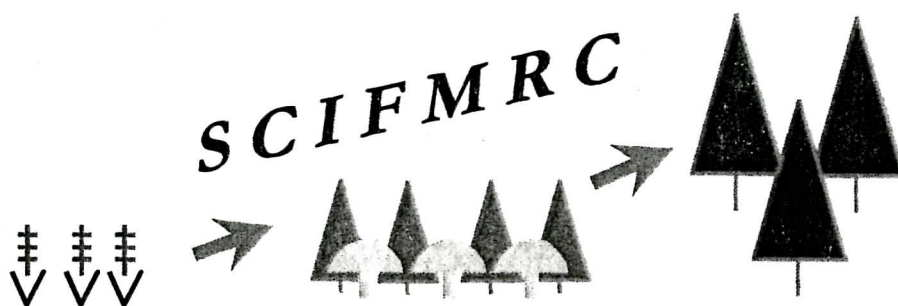


# Sierra-Cascade Intensive Forest Management Research Cooperative

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Series Report No. 11



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<http://wric.ucdavis.edu.sierracascade/>

***ANNUAL REPORT***  
**2010**

## TABLE OF CONTENTS

Summary	1
2010 Membership	3
2010 Annual Meeting	4
Research Results	
Glyphosate, Gray	7
Cedar Trials, Warshawer	14
Milestone VM, Fredrickson	16
Vista XRT, Fredrickson	18
2010 Budget	23
Working Groups	24

The year 2010 marked the eleventh year as an organization for the Sierra Cascade Intensive Forest Management Research Cooperative.

Membership increased as Thunder Road Resources joined the Co-op in June at the Affiliate Membership level. Dow AgroSciences also expressed an interest in joining the Co-op and the process of setting up a new membership is proceeding (invoices sent, etc.). They hopefully will be added to the Co-op membership early in 2011. The current membership consists of a mixture of landowners, forestry-related industries, State of California and federal agencies. There are currently fourteen member organizations in the Co-op.

The annual business meeting was held at the Forest Service office April 8, 2010 in Redding (a summary of the meeting can be found in this Annual Report). Twelve Co-op members and guests attended. The first item of business was a review of the 2009 Annual Report. Membership status was discussed. All members from 2009 had paid dues for 2010. As of the date of the meeting, no new members had joined (Thunder Road Resources joined in June). There were currently thirteen member organizations in the Co-op.

The next item of business was a discussion on the budget. The Co-op ended 2009 with a surplus of \$6,920.21. A discussion followed concerning dues for the near future. Since there was still some uncertainty about the economic recovery, the membership decided that 2011 dues would be collected at 75 percent of the normal level; dues will return to the normal

rate for 2012. This decision was to be revisited in the fall prior to finalizing the 75 percent rate (the Steering Committee decided in December to implement this change and invoices for 2011 dues will reflect this 75 percent rate). The Co-op manager's expenses will continue at the 50 percent level in 2011.

A discussion on the desirability of a field trip for 2010 followed the budget discussion. The membership decided to have a field trip and made a couple of suggestions on an agenda. One was a trip centered around the four Co-op study sites in Oregon – three on former Boise Cascade holdings and one on Silver Butte lands. Ed Fredrickson suggested a field trip featuring some of the herbicide study sites he was currently working on. Due to excessive work loads, the field trip had to be cancelled. Plans are to hold the trip in 2011.

Following the discussion on the field trip, updates on four recently funded Co-op studies were presented. Mark Gray reported on Proposal 07-01 Glyphosate/Evergreen Brush; Jason Warshawer on Proposal 08-02 Cedar Trials; Bob Powers on Proposal 03-01 Agenda 2020; and Jianwei Zhang on Proposal 09-01 Stand Density Index. These updates can be found in the write-up of the annual business meeting found in this Annual Report. Executives Summaries for Proposals 07-01 and 08-02 can be found in this Annual Report. Mark Gray will present results from the Glyphosate/Evergreen Brush study at the Vegetation Management Conference in January 2011.

Following the updates on funded proposals, new proposals were presented to the

membership. Ed Fredrickson presented two proposals: "Aminopyralid Site Preparation and Conifer Tolerance" and "Vista XRT Conifer Tolerance and Manzanita Control". After discussion by the membership, the voting membership approved the funding of the Aminopyralid (Milestone VM) proposal for \$7,110. The membership was in favor of the Vista XRT proposal but funds were not available for implementing the study at the time of the meeting (an increase in Co-op membership later on in the year allowed for funding of this project for \$4,500). The annual meeting ended at this point.

The two new proposals funded in 2010 by the Co-op, 10-01 Milestone VM and 10-02 Vista report results in this issue of the Annual Report. These proposals are both multiple year studies so the results reported in this issue are preliminary findings.

The year 2010 marked the second growing season since treatments were applied for Proposal 07-01, Glyphosate/Evergreen Brush. As planned, measurements were made on the plots in this study at the end of this second growing season. Results from this study are included in this issue of the Annual Report. As noted earlier, Mark Gray will present these results at the 2011 Vegetation Management Conference in Redding in January. There is still the possibility that this study will be replicated at an additional site (Indian Springs on Sierra Pacific Industry lands).

Plot layout was completed for the Cedar Stock Trials study, Proposal 08-02, in

November. The study site is located near Pondosa on Roseburg Resources land in a new clearcut. Planting spots will be marked in early 2011 with planting to follow. A progress report on this proposal is included in this Annual Report.

Data collected from Proposal 05-01, Carbon Allocation, were featured in a presentation made at the 2009 National Silviculture Workshop in Boise, Idaho. The theme for the workshop was: Integrated Management of Carbon Sequestration and Biomass Utilization Opportunities in a Changing Climate. The title of the presentation was: "To Manage or Not to Manage: The Role of Silviculture in Sequestering Carbon in the Specter of Climate Change". Proceedings for the workshop were published in 2010. A copy of this presentation is available at the Co-op's Redding office.

