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**SUPPLEMENTAL MEMO**

**DATE OF MEMO:** October 13, 2006

**TO:** Board of County Commissioners

**FROM:** Jerry Kendall/Land Management Division JK

**RE:** **ORDINANCE NO. PA 1237 -- IN THE MATTER OF AMENDING THE RURAL COMPREHENSIVE PLAN TO REDESIGNATE LAND FROM "AGRICULTURAL" TO "MARGINAL LAND" AND REZONING THAT LAND FROM "E-40/EXCLUSIVE FARM USE" TO "ML/SR" ("MARGINAL LAND WITH SITE REVIEW"), AND ADOPTING SAVINGS AND SEVERABILITY CLAUSES (file PA 05-5985; Ogle)**

**Scheduled board date for third reading/deliberation is October 18, 2006.**

Background:
The Board conducted the 2nd reading and public hearing on September 13. The Board then closed the hearing, leaving the record open for written comments in the following manner:

- Until September 27 for any party to comment on any aspect of the proposal.
- Until October 4 for any party to respond to materials submitted during the period above.
- Until October 11 for the Applicant's final rebuttal.

Copies of all materials received during open record period are attached.

Within the Applicant's final rebuttal (attachment #6), Mr. Farthing includes two pages of suggested supplemental findings, to be added to the current set of findings provided to the Board in the original staff packet dated August 11, 2006. The purpose of these additional findings is to fortify the original findings in response to Mr. Just's latest submittals.

Conclusion:
Whereas staff has reviewed the enclosed submittals, and (still) recommends that the Board approve the proposal and Ordinance No. PA 1237, it is also advised that the supplemental findings be adopted by the Board and added to the ordinance.

Please contact me at x4057 if you have any questions or comments.

**Attachments:**
1. Jim Just submittal of 9-13-06—108 pp.
2. Jim Just submittal of 9-25-06—3pp.
3. Michael Farthing submittal of 9-27-06—29pp.
4. Jim Just submittal of 10-2-06—3pp.
5. Michael Farthing submittal of 10-4-06—4pp.
6. Michael Farthing final rebuttal of 10-11-06--4pp.

Lane County Board of Commissioners
125 E. 8th Avenue
Eugene, OR 97401

September 13, 2006

**RE: Ogle-Childs marginal lands application, PA 05-5985**

Dear Commissioners,

The Goal One Coalition (Goal One) is a nonprofit organization whose mission is to provide assistance and support to Oregonians in matters affecting their communities. Goal One is appearing in these proceedings at the request of and on behalf of its membership residing in Lane County. This testimony is presented on behalf of Goal One and its membership; LandWatch Lane County, 642 Charnelton, Eugene OR 97401; LandWatch's membership in Lane County, specifically to include LandWatch President Robert Emmons, 40093 Little Fall Creek Road, Fall Creek OR 97438, as an individual.

## I. Introduction

This application for a plan amendment and zone change to Marginal Lands involves the same property that was the subject of a similar application (PA 02-5838) that was withdrawn in December 2004 after a preliminary denial by the Board of Commissioners.

This proposal would redesignate 73.74 acres of land on two parcels, identified as Tax Lot 304 and Tax Lot 303 (parcels #1 and #2 of Plat No. 94-PO510, respectively) totaling 113.74 acres, from "Agricultural Land" to "Marginal Land," and change the zoning from E-40/Exclusive Farm Use to ML/Marginal Land. The northern portions of both TL 304 and TL 303, totaling 40 acres, were redesignated and rezoned Marginal Land in 1992 (PA 0221-92). The subject property is located just south of the Metro UGB in southwest Eugene. It is accessed from the southern end of Timberline Drive.

The subject lands are adjacent to F2-zoned land to the west and south, and to E40-zoned lands to the east. ORS 215.237 and LC 16.214 require a minimum parcel size of 20 acres if the parcel is adjacent to land zoned for farm or forest use that would not qualify as marginal land, and otherwise require that parcels be at least 10 acres in size.

