File Code: 2470 Silvicultural Systems **Date:** March 15, 2000

Subject: Tower Fire Veg Competition Control

To: David Powell Umatilla Forest Silviculturist

I was asked to respond by David Powell Forest Silviculturist for the Umatilla National Forest, to an internal memo on the Umatilla National Forest in regards to the proposed control of ceanothus on Tower Fire Rehabilitation EIS. The memo questions whether the control of ceanothus is of any benefit and is based on comments to the author of the memo, by a former employee of the Bear Valley Ranger District Malheur National Forest. Based on this memo David indicated you are preparing to drop control for further consideration. A paragraph from the memo was sent to me and reads as follows:

> "Retired certified district silviculturist, Bob Hilliard-Bear Valley RD-Dave Powell knows him (personal communication Bob and myself-early 90's). Monitored growth and survival (20-year unpublished study data-Bear Valley RD files) of north slope burned, planted sites, where heavy Ceanothus dominated understory. Net growth and survival at 20-years was no less than sites where Ceanothus was controlled early. Survival was not affected. Early tree growth on Ceanothus-dominated site was slowed by competition, but once trees grew above shrub canopy, trees grew faster, made up for suppression period (N-fixation, fertilizer effect-possibly). Question whether Ceanothus control is truly necessary, based on his observation period on same site".

I am not sure what data or studies the memo is referring to, because there is no data in the Bear Valley Files that refer too the alleged study. For a proper study to be conducted a control and a treatment plot side by side need to be established and then followed through for the 20 years the memo above states. Usually a study like this is not conducted by district personnel and is done normally by the Research and Experimental Stations who has the responsibility to conduct such research.

To verify the conditions that led to the memo above I personally called Bob Hilliard at his home in Bend, Oregon. The study he did was not a scientific study plot and that all he did was take measurements 20 years later on a purchaser caused ten acre fire that occurred in the summer and was immediately planted with 2-0 ponderosa pine the very next spring. Later the grass around the trees was sprayed with Roundup. There was no attempt nor was ceanothus a target for control.

The species of ceanothus we have is commonly referred to as Snowbrush (Ceanothus velutinus). This species like many of its cousins germinates quite readily after a wildfire and in many instances can completely occupy the site with as much as 100% canopy cover (See Bozenburg). The species can quickly reach heights of 2 to 3 foot in as little as three years. In most cases on the Malheur it takes approximately 3 years to reach 2 foot tall after germination and depending on the site by year 5 or 6 it will be 4 to 5 feet tall.

The overwhelming majority of studies dispute the premise the above memo makes that there is no effect on net growth with the early control of shrubs such as ceanothus. Studies such as "Conifer Release In the Inland Northwest-Effects" by Daniel L. Miller, " Influence of Ceanothus velutinus and Associated Forbs on the Water Stress and Stemwood Production of Douglas-fir " by Peterson, Newton and Zedaker, and "The Garden of Eden Experiment: Four Year Growth of Ponderosa Pine Plantations by Ferrell and Thomas A. Koerber are among the many papers written, that test the performance of planted trees when in competition with shrubs such as ceanothus and each document shows a significant increase in growth over the control. Most research verifies that ceanothus is capable of fixing nitrogen but is unable to demonstrate that nitrogen is available for the trees to use. The most likely explanation is that moisture is limiting when the tree needs the nitrogen the most. One paper I have read indicated that because of this water limitation it only fixes enough nitrogen for itself.

When it comes to survival, the effect of ceanothus competition is not as clear. In most cases the papers indicate that survival is not affected by brush competition, but is affected by grass and other herbaceous competition more. In

interpreting the conclusions of any of the papers, in regards to statements on survival, one needs to look at the study design. In all cases each of the tests were conducted where adequate site preparation was accomplished and the trees planted immediately afterward. In most cases trees were rarely killed by brush competition that became established at the same time the trees were planted. These are the same conditions that Bob Hilliard experienced in the operational reforestation of the 10 acres fire he measured 20 years later. Tree survival is more prone to grass competition and most research says you can double survival if grass is treated early. Ceanothus just compounds the problem. I have not been able to find research that tests planting trees in already established brush fields without doing site preparation and this is where I believe the Umatilla will have plantation failures if ceanothus control is not done. The Malheur has a long history of successes and failure in regards to ceanothus control.