The year 2011 should be an interesting one for the Co-op. A decision needs to be made regarding the future of Proposal 03-01, Agenda 2020. The SDI Proposal, 09-01, should see more sites being measured (this work was planned for the fall of 2010 but manpower limitations prevented accomplishment). If possible, the Glyphosate/Evergreen Brush Proposal, 07-01, should be replicated at another site. The Cedar Stock Trial Proposal, 08-02, will be outplanted and measured this year. This study should be replicated at other sites if at all possible. Hopefully, new proposals will be presented to the membership during the year.

## 20010 MEMBERSHIP

### Land Manager Membership

California Department of Forestry  
Fruit Growers Supply Co.  
Roseburg Resources Co.  
Sierra Pacific Industries, Inc.  
Soper-Wheeler Co.  
Timber Products Co.  
W.M. Beaty & Associates, Inc.

### Associate Corporate Membership

Cal Forest Nurseries & Mountain Gate Gardens

### Affiliate Membership

Silver Butte Timber Co.  
Thunder Road Resources

### Supporting Members

California Forestry Association  
PSW Research Station  
University of California, Davis  
USDA Forest Service

## Sierra Cascade Intensive Forest Management Research Cooperative

Annual Meeting April 8, 2010

The 2010 annual meeting was held at the Forest Service office in Redding, CA on April 8, 2010. Twelve Co-op members and guests attended.

The 2009 Annual Report was the first item of business. Membership status was discussed. All members from 2009 have paid dues for 2010. At the time of the annual meeting, no new members had joined. There are currently thirteen member organizations in the Co-op.

The next item of business was a discussion on the budget. The Co-op ended 2009 with a surplus of \$6,920.21. As in 2009, dues were reduced by 50 percent for 2010. Dues received for 2010 at the time of the annual meeting totaled \$27,000. To supplement the summary of the 2009 budget found in the Annual Report, spread sheets of the proposed budget/workload for 2009-2014 and the co-op manager's time/contract costs through the same period were presented to the membership. Data presented on the spread sheet reflected a return to normal dues rates starting in 2011. A discussion followed concerning dues for the near future. The membership was unanimous in the opinion that dues should return to normal levels (full dues) as soon as economic/market conditions allowed. Since there is still some uncertainty about the economic recovery, the membership decided to compromise on the dues for 2011. Tentatively, for 2011, dues will be collected

at 75 percent of the normal level; dues will return to normal rates for 2012. The dues rate for 2011 will be revisited in September prior to finalizing the 75 percent rate. In order to free up more funds for new research proposals, the membership decided to keep the Co-op manager's funding at the 50% level for 2011 (\$25,000). This funding will be increased to the 75% level in 2012. The manager's funding beyond 2012 was not discussed.

A discussion on the desirability of a Co-op field trip for 2010 followed the budget discussion. The membership decided to have a field trip. Possible locations were brought up. One suggestion was to arrange a trip based on the Co-op's studies in Oregon. There are four completed studies in the Prospect/Butte Falls area – three on former Boise Cascade holdings and one on Silver Butte lands. Ed Fredrickson volunteered some of the herbicide study sites he has been working on for the field trip. It was decided that the membership would send suggestions for the field trip location/theme to the Co-op manager who would in turn organize a trip based on these suggestions (email reminder sent to membership on April 13<sup>th</sup>). The proposed trip would be sent out to the membership for comments.

Following the discussion on the field trip, updates on four recently funded Co-op studies were presented. Mark Gray reported

on Proposal 07-01 Glyphosate/Evergreen Brush; Jason Warshawer on Proposal 08-02 Cedar trials; Bob Powers on Proposal 03-01 Agenda 2020; and Jianwei Zhang on Proposal 09-01 Stand Density Index. An executive summary for each of these studies can be found in the 2009 Annual Report.

All treatments have been installed on the glyphosate study. Treatment effects on the shrubs will be determined at the end of the 2010 growing season (second growing season) using the line intercept survey method. Results will be compared to the untreated control. Conifer damage will be noted at this time. Results of this study are to be presented at the Forest Vegetation Management Conference in January, 2011. The study site was one of the featured stops on the 2009 Weed Tour. There is still the possibility that this study will be replicated at an additional site.

The cedar stock trials will be out-planted in spring of 2011. Plot layout will be done in 2010. The need for seedling protection was discussed by the membership. Browsing damage could vary by stock type. Due to the problems of maintenance/costs of netting, it was decided not to protect the seedlings and to account for browsing damage during the annual survival counts. The next discussion concerned the use of velpar on the study sites. Some of the sites that are candidates for the study were treated with velpar two years ago – would this be a problem which could result in eliminating these sites from consideration? The membership decided that the use of velpar might influence the study results and decided it will not be used. The question

was asked about using atrazine instead of velpar. No decision was made regarding this. As originally proposed, there were to be replications of this study on other Co-op members' lands in addition to the initial replication on Roseburg Resources holdings. At the time of the annual meeting, no other member was interested in installing another replication on their lands.

The Big Bend Agenda 2020 site was treated in December to bring the ceanothus plots closer to the desired density levels (5%, 15%, 30%, 50% brush cover). Plans are to remeasure these plots in 2010 to determine how effective the December treatment was in bringing the plots to the desired levels. If needed, the plots can be "tweaked" at this time. Tree measurements will be done following the 2011 growing season. Bob Powers stated that it might take a decade for nitrogen results to show up. Hopefully the original study plan can continue on the Big Bend ceanothus plots at the same time giving the manzanita plots time to develop the scrub stocking needed to meet study objectives. The Agenda 2020 site at Dana will be checked in late June of 2010 to determine what to do with this replication of the study.

Jianwei Zhang presented results from his Stand Density Index study. He found that in pine stands that were not subjected to beetle attacks, SDI reached as high as 570. In stands impacted by beetles, the number was 365, which confirmed Oliver's findings. Only plantations with early release exceeded SDI of 365. Jianwei would like to expand his data set by including additional plantations that are twenty years old or

older. He requested that the membership send him possible candidate sites that he could remeasure and add to his data (an email request was sent April 13<sup>th</sup>). He would also like to remeasure three Garden of Eden sites (Chester, Jaws, and Pondosa) after the 2010 growing season. He requested help from Co-op members to get these remeasurements accomplished. Results of the SDI study are to be published in the Western Journal of Applied Forestry.