## II. Applicable criteria

### A. ORS 197.247

The criteria for the designation of marginal land are set out in ORS 197.247 (1991 edition). The Staff Report refers also to Lane County guidelines for interpreting and administering marginal lands provisions, issued by the Board of Commissioners in March 1997. Because



BCC #1 -108 pp.

the provisions being applied are provisions of state statute, no deference is due or will be given to local interpretations of ORS 197.247.

ORS 197.247 establishes a two-part test for the designation of marginal land. Any proposal for a marginal land designation must first comply with the "income test" requirement of ORS 197.247(1)(a), which requires that the applicant prove that the subject land was not managed, during three of the five calendar years preceding January 1, 1983, as part of a farm operation producing $20,000 in annual gross income or as part of a forest operation capable of producing an average of $10,000 in annual gross income over the growth cycle.

The second part of the marginal land test contains three options. ORS 197.247(1)(b)(A) and (B) are "parcelization" tests, which look at parcel sizes of adjacent and nearby lands. ORS 197.247(1)(b)(C) is the "productivity" test, which requires the applicant to demonstrate that the land is predominantly comprised of soils in capability classes V through VIII and is not capable of producing 85 cf/ac/yr of merchantable timber.

### B. Board of Commissioners' 1997 Marginal Lands Direction

The applicant's representatives persist in relying on the March 1997 *Supplement to Marginal Lands Information Sheet* as providing authority for interpretation and administration of ORS 197.247. Lane County may not rely on this document for guidance. Rather, the Board must conduct the analysis required by statute. Lane County guidelines not incorporated into the county's comprehensive plan or land use regulations do not substitute for the actual analysis required by applicable state law. *Johnson v. Lane County,* 31 Or LUBA 454 (1996).

The applicant has submitted a Forest Productivity Analysis prepared by Marc. E. Setchko, Consulting Forester (Setchko Report). The Setchko Report indicates that the applicant has again chosen to address the "productivity" option of the second prong of the marginal lands test.

## II. Analysis

Because calculation of average income over the growth cycle depends upon assumptions and evidence related to productivity of the proposed marginal lands, this letter will first address issues concerning the "productivity" test of ORS 197.247(1)(b)(C) and then address "income" test issues relating to ORS 197.247(1)(a).

### A. Productivity test

The inquiry under ORS 197.247(1)(b)(C) requires that the county re-visit its forest inventory and allows for cubic foot class 5 and 6 soils to be designated as marginal lands. The methodology for conducting the forest land inventory is set forth in OAR 660-006-0010 which provides, in relevant part:

> "Governing bodies shall include an inventory of 'forest lands' as defined by Goal 4[.] * * * [T]his inventory shall include a mapping of forest site class. If site information is not available then an equivalent method of determining forest site suitability must be used."

OAR 660-006-0010 requires that inventory methodology include a mapping of forest site class. Forest Site Class methodology assigns a numeric site class according to potential productivity of each soil unit as shown in Table 1.[1]

**TABLE 1: FOREST SURVEY SITE CLASS**

| Site Class | Potential Yield, Mean Annual Increment |
|---|---|
| I | 225 or more cubic feet per acre |
| II | 165 to 225 cubic feet per acre |
| III | 120 to 165 cubic feet per acre |
| IV | 85 to 120 cubic feet per acre |
| V | 50 to 85 cubic feet per acre |
| VI | 20 to 50 cubic feet per acre |

The productivity test must be based on the potential forest productivity of the proposed marginal lands. In this case, this includes a total of 73.74 acres of the combined total of 113.74 acres of TLs 303 and 304.

Soils on the proposed marginal lands and their potential productivity for forest production are shown in the table below. Soils are as given in the Soil Survey of Lane County Area, Oregon. Forest productivity is for Douglas-fir except for the Philomath soil units, for which productivity is for Ponderosa pine.