Big Cow Burn

This burn burned in 1939 on both the Malheur and W-W national forests of which 10,300 were on the Malheur. No real rehabilitation work was begun until 1959 primarily because of World War II. In 1959 a plan was developed which called for the eradication of snowbrush on 426 acres followed by planting. The method prescribed was aerial spraying of an un-named herbicide. The plan also called for planting and inter-planting on an additional 3,398. No site-preparation was described. Later the plan was revised to do brush and grass eradication with the use of a Holt plow. The plow created strips 8 to 10 foot wide on the contour as can be seen in the photo in both the brush fields in the foreground and on the grass areas in the background. Acreage treated with the plow was around 1700 acres. If one visits the area today, there was very good success in the background grassy areas in establishing trees. In the foreground brush fields the control was successful in the lower slopes but in the upper slopes success was not very good to the point where there are no trees there today. I have not been able to find any documentation as to why but I suspect that in the upper part of the slopes where it was steeper the terracing was done on full bench ground and the topsoil was side cast. The trees were planted in the subsoil making for poor survival. Similar treatments were done on other fires on the forest from about 1959 through the 1970 and terracing was no longer used after the Bitterroot controversies.

Glacier Fire

The Glacier burned in the Summer of 1989 although over 10,000 acres were burned only about 2500 acres were actively rehabilitated because of its allocation to general forest in the 1990 Land Management Plan. The rest of the fire area is in un-roaded and recreation use allocation and was primarily in lodgepole pine plant associations where natural regeneration is prolific. I was the silviculturist who wrote the prescriptions for the approximate 2500 acres selected for rehabilitation. The stands that were burned were primarily Grand-fir/grouse huckleberry, grand-fir/big huckleberry, grand-fir/twin flower-forb or grand-fir/pine grass plant associations. The prescriptions called for the

removal of most fire-killed trees except those needed for snags. Live Douglas fir and western larch were to be marked for leave. While there was some ponderosa pine in some stands those stands were completely burned. All grand-fir was to be removed. Reforestation would consist of planting of Douglas fir, western larch and western white pine on most sites. Ponderosa pine was to be planted on the on the grand-fir/pine grass and the lower elevations of the other plant associations. Most planting was to be done to increase species diversity because lodgepole pine was expected to seed in everywhere except for the grand-fir/pine grass units. I did not anticipate problems with ceanothus on these sites. As you can see in the picture above ceanothus is quite prolific having in most areas 70 to 100 % cover. The lower portion of the picture consists of natural lodgepole pine and western larch that has out grown the ceanothus competition. These sites were also planted with ponderosa pine to increase species diversity most of the pine did not make it. In the upper half of the picture, which is on a west aspect, no natural regeneration occurred and was planted with ponderosa pine.

Approximately half of the west aspect primarily below the road down to the timber is under-stocked primarily as a result of ceanothus competition as can be seen in the picture below. This picture shows the results of spraying with Pathfinder II 3 feet in radius around the trees. The results were marginal below the road because the trees were completely overtopped and spindly with thin bark. Most trees had shade needles and were highly susceptible to the spray. Above the road results were better because we learned from what happened below and were more careful with the application. Approximately 30 percent of the trees showed some herbicide damage resulting in mortality on some of the trees. The initial treatment prescribed to treat and release 150 TPA based on a previous survey of 300TPA. However when the contractors actually begun to spray we estimated only half of the 150 TPA to be treated were actually found. Most of the trees died between the initial survey and when the treatment took place.

The biggest reason for the development of the problem was because of the reforestation delay, which was up to 4 years after the fire. Environmental Analysis and subsequent salvage logging was not completed until 1992. The first units were not planted until 1992 three years after the fire. . The remainder of the units was not planted until 1993, including the one above. The primary reason for the failure is that we were delayed too long in planting of the trees and did not recognize the snowbrush as a threat until it was too late. If we could have planted the trees, 1 maybe two 2 after the fire, I seriously doubt we would have had to do anything but we should have treated this west aspect. Most effective would have been the use of pronone

25G. It was not used because the manufacturer did not recommend use on ceanothus when the plants are over 2 foot tall. At the time we treated the plants were over 4 feet tall so pathfinder II (triclopyr) was selected.

Snowshoe Fire and Bozenburg Burn

The Bozenburg Burn and the Snowshoe fire are together here because the Snowshoe fire re-burned the Bozenburg burn. The Bozenburg fire burned in 1958 about 600 acres above Logan Valley on the Prairie City Ranger District. In 1990 the Snowshoe fire burned 10,000 acres including about 400 acres of the Bozenburg burn. The Bozenburg fire was planted first in 1960 and portions were planted two more times after that. The records do not mention ceanothus at all and most discussions centered on the amount of grass competition. However prior to the Snowshoe Fire the Bozenburg had a well established understory of ceanothus demonstrating again that if you plant or as soon as possible after the burn or site preparation, ceanothus will not be much of a problem to meet your stocking objectives because ceanothus takes about 3 years to develop a serious competition effect\ when germinated from seed.