Following the updates on funded proposals, new proposals were presented to the membership. Ed Fredrickson presented two proposals: "Aminopyralid Site Preparation and Conifer Tolerance" and "Vista XRT Conifer Tolerance and Manzanita Control".

Complete write-ups of the proposals are available from the Co-op office in Redding. The voting membership approved the funding of the Aminopyralid (Milestone VM) proposal for \$7,110. The membership was in favor of the Vista XRT proposal but funds available for implementing this study were not available at the time of the annual meeting. Since both of these proposals are primarily product research, two of the executive council members (Bob Rynearson and Mark Gray) said they would contact the manufacturer (Dow Chemicals) to see if they would help support this second proposal. This support could take the form of Co-op membership.

The annual meeting adjourned at this time.

# Sierra Cascade Intensive Forest Management Research Cooperative Proposal 07-01 Glyphosate Control of Evergreen Brush

Principal Investigator: Mark Gray

Title: Investigating the Efficacy of Glyphosate for Control of Evergreen Brush Species

Year Funded: 2007

## Executive Summary:

Glyphosate has been used effectively for control of many common weed species that infest conifer plantations.

Treatments of evergreen species have historically had mixed results. Recent price reductions, due to the Roundup patent expiration, have renewed interest in developing effective treatment regimes for these harder to control species. Operational experimentation indicates control of manzanita, snowbrush, chinquapin, and tanoak is possible with various glyphosate/surfactant combinations and, conversely some attempts result in poor control. Is the variability in control a function of timing, material applied or a combination of factors? A more controlled investigation of the treatment parameters would provide better guidelines for this promising application.

The stated purpose of this study is to determine the optimal rate of application of various glyphosate formulations for control of manzanita, chinquapin, snowbrush and brush-form tanoak. Additional purposes include determining surfactant superiority and the best application timing for each target pest.

Several sites on industrial timberlands that contain adequate populations of the target species will be selected.

Treatments to be studied will include: 5% glyphosate, 5% oil; 10% glyphosate, 5% oil; 5% glyphosate, 5% sylvac; 10% glyphosate, 5% sylvac; and an untreated

control. All vegetation will be treated with a directed foliar spray.

Operational-size test plots will be 1 acre in size. Each study site will require 21 one acre plots. Treatment timing will be once a month starting in May and concluding in September (5 treatment dates). Base line data will be taken in the control plots prior to applying the other treatments. Crown reduction of the target species will be determined at the end of the second growing season after treating.

**2008:** The first site chosen for the study was located on Sierra Pacific Industries land near McCloud, California. The site was a conifer plantation about ten years old that contained a good compliment of the target brush species. The planted conifers were taller than the adjacent brush. Brush species present included manzanita, rabbit brush, snowbrush, current, bitter cherry, and chinquapin. Plots were laid out in August and base line data from the control plot was collected in September. Shrub data was collected using the line intercept method. The control is very representative of the plantation as far as amount of competing shrubs. This plot had shrub foliar cover of 52%. The August set of treatments were applied August 15<sup>th</sup>; the September set on September 25<sup>th</sup>. Weather conditions prevented installation of the May, June, and July treatment sets. These treatments will be applied in 2009.

**2009:** Final plot layout (Figure 1) and the May, June, and July treatment applications were completed by July, 2009. The primary study objective is to evaluate the effectiveness of the treatments, through the quantification of crown reduction of the target species, two growing seasons after treatment. Therefore all treatments will be evaluated at the end of the 2010 growing season and compared to the control plot.

The study site was one of the featured stops on the 2009 Weed Tour.

In addition to the Ski Park site, plans are to install another replication of the study on Sierra Pacific Industries lands. An area near Indian Springs is a possible location. Additional replications could be installed on lands of other Co-op members if desired.

**2010:** All plots were measured in September, two growing seasons after treatment. The line intercept method was utilized to determine live crown cover of the shrubs by species. The measurements for the control treatment were collected from the same transects that were measured in 2008. Conifer damage was noted; re-sprouting of the shrubs was recorded when present.

**Results: Conifers** – eleven of the twenty treatments resulted in conifer damage. All four formulations (see previous page for formulations) damaged conifers when applied in May,

June, and July. Damage was mostly minor and confined to lower branches which had been directly sprayed. August and September applications resulted in very little damage. **Shrubs** – the best treatment timing was June through August, although higher herbicide rates may be needed in August treatments to get satisfactory results. Figures 2 and 3 illustrate these points. The most economical alternative is treating in June or July. Chinquapin needs further investigation as results were more varied for this species than with the others. **Control** – Figure 4 illustrates shrub composition in 2008 and 2010. Total shrub cover increased from 52% in 2008 to 53% in 2010. Manzanita cover was declining while snowbrush cover was increasing. **Re-sprouting** – Six treatments showed signs of re-sprouting but in two of these treatments, the re-sprouts looked very stressed. The most re-sprouting was in the GLY 5/OIL 5 treatment and the shrubs were primarily snowbrush.

Full data sets for this study are available at the Co-op manager's office in Redding.

Another replication of this study is under consideration for Indian Springs. As the primary competing species at this site is chinquapin, this would appear to be a good research opportunity.

## Figure Captions

Figure 1 – Ski Park plot layout and treatments.

Figure 2 – Percent live crown cover of shrubs by month of treatment.

Figure 3 – Percent live crown cover of shrubs by formulation.

Figure 4 – Percent live crown cover of shrubs in control: 2008 vs. 2010.