**TABLE 2: PRODUCTIVITY USING PUBLISHED DATA[2]**

| # | Soil Name | Acres | Site Index | cf/ac/yr | total growth cf/yr |
|---|---|---|---|---|---|
| 81D | McDuff clay loam 3-25% slopes | 5.6 | 112 | 158 | 884.8 |
| 102C | Panther silty clay loam 2-12% | 14.7 | - | 45 | 661.5 |
| 107C | Philomath silty clay 3-12% | 31.2 | 131 | 168 | 5,241.6 |
| 108F | Philomath cobbly silty clay 12-45% | 12.6 | 131 | 168 | 2,116.8 |
| 113E | Ritner cobbly silty clay loam 12-30% | 6.9 | 107 | 149 | 1,028.1 |
| 113G | Ritner cobbly silty clay loam 30-60% | 2.7 | 107 | 149 | 402.3 |
| **Totals** | | **73.7** | | | **10,335.1** |

**Average growth potential = 10,335.1 cf/yr ÷ 73.7 acres = 140.23 cf/ac/yr.**

As the applicant's forestry consultant has conducted on-site measurements and calculations for the Philomath units' productivity for ponderosa pine, the discussion that follows will rely solely on Mr. Setchko's data rather than on published data. The published data for ponderosa pine is provided here for the purpose of showing that Mr. Setchko's data – the data utilized and relied upon in Goal One's analysis - is very conservative in comparison to other available data.

[1] Source: USDA Forest Service. See Exhibit 10.

[2] Source of measurements: *Establishing and Managing Ponderosa Pine in the Willamette Valley,* Oregon State University Extension Service, EM 8805, May 2003, p. 1-14. See Exhibit 1. Site index in publication is a 50-year index; tables converting site index to cf/ac/yr productivity require the use of a 100-year site index. Derivation of 100-year site index is shown at Exhibit 5-1. Cf/ac/yr productivity is shown in the CMAI table at Exhibit 5-2.

The following table is identical to the preceding table except that it uses the on-site productivity data for Ponderosa pine produced by the applicant's forestry consultant.[3] Cf/ac/yr productivity data for Douglas-fir is as reported in King's west side CMAI tables; for ponderosa pine, from appricant's forestry consultant's measurements and calculations.

**TABLE 3: PRODUCTIVITY USING APPLICANT'S PUBLISHED DATA AND SITE DATA**

| # | Soil Name | Acres | Site Index | cf/ac/yr | total growth cf/yr |
|---|---|---|---|---|---|
| 81D | McDuff clay loam 3-25% slopes | 5.6 | 112 | 158 | 884.8 |
| 102C | Panther silty clay loam2-12% | 14.7 | - | 45 | 661.1 |
| 107C | Philomath silty clay 3-12% | 31.2 | 104* | 110 | 3,432.0 |
| 108F | Philomath cobbly silty clay 12-45% | 12.6 | 104* | 110 | 1,386.0 |
| 113E | Ritner cobbly silty clay loam 12-30% | 6.9 | 107 | 149 | 1,028.1 |
| 13G | Ritner cobbly silty clay loam 30-65% | 2.7 | 107 | 149 | 402.3 |
| **Totals** | | **73.7** | | | **7,794.2** |

* Ponderosa pine.

**Average growth potential = 7,794.2 cf/yr ÷ 73.7 acres = 105.8 cf/ac/yr.**

The applicant's forestry consultant has calculated that the cf/ac/yr productivity of the proposed marginal land is only 69.327 cf/ac/yr. ***However, in arriving at this result, the forestry consultant excluded approximately one-third of the property from consideration, assuming that it has "zero" productivity for forestry.*** According to SCS and NRCS soil maps, the excluded areas have the same Philomath soils as those containing the ponderosa pine that the applicant's forestry consultant measured. The applicant's forestry consultant explains that no trees grow on these soils.

Statewide Planning Goal 4 became effective in 1975. It charged the counties with the responsibility for determining and mapping their forest land by cubic foot site classes. The U.S. Forest Service manual, *Field Instructions for Integrated Forest Survey and Timber Management Inventories – Oregon, Washington, and California, 1974* was designated as the common source document for site class determinations. The Oregon State Department of Forestry issued a publication explaining how SCS soil maps can be used to develop an inventory of forest lands to satisfy statewide land use planning Goal 4.[4]

Goal 4 itself no longer specifies an authority for forest inventory and mapping methodology. However, OAR 660-006-0010 does require that the forest land inventory include a determination of "forest land suitability" using "a mapping of forest site class" or, if site information is not available, "an equivalent method."