The exception to this is when the plants already existed prior to the treatment or wildfire. As can be seen in the adjacent picture this brush field developed almost 70% cover. It developed within two years after the fire, reaching 5 feet in height in that time primarily from prolific sprouting of the fire killed tops. Most of the 15to 20 foot fully stocked ponderosa pine stand was killed and the dead trees fell over in less than 5 years. The picture above was taken 8 years after the fire. Again I was the silviculturist on the Snowshoe recovery. I realized my mistake on Glacier fire of not accounting for ceanothus competition, but was unsuccessful in convincing management to include the use of chemicals under the analysis for the initial recovery effort. An EA was prepared allowing the use of chemicals later but was generally too late. The trees planted the following spring largely died out by the third year. The unit was planted again and once more in 1998. In 1998 the planted trees along with any surviving trees from earlier plantings had the ceanothus sprayed with Pathfinder II in a 4-foot radius around the trees. In the picture above you can see the dead spots that were sprayed. It was largely successful and damage to trees was minimal from the spray operation. If management would have allowed the analysis and use of chemicals in the original Snowshoe recovery plan we probably would not have had to plant three times. In the original Snowshoe analysis we were allowed to use mechanical means for control of both brush and grass competition. The most successful was the combination of machine scarification and sub soiling. Hand pruning was also done and to a large extent was successful but the effects are not as dramatic, and in most cases had to be repeated, which greatly increased the cost. Much of the Snowshoe fire burned in lower elevation mixed conifer and pure ponderosa pine stands that had been repeatedly entered, and precomercially thinned. These repeated entries along with complete slash cleanup by machine piling caused the area to exceed regional standards for detrimental soil compaction. The hydrologist, soil scientist and myself prescribed that much of this lower elevation gentle slopes be sub soiled. In the several years prior to the fire we had been using a D-8 cat fitted with fixed ripper teeth and 12-inch wide wings welded to the teeth. This method while reducing the compaction also tilled the soil reducing both grass and ceanothus competition dramatically. When applied to the whole unit competition was usually reduced to below 20% cover. As can been seen in the adjacent picture. The results are dramatic in terms of both survival and growth. The

subsoil site preparation combination was completed 3 years after the fire and planted in 1994. The picture was taken 5 years later in the early July after height growth was completed. Most of the trees are already 4 foot tall with 1 to 1.5 feet of leader growth. Almost every acre in the picture was treated in this manner and both growth and survival was approximately the same. In this example proper timing and site preparation was accomplished to meet stocking objectives. The site in this picture is directly adjacent to and below the Bozenburg Burn.

SUMMARY

1) Both the research and the examples of past and recent experience on the Malheur both contradicts and supports the statement made above. What I disagree with is that it would lead you to believe that control of ceanothus is not necessary in all situations. When I talked with Bob Hilliard he verified what I suspected. The trees were planted the following spring after the fire and the spray control was targeted for grass and that the study was not a scientific installed test using Analysis of Variance Techniques to actually test for effect of ceanothus competition.

2) You cannot always have the ideal situation and execution of plans. Contingency plans must be made especially in today's political climate and willingness of certain publics to delay rehabilitation activities at any cost. Since the Tower Fire burned in 1996 and it is now 4 growing seasons since the fire with areas still in need of planting, most if not all the benefits of the wildfire site preparation are now gone. Probably grass will be your major enemy and in many cases ceanothus will be too. If you have any failures of the acreage already planted you will need to control both grass, ceanothus or both before replanting. If you cover all these contingencies in the EIS now you will give the reforestation staff far more tools to ensure the objectives of the effort are realized. Not dealing with ceanothus and grass competition will most likely result in not meeting stocking objectives and will either lead to accepting marginal stocking densities or having to replant.

3) If I could have done it over again in those areas where we could have predicted ceanothus would have overtopped the trees I would have fought harder to use the granular form of hexazinone in spot treatments 3 to 4 feet around the trees when ceanothus was small and easily controlled. Hexazinone controls both the brush and grass giving you the best control of competition. The reason we used triclopyr (Pathfinder II) in some cases was that the manufacturer of hexazinone indicated to us that the best control is obtained when the plants are less than 18 inches tall. Once the plants are above that height, control is not as effective on our soils unless you increase the amount used. .

4) Do not focus just on ceanothus because grass is as much or even more of problem for survival and if ceanothus is present just exacerbates the potential for failure.

5) I find it hard to believe that the Umatilla is considering dropping the need for ceanothus control when your forest has competent silviculture staff expressing the need for its control. Your staff visited the sites in the pictures above and we explained our experiences. In a Regional Reforestation review of your forests reforestation operations, of which I was selected to participate in by the Region, also recommended that you prepare to control competing vegetation and to use chemicals where it is safe to do so. Current research also supports this recommendation.

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Reforestation