken on all trees in all plots in WS6, 7 and in the buffer area between WS7 and 8.

1975 through ??at least 1983: yearly surveys in each milacre plot in WS6 and 7. Also, seed traps were monitored for some time period after initial cuts in 1974. I believe that most of this data is missing. It was planned for these measurements to be taken for up to 5 years after complete canopy removal in WS7 in 1984. I have not found a record confirming or denying this.

Measurements taken in each milacre plot include:

1. Natural tree regeneration (number, by species, and total height).
2. Seedbed conditions.
3. Lesser vegetation (estimation of cover for each species present).
4. Overstory canopy density using verical wide-angle photographs, a microfilm projector, and a dot grid.
5. Soil-air interface temperatures.

I have found what I think are the "lesser vegetation" surveys for 1979, 1986, and 1995. I have both the original field datasheets for these surveys, and the data is on the FSDB. I am very uncertain of the quality of this data. I believe that the 1995 survey was done by Gabe Tucker and company.

Other data in the Hi-15 watersheds include: water measurements since 1964, climate since 1964, and stream chemistry since 1972. Streamflow records are continuous up to the present, except for Watersheds 6 and 7, where streamflow was not measured from 1987 to 1994. Precipitation records began in 1964. Air temperature records began in 1958 (WS 9, 10) and solar energy records began in 1972.

Streamwater chemistry sampled using proportional sampler for 3-week intervals. Water chemistry analyses include: NO_3-N, NH_4-N, PO_4, Ca, Mg, K, Na, Si, SO_4, Cl, alkalinity, conductivity, pH, particulate N, particulate P, and suspended sediment. Sampling stopped in 1987 at Watersheds 6 and 7 and will resume in 2002.

Most of above information came from Williamson report and/or Forest Service field work reports that I got from Dan Mikowski.

<u>Potential questions to be asked for WS7</u>

What is the tree response to thinning? The best way to investigate the growth response of trees remaining after the thinning will be to take tree cores several years down the line

and count back to the year WS7 was thinned. I don't believe that this would be much of a contribution to PNW forestry/ecology research. I believe that the growth response of a stand to thinning is quite well documented.

What is the response of understory vegetation to thinning? As Charlie Halpern has mentioned, if we wish to develop a study along these lines, there are better experimental designs we could develop. A study to answer this question may give us some insight as to whether understory release could be responsible for the higher vegetation water use that has been documented in WS02.

Does thinning increase the rate of development of old-growth structure in young, managed Douglas-fir forests? Many believe that thinning is essential for the development of old-growth/late-successional characteristics in high-density young forests. To answer this question, we would have to commit to taking long-term measurements of density, mortality and diameter in WS6 and 7. We would need to compare the thinned forest (WS7) with the non-thinned forest (WS6). However, since WS6 and 7 have such different management histories it would be practically impossible to separate the effects of thinning from say the effects of a shelterwood cut v. clearcut.

How did thinning affect C storage of WS7? We would need to retrospectively estimate C budget of WS7 before thinning by measuring diameter and species of trees laying on the ground. Then it might be interesting to core the trees several years (10-20) from now to watch when the forest recovers to it's pre-thinning C storage capacity.

References available

Dyrness, C.T. and G. Hawk. 1972. Vegetation and soils of the Hi-15 watersheds, H.J. Andrews Experimental Forest. Internal Report 43 to Forestry Sciences Laboratory and Oregon State University.

Williamson, R.L. 1973. Study plan and Establishment Report: shelterwood harvest test (H.J. Andrews Experimental Forest). USDA, Forest Service Project 1207.