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[3] Data from Setchko on-site measurements and calculations. See Exhibit 9.

[4] *A Technique for Mapping Forest Land by Site Productivity Using Soil Survey Information,* Oregon State Department of Forestry Resource Study Team, August, 1978. See Exhibit 11. The methodology laid out in this document was used in conducting Lane County's forest land inventory. See *Working Paper: Forest Lands*, p. 4.

The 1978 ODF publication explains what forest site class methodology requires[5]:

> "OR-1's, as they are usually called, are prepared for each soil series in Oregon. * * * A woodland Suitability section is on the back of the OR-1 form. If the soils described are not rated as suitable for forest production, no information will be entered in the Woodland Suitability section[.] * * * If the soil type is rated for forest production, the section includes productivity, species, and management information. * * *
>
> "Site index is given in the third column for the <u>species</u> listed in the second column. <u>Site index</u> is an indication of potential productivity without man's management and is based on the average total height of the dominant and codominant trees in the natural stand at the age of 100 years.
>
> "Average site index, based on sampling, is given for the listed species. The standard deviation (±) is shown when four or more plots were measured on the listed soil. <u>This is the site information that is used to identify the productivity of an area; its conversion to cubic foot site classes is described later</u>."

The 1978 ODF publication explains what must be done if a soil is not rated for woodland production:

> "Productivity would have to be determined from Department of Revenue productivity maps, other productivity rating, or field measurements."

The 1978 ODF publication also states that the dominant species must be used to determine forest productivity and explains how to determine the dominant species if the soils are suitable for the production of more than one species:

> "The Woodland Suitability section may indicate more than one species and range of site index. In such a case the dominant species type should be used to determine the productivity of the forested area. The dominant species may be determined in several ways, such as using Oregon State Department of Revenue forest type maps, private industrial owners' type maps, aerial photographs, or field observation."

Another ODF publication[6] explains the "equivalent method" that OAR 660-006-0010 requires be used when site information is not available:

> "Before deciding to use an alternative method of measuring the productivity of forestland, documentation should be produced showing that an attempt has been made to use the soil survey and either the soil(s) in question have no rating, or reasons exist indicating that the soil survey may be inaccurate. Where either of these two

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[5] References are to SCS data contained in OR-Soils-1 Forms (OR-1s, or "green sheets"), as soil surveys were for the most part not yet published.

[6] Goal 4 specified that the methodology be applied as described in *Field Instructions for Integrated Forest Survey and Timber Management Inventories – Oregon, Washington, and California, 1974*. See Exhibit 11. The ODF publication Land Use Planning Notes Number 3, April 1998, summarized the required methodology. See Exhibit 12.

circumstances exists, a soil scientist from the USDA Natural Resource Conservation Service (NRCS, formerly SCS) should be contacted.

"In many cases soils that are not primarily used for agriculture were not given ratings for forestry. However, this does not mean they are not capable of growing trees. On the contrary, they may be highly productive, and a NRCS soil scientist may be able to provide a rating of that soil's forest capability. * * *

"Because the soil survey is not site specific information, The Department of Forestry has agreed to approve methods that would allow a land owner to use site specific information to determine the productivity of the land when applying for a dwelling or other land use decision.

"The process should work something like this:

"1. The Department of Forestry has approved a methodology for calculating site productivity (the details are described below in this document). When the landowner contacts the county with concerns about the productivity rating of their property, they are provided with information about the required methodology.

"2. The landowner must have an independent, knowledgeable person, like a consulting forester, *measure the trees on the property* and calculate the cubic foot site class using the approved methods. Plots must be taken to measure the productivity of *each different soil type and aspect* on the property. The consultant must use care when selecting site trees to obtain an accurate measurement, and *the consultant's report must provide adequate detail to determine whether the approved methods were followed.* (Emphasis added).