Ski Park Hwy

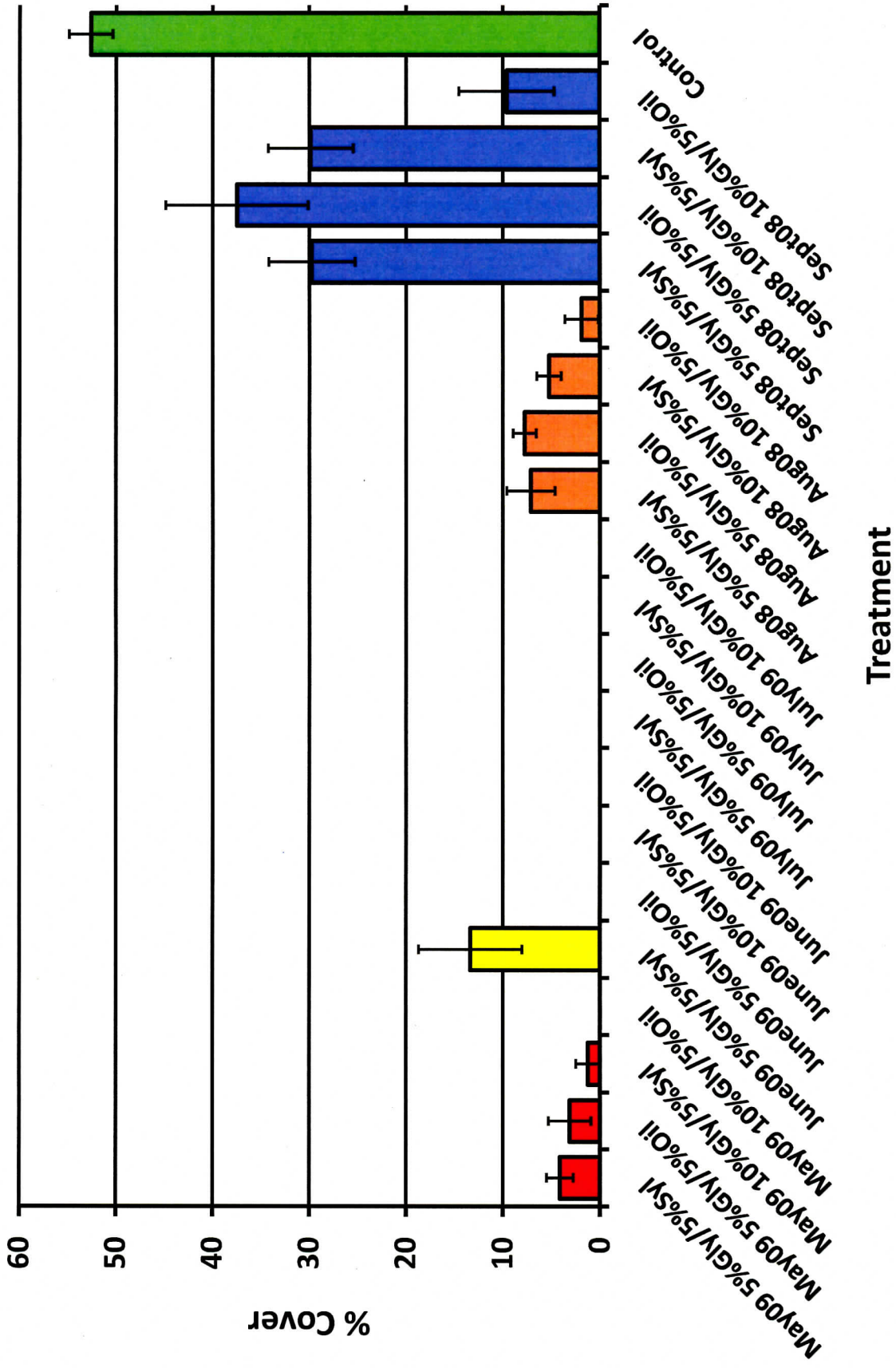
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7 5%Gly,5%Oil May 09	8 10%Gly,5%Syl Sept 08	9 10%Gly,5%Oil Sept 08	10 5%Gly,5%Syl Sept 08
11 5%Gly,5%Oil Sept 08	12 10%Gly,5%Oil Aug 08	3 10%Gly,5%Syl Aug 08	4 10%Gly,5%Oil May 09
2 5%Gly,5%Syl Aug 08	5 Control	6 5%Gly,5%Syl June 09	1 5%Gly,5%Oil Aug 08

17 10%Gly,5%Syl June 09	18 10%Gly,5%Syl July 09
21 5%Gly,5%Syl July 09	20 5%Gly,5%Oil July 09
	19 10%Gly,5%Oil July 09

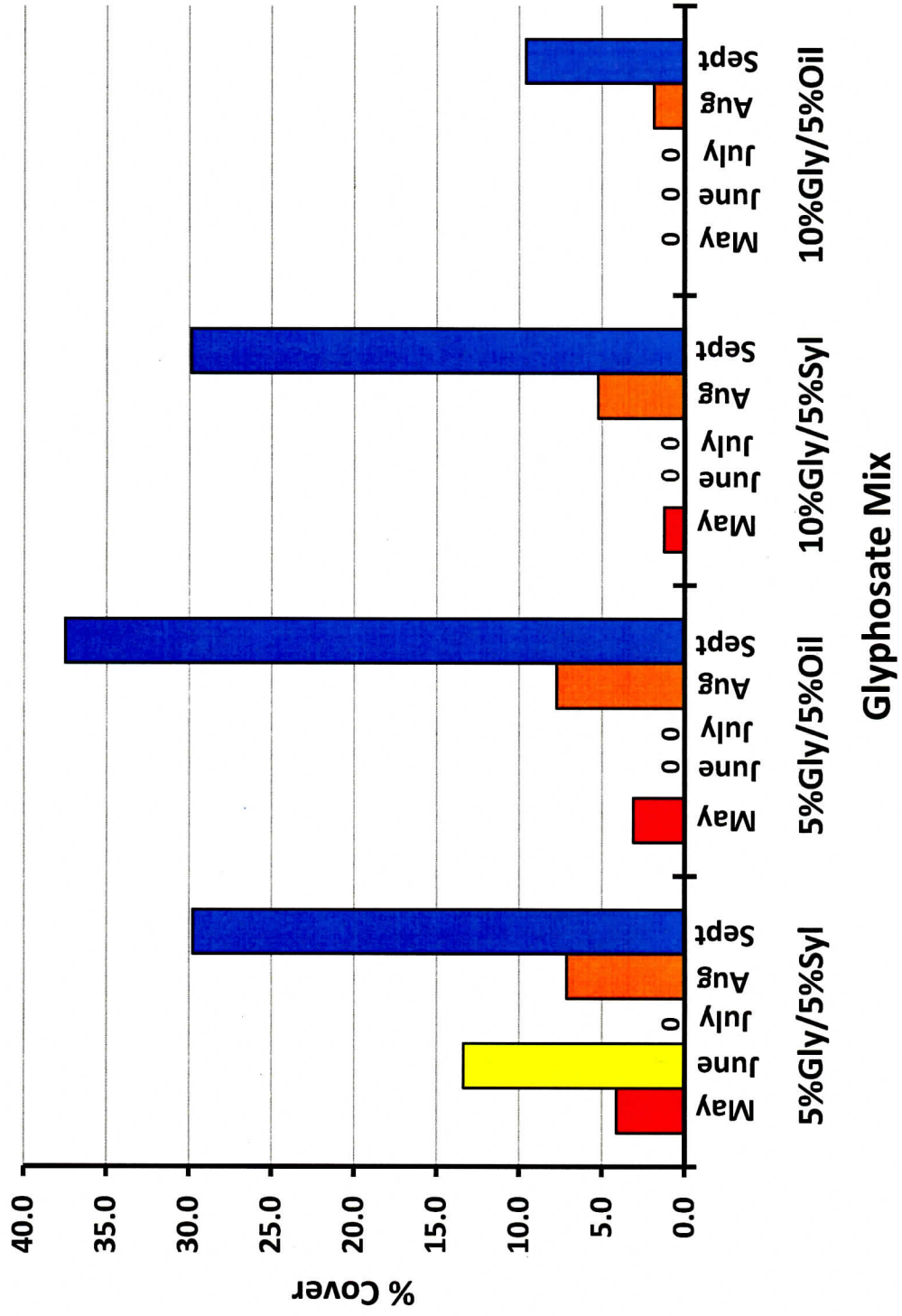
# SCIFMRC

## Glyphosate Study

# Ski Park Glyphosate Study

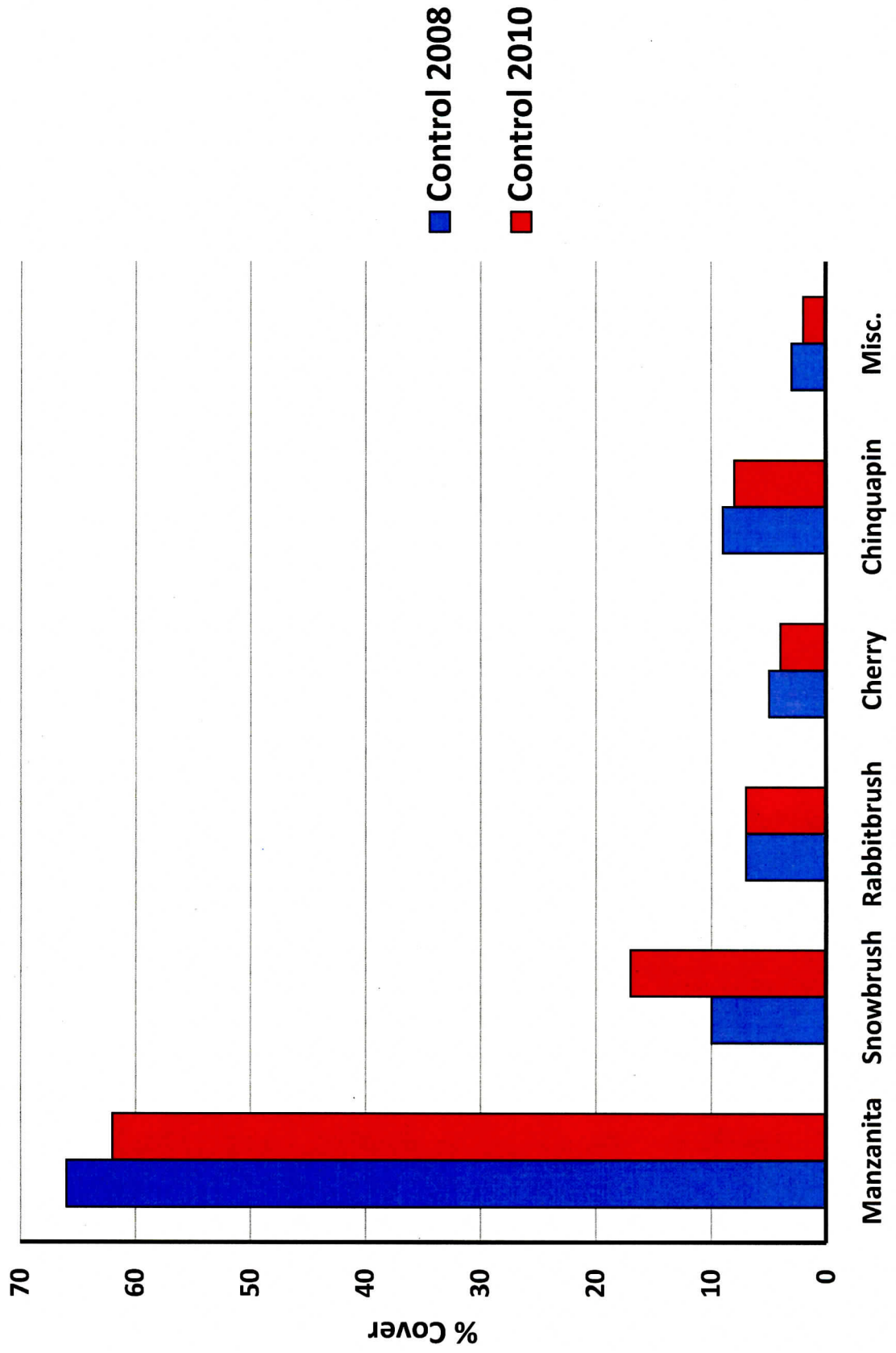


# Ski Park Glyphosate Study



# Ski Park Glyphosate Study

## Control Plot Brush Comparison: 2008 vs. 2010



**Sierra Cascade Intensive Forest Management Research Cooperative Proposal 08-02  
Incense Cedar Stock Type Trials**

Principal Investigator: Jason Warshawer

Title: Improving the Establishment and Growth of Incense Cedar on Dry Sites Through Stock  
Type Trials