"3. The consultant shall provide a copy of the report to the county to use in making land use decisions. If the county has questions about whether the consultant followed the methodology, the Department of Forestry may need to review the report. However, because this is a land use decision, the county must make the final decision to accept or reject the work of the consultant."

To determine the productivity of a soil type and aspect, an "equivalent method" requires that the height of 15 to 20 dominant and co-dominant trees be measured. Determining the age of about 10 of those trees is sufficient if the area is homogeneous. Additional plots must be taken for each soil type and aspect on the property. If sufficient suitable site trees are not available from the property, dominant trees from a nearby area with the same general aspect, elevation, and soil type may be selected. If trees are not available or if the site index cannot be accurately determined, soil survey methodology is required to accurately assess the site productivity. This requires that a soil scientist be employed to do a higher intensity soil survey. The soil scientist can determine whether the properties of the soils are close enough to soils with known productivity to apply the known productivity to the soils on the site.[7]

The absence of trees on a site means only that trees are not available. When adequate trees are available on a particular soil and aspect, measuring those trees is sufficient to establish the

[7] This explanation of how soil science methodology is applied to determine forest productivity is found in the 1978 ODF publication at p. 10. See Exhibit 11-12.

productivity of that soil and aspect. For example, in the present instance, the fact that Mr. Setchko has measured and established the productivity for ponderosa pine of the Philomath soil units conclusively establishes the productivity of those units. It cannot be said that the absence of trees on areas of the Philomath soils is adequate to establish that the productivity of those areas is zero. At best, if it can be shown that the areas without trees differ in some way in soils or aspect, the absence of trees means only that there aren't trees to measure. Assuming that the productivity of those soils is zero is not an "equivalent method." The productivity of other areas with the same soil and aspect and containing trees must be determined to establish the productivity of the area without trees. Alternatively, a soils scientist may be able to determine productivity if the soils can be compared to soils with known productivity.

An "Ogle Property Soil Report" (Report) has been submitted into the record. The Report was prepared by Mr. Stephen Carnuana, an agronomist whose professional experience includes 15 years with NRCS as a Line Officer and a Staff Specialist (Soil Conservationist, District Conservationist, Salmon Recovery Officer) and 11 years as Principal of Agronomic Analytics, a firm which provides consulting services to private and government entities.

Mr. Carnuana performed a field examination of the subject property. The investigation included soil sampling across the property. A total of 20 auger and backhoe pits were dug to a maximum depth of 60 inches or until bedrock was reached.

Sampling was concentrated in areas mapped by the NRCS as containing Philomath soil units. 16 samples were taken in these areas; areas with and without trees were sampled. Four samples were taken in areas with other soils. As the productivity of the Philomath units for ponderosa pine is at issue here, this letter will address only data pertaining to the Philomath soil units.

The Report notes that the published *Soil Survey of Lane County Area, Oregon* (*Soil Survey*) is a 2$^{nd}$ order survey, that insufficient sampling was undertaken to map the soils to the level of a 1$^{st}$ order survey, and that no revisions are made to existing soil map units. The Report concludes that soils conform in general to the mapped data in the published *Soil Survey*; that soils noted in the field matched; and that texture and stoniness in the field were as reported in the soil survey.

The *Soil Survey* describes all of the Philomath units as typically 14 inches in depth to bedrock. Data in the Report confirms that soils on the subject property are in fact deeper than typical for these units. The 16 sample sites show an average depth of 29.5 inches.

Referring to the 107C Philomath unit, the Report states: "Significant areas of the soil * * * exhibit evidence of deeper soil inclusions. The average depth of soils at the 11 sample sites within this map unit is 34.8 inches. The average depth at the 5 sample sites within the 108F Philomath map unit is 17.8 inches.

The Report contains a conclusion that "[t]he pattern of forest cover on the property was found to follow closely the presence of deeper soils on the property." However, this conclusion is not supported by the data.

Of the 11 sample sites within the area mapped as 107C, seven were forested and four were grass-covered. Three sample sites showed depths of 14 inches; two of these sites were grass-covered, one was forested. One sample site with a soil depth of 40 inches was also grass-covered. This data shows that soils of "typical" depth can and do support tree growth, and that the presence of grass cover is not sufficient to establish that soils are shallow or that trees are incapable of growing in those areas.

The data is similar regarding the 108F unit. The shallowest soil, at sample site AH #E2, was 8 inches. This site was forested. Two sample sites showed the "typical" soil depth of 14 inches: one site was forested, one was grass-covered. This date establishes that shallow soils – even soils shallower than typical for the soil unit – can and do support tree growth.

What is clear from data provided in the *Report* is that Philomath soils on the subject property are deeper than is typical for these soil units, and that these soils – when typical in depth and even when shallower – can and do support timber production. While it may be true that the deeper soils on the subject property are more likely to have been or be forested, this does not establish that the Philomath soils on the subject property are not capable of supporting merchantable tree species, including ponderosa pine, or of being managed for timber production.

Regarding the 108F unit, the *Report* states that it is "unrated for timber production indicating just how poorly suited this soil is for long-term production." It is well established in law that the lack of a rating in the Soil Survey says nothing about potential productivity. The absence of a rating means nothing more than adequate information regarding forest productivity was not available when the forest productivity tables were produced.

The *Report* concludes that the Philomath soil units have limitations for Douglas-fir, including shallow soils, competition from grass, and the hot, dry aspect of the southern slope. The *Report* did not establish an estimated productivity for Douglas-fir, and does not address ponderosa pine at all.

Southern slopes are common in forested areas in Oregon – every hill or mountain has one. While a southern slope may present management challenges, it does not preclude successfully growing trees. On south-facing slopes, where seedlings may be damaged or killed by intense sunlight and heat, shading the seedling's lower stem with shade cards (available commercially or homemade) can improve seedling survival.[8]

The data shows that the slopes are in fact deeper than typical. Forest managers manage for grass competition and southern exposures regularly and successfully. Even were the *Report*'s conclusion to be supported by data in the *Report*, the conclusion does not refer or apply to ponderosa pine.

The *Report* confirms the accuracy of NRCS data. It does not provide any data or conclusions that would contradict the published productivity data for the Philomath soil units for ponderosa pine, or the on-site ponderosa pine productivity data for the Philomath soil units on the subject property produced by the applicant's forestry consultant.

The available objective, quantitative data establishes that Philomath soil units, on the subject property as elsewhere, have a 100-year site index for ponderosa pine of at least 104 and a

[8] See Exhibit 2, The Woodland Workbook: Reforestation, "Successful Reforestation: An Overview," Oregon State University Extension Service, EC 1498, April 2002, p. 6. *See also* discussion of reforestation practices in *Fletcher*, Exhibit 1 pp. 1-7 through 1-12.

productivity rating for ponderosa pine of at least 110 cf/ac/yr. Decisions regarding forest productivity must be based on objective measures of productivity rather than subjective, qualitative evaluations. *Wetherell v. Douglas County,* 50 Or LUBA 167, 203-04 (2005).

The applicant's representative has summarized the findings of Mr. Caruana as follows:

> "In short, the areas of the subject property that have trees also have deeper soils while the areas that do no[t] now and likely have never supported trees are characterized by shallow or no soils."

This summary mischaracterizes Mr. Caruana's conclusions and is not supported by Mr. Caruana's data. That data confirmed the mapping as reported in the Soil Survey. Mr. Caruana found *no* soils on the property shallower than eight inches. At only one sample site out of the twenty sites examined was the soil found to be shallower than the 14 inches which is reported by the Soil Survey as average for the Philomath units. Mr. Caruana's data shows that trees on the site grow where the soils were shallower, and even on the shallowest soil, only eight inches in depth. Conversely, Mr. Caruana found grass cover even on the deepest soils. No correlation was established between depth of soil and vegetative cover. No data whatsoever was provided relating depth of soil to productivity for timber in cf/ac/yr. Mr. Caruana's data establishes conclusively that trees in fact grow on the site in Philomath soils; that the soils on the property are not particularly shallow, and in fact are deeper than normal for Philomath soils; and that trees grow on the Philomath soils on the property, even in areas with a