Year Approved: 2008

**Executive Summary:**

To help address a lack of knowledge concerning growing cedar - in nurseries as well as after out-planting - as a component species in conifer plantations, a study was proposed in 2008 to determine the principal contributions of stock type to incense cedar (*Libocedrus decurrens*) and sugar pine (*Pinus lambertiana*) survival, early growth, and total above-ground biomass on dry sites in the interior Sierra Cascade region of northern California and southern Oregon under vegetation free conditions. The study will also provide information on effects of time of sowing on seedling performance. Sugar pine was dropped from the trials for the time being at the annual meeting of the Co-op in March, 2008.

Planting sites on lands managed by Co-op members Sierra Pacific Industries, Roseburg Resources and possibly Silver Butte Timber Co. were proposed for the initial installations of the study.

The study will include stock types Styro 5, 8, 10D, and 15; bare root 1-0 and 1-1; and plug-1. The styro stock types will have three periods of sowing: April, May, and June. This results in 15 treatments which

will have 4 replications at each site. Plot size is 72'x72' per replication with 60 plots per site. Planting spacing will be 8 feet x 8 feet resulting in 81 seedlings per plot. The center 25 seedlings will be measure trees with in-plot buffering of two rows of seedlings receiving the same treatment. Each site will require 7 – 8 acres for installation.

Caliper and height will be taken pre-planting and at the end of the fifth growing season. Survival will be monitored annually at the end of each growing season.

**2009:** The initial installation of the study will be on Roseburg Resources land. One thousand Stubby 4's were grown at Cal-Forest Nursery in Etna, California for the plug-1 stock type and will be transplanted in the spring of 2010 at IFA's nursery in Elkton, Oregon. Two thousand bare root seedlings were grown at the IFA nursery in Canby, Oregon for the 1-1 stock type and will be transplanted in the spring of 2010 at the IFA nursery in Elkton. The seedlings for the 1-0 stock type will be grown in Canby. Seed for the Styro 5, 8, 10D, and 15 stock types will be sown in April, May, and June

of 2010 at Cal-Forest Nursery for the 2011 spring plant.

**2010:** Because of the wet spring, some changes were made in the nurseries that were to receive seedlings for transplanting. Instead of going from Cal-Forest (Etna, CA) to IFA at Elkton, Oregon as originally planned, the Stubby 4's were sent to the IFA nursery at Canby, Oregon for transplanting. Planting date was 4/26/10. The 1-1 stock type transplants from Canby were planted in Elkton on 6/16/10. The 1-0 stock type were grown at Canby and all Styro stock types were grown at Cal-Forest as originally planned.

Plot layout was completed in November. The study site is located near Pondosa on

Roseburg Resources land in a new clearcut. The clearcut has been doubled ripped. Planting spots will be marked in early 2011 with planting to follow. Representative measurements for caliper and height for each stock type will be taken prior to outplanting.

Due to the wet spring, late planting dates, and less than ideal nursery practices, the 1-1's are poor representatives of this stock type. The 1-0's are small, averaging about 2 inches in height. Plug-1's look good. All stock will be frozen for the trial.

Hopefully more installations of this study will be initiated.

**Sierra Cascade Intensive Forest Management Research Cooperative Proposal 10-01**  
**Milestone VM**

Principal Investigator: Ed Fredrickson

Title: Aminopyralid Site Preparation and Conifer Tolerance

Year Approved: 2010

**Executive Summary:**

Milestone VM (aminopyralid) is a relatively new product in California. It was registered for use in 2008 for non-crop sites. Currently Dow AgroScience is compiling data in the hope of obtaining a forestry label.

Milestone VM is a pre and post emergent herbicide that controls a wide variety of broadleaf weeds (including legumes) and brush. It is an auxin and has both foliar and soil activity. The residual control is proving to be quite good and the product is an excellent inhibitor of seed germination. It is also showing some unique properties for brush control when tank mixed with other products. It has very low use rates, with maximum label rates at seven ounces per acre (0.1 lb ae/ac).

Previous testing has indicated no conifer tolerance for "over the top" applications, but directed applications around trees appears to be feasible. There is also a strong potential to broaden the spectrum of control when tank mixed with Velpar DF. The major questions surrounding Milestone VM and forestry at this point are regarding conifer tolerance as a site preparation spray and the duration of control by season. Milestone VM might have a fit as a site preparation treatment for some of the chemically intolerant conifers such as sugar pine, cedar,

and redwood, although testing has yet to be done.

The stated objective of this study is to evaluate the effect of aminopyralid rate and timing on vegetation control and conifer tolerance of ponderosa pine and Douglas-fir when applied as a pre-plant site preparation treatment with Milestone VM alone and in combination with Velpar DF compared to Velpar DF as the operational standard.

The study will have two sites, one east side Cascade site and a low elevation west side Cascade site. Each site should be a fresh clear-cut or wildfire that has not had any chemical treatment prior to the trials. The plan will be to spray the east side site in the fall of 2010 and the low elevation site in the spring of 2011. Both sites will be planted in the spring of 2011. The study design will be a completely randomized block design with four replications. Stock type and seed lot will be the same for all trees of each species in the study. The stock type will be similar to what is operationally planted on the site.

Treatments to be studied include: Milestone VM alone at 0.0625, 0.11, and 0.22 lbs. a.i./acre; Milestone VM at 0.11 lbs. a.i./acre plus Velpar DF at 1.0 a.i./acre, and Velpar DF alone at 2.5 lbs. a.i./acre. All

applications will be applied at 10 gallons per acre at 30 psi. Base line data for conifer height and caliper will be taken at time of planting. End of season evaluations will take place at the end of the first and second growing seasons after treatment and will consist of ocular estimates of vegetation percent cover by species for the weeds and brush, ocular rating of conifer damage, and measurement of conifer seedling height and caliper.

**2010:** The fall site is located on property owned and managed by Sierra Pacific Industries approximately 10 miles west of Dana, California. Elevation is approximately 4000 feet. Slope is between 0 and 10 percent. The site is a sub-soiled clear-cut that was planted three years ago and has never received any herbicide

treatment. As a result, the site is dominated by herbaceous vegetation with relatively poor stocking. Study plots were established in areas with no conifer stocking. Plot size is 12 feet by 36.3 feet (0.01 acre).

The study site was sprayed on October 6, 2010. All treatments were applied with a 12 foot backpack boom sprayer and all plots were sprayed with one timed pass.

Each plot will be planted with 10 ponderosa pine and 10 Douglas-fir seedlings in the spring of 2011. A spring location for the second replication of this study will be installed on Sierra Pacific Industries land in the Sacramento Canyon near Sweetbriar. Plots will be installed and sprayed in February 2011 and planted and measured soon after.

**Sierra Cascade Intensive Forest Management Research Cooperative Proposal 10-02**  
**Fluroxypyr (Vista XRM)**

Principal Investigator: Ed Fredrickson

Title: Vista XRT Conifer Tolerance and Manzanita Control

Year Approved: 2010

**Executive Summary:**

Vista XRT (fluroxypyr) is a newly registered chemical to California and forestry. The active ingredient fluroxypyr has been around since the late 1908's. It is a growth regulator herbicide similar in action to triclopyr with several unique characteristics. The main one being fluroxypyr having a greater conifer tolerance compared to triclopyr. The second is that fluroxypyr is very effective in controlling manzanita.

A limited amount of development work was done in the late 1980's and early 1990's with fluroxypyr in forestry. The results showed a potential for conifer release "over the top" applications. Conifer tolerance was good overall, but varied with geographic location. All of the early conifer tolerance and efficacy work on manzanita was with application in either April or June, timings not typical for usual conifer release. Further tests need to be done in a more typical timing for aerial release applications, such as late August or early September. The other concern is that since its conception, the formulation of fluroxypyr has changed significantly. This change in formulation may increase conifer tolerance but could decrease efficacy on a waxy-leaf species such as manzanita.

The significance of a herbicide that could be applied over the top of conifers to release seedlings from evergreen brush cannot be overstated. The potential cost savings of being able to release plantations with aerial applications rather than ground directed treatments is dramatic. Fluroxypyr is currently labeled for aerial release in pine plantations. Applications at a more typical time for release should provide an even greater degree of tolerance than previous studies have shown. Based on previous data, there may be the potential for an early season release window.

The stated objective of this study is to evaluate the effect of Vista XRT rate and timing on manzanita control and tolerance of ponderosa pine and Douglas-Fir with "over the top" broadcast applications. The study is a trial that will look at several application rates and timing of application to define the conifer tolerance of Vista XRT.

The study site should be a two or three year old conifer plantation with a manzanita brush component. Plans are to look at ponderosa pine and Douglas-fir tolerance to the herbicide treatments; however, plot size is limited and it may be hard to find a plantation with enough of each species for a

good sample size. The study site should be chosen and laid out by August 2010. The study design will be a completely randomized block design with four replications. At least four seedlings of each species must be present in each plot to provide a valid sample size if both ponderosa pine and Douglas-fir are included. For a pine only trial, 8 seedlings per plot would be a minimum.

Two spray timings will be utilized in this study (late August 2010 and April 2011 – or as soon as the site opens in the spring prior to bud-break). Treatments will include: Vista XRT alone at 0.25, 0.5, and 1.0 lbs. a.i./acre; Vista XRT at 0.25 and 0.5 lbs. a.i./acre plus Garlon 3A at 0.5 lbs. a.i./acre; and a control. No surfactants will be added to the treatments. All applications will be applied at 10 gallons per acre. At treatment, conifer caliper and height will be measured on all conifers as well as initial manzanita percent cover. Post-treatment evaluations will take place at the end of the season in 2011 and 2012. Percent crown and stem reduction will be evaluated for manzanita; conifer evaluations will consist of caliper and height measurements and an ocular rating of damage.

**2010:** The study site is located on property owned and managed by Sierra Pacific Industries approximately 5 miles southwest of Burney, California. Elevation is approximately 4500 feet. Slope is between 0 and 10 percent. The site was clearcut and planted to a mix of ponderosa pine, Douglas-fir, and white fir. The site was initially treated with Velpar DF as a site

preparation treatment. Seedlings were two years old at the time of treatment. Study plot size is 12 feet by 72.6 feet (0.02 acre). A minimum of three ponderosa pine and Douglas-fir were in each plot.

The plots were sprayed on September 3, 2010. All treatments were applied with a 12 foot backpack boom sprayer and all plots were sprayed with one timed pass. Initial measurements of caliper and height for all conifers within the plots were recorded at the time of treatment.

The trial was evaluated on October 21, 2010. No conifer growth had occurred since treatment, therefore only ocular evaluations were conducted. Percent foliar brownout was evaluated for greenleaf manzanita, gooseberry, ponderosa pine, Douglas-fir, and white fir where it was present. White fir was not a part of the study but it did occur in the majority of the plots. Tolerance was evaluated for white fir, but the results are anecdotal and any statistical analysis would be invalid. Terminal and lateral bud damage was assessed for all conifers on a scale of 0 to 10 with 0 being no damage and 10 being dead. Results were taken only seven weeks after treatment and are preliminary. Full treatment effects will not develop until the end of the 2011 growing season.

**Brownout:** Results are presented by species. **Manzanita** percent brownout was very low for all treatments (10 to 16 percent) which is typical of fall treatment application evaluations done in the same season as treatment (Table 1). However, all treatments were significantly different from

the control. There were no significant differences between treatments. Manzanita showed a very slight rate response for Vista XRT alone at 0.25, 0.5, and 1.0 lbs. a.i./acre and for the tank mixes with Garlon 3A, however the results are not statistically significant at this time. Generally, the tank mix treatments provided slightly better control than Vista XRT alone. **Gooseberry** showed a strong rate response for treatments with Vista XRT alone at 0.25 and 0.5 lbs. a.i./acre, but no further increase was noted when rates were increased to 1.0 lbs. a.i./acre. No rate response was seen in the tank mix treatments with Garlon 3A and results were similar to those seen in the 0.5 lbs. a.i./acre Vista XRT alone treatment. In general, initial percent brownout was high for all treatments on gooseberry.

Conifer damage was minimal at this time (Table 1). **Ponderosa pine** percent brownout was under 10 percent for all treatments. There was a rate effect for treatments with Vista XRT alone and with the tank mixes with Garlon 3A up to 0.5 lbs. a.i./acre. Increasing rates of Vista XRT alone to 1.0 lbs. a.i./acre showed no further increase in damage. Damage was slightly higher from treatments including Garlon 3A compared to Vista XRT alone. Analysis of variance showed a significant difference in percent brownout for all treatments compared to the control with the exception of the lowest rate of Vista XRT by itself. Due to the limited data range at these early evaluations, the significance of these results appears to be an artifact. **Douglas-fir** percent brownout was under 10 percent for all treatments. As with ponderosa pine,

there was a rate effect for treatments with Vista XRT alone and with the tank mixes with Garlon 3A up to 0.5 lbs. a.i./acre. Increasing rates of Vista XRT alone to 1.0 lbs. a.i./acre showed no further increase in damage. No difference in damage was seen between Vista XRT alone and tank mixes with Garlon 3A. There were no significant differences from the control with any of the treatments. **White fir** seems to be tolerant to Vista XRT treatments alone up to 0.5 lbs. a.i./acre. Slight damage occurred at the 1.0 lbs. a.i./acre Vista XRT rate alone and with the tank mixes with Garlon 3A. However, these results are observational only.

**Bud Damage:** Results are presented by species (Table 2). **Ponderosa pine** showed little to no bud damage for treatments with Vista XRT alone up to 0.5 lbs. a.i./acre and the low Vista XRT rate when tank mixed with Garlon 3A. Very minimal damage occurred to buds with the high rate of Vista XRT tank mixed with Garlon 3A and the 1.0 lbs. a.i./acre rate of Vista XRT alone. **Douglas-fir** showed virtually no bud damage on either the terminal or lateral buds for any treatment. **White fir**, like Douglas-fir, showed little bud damage for any of the treatments.

Early results seem to indicate fairly good conifer tolerance for most treatments. It appears that ponderosa pine and Douglas-fir have similar tolerances to Vista XRT by itself. Douglas-fir appears to have more tolerance to treatments that include Garlon 3A. Any speculation on long-term vegetation control would be premature at this time. Full treatment effects on

vegetation will not be present until the end of next season. It appears that gooseberry is highly sensitive to all treatments tested, however, long-term control is not established.

Full data sets for this study are available at the Co-op manager's office in Redding.

Table 1 Percent Brownout Data Seven Weeks After Treatment

	<b>Manzanita</b>	<b>Gooseberry</b>	<b>Pine</b>	<b>Doug F</b>	<b>W. Fir</b>
<b>Treatment</b>	<b>% Brownout</b>	<b>% Brownout</b>	<b>% Brownout</b>	<b>% Brownout</b>	<b>% Brownout</b>
Vista 0.25	10.	76.3	0.8	0.3	0.0
Vista 0.5	11.3	95.0	2.5	2.3	0.0
Vista 0.25 + 0.5 Gar 3A	15.0	95.0	4.3	1.8	12.5
Vista 0.5 + 0.5 Gar 3A	16.3	93.8	6.8	2.5	5.0
Vista 1.0	16.3	100.0	3.5	1.5	6.7
Control	0.0	0.0	0.0	0.0	0.0

Table 2 Terminal and Lateral Bud Damage By Species. 0 = No Damage; 10 = Dead

	<b>PP Term</b>	<b>PP Lateral</b>	<b>DF Term</b>	<b>DF Lateral</b>	<b>WF Term</b>	<b>WF Lateral</b>
<b>Treatment</b>	<b>Bud Dam.</b>	<b>Bud Dam.</b>	<b>Bud Dam.</b>	<b>Bud Dam.</b>	<b>Bud Dam.</b>	<b>Bud Dam.</b>
Vista 0.25	0.0	0.0	0.0	0.0	0.0	0.0
Vista 0.5	0.0	0.3	0.0	0.0	0.0	0.0
Vista 0.25 + 0.5 Gar 3A	0.0	0.0	0.0	0.0	0.0	0.0
Vista 0.5 + 0.5 Gar 3A	0.5	0.5	0.0	0.3	0.0	0.0
Vista 1.0	0.5	0.3	0.0	0.0	0.3	0.0
Control	0.0	0.0	0.0	0.0	0.0	0.0

Sierra Cascade Intensive Forest Management Research Cooperative  
Income/Expense Statement  
Calendar Year Report for the Period Jan. 1 to Dec. 31, 2010

Beginning Balance on January 1, 2010		\$6,920.21
Total Income (Membership Dues)		\$29,000.00
Expenses:		
Vista Proposal	\$4,500.00	
Milestone Proposal	\$7,110.00	
Co-op Manager Expenses	\$21,224.00	
Total Expenses		\$32,834.00
Year End Balance as of December 31, 2010		\$3,086.21

## **WORKING GROUP MEMBERSHIP**

### **Working Group I**

Seed to Establishment

Tom Jopson, Chair  
Bob Amesbury  
Mark Gray  
Lewis Howe  
Scott Worden  
Bob Rynearson  
Tom Young

### **Working Group II**

Out-planting through Precommercial Thinning

Jason Warshawer, Chair  
Bob Amesbury  
Mark Gray  
Lewis Howe  
Scott Worden  
Bob Powers  
Bob Rynearson  
Tom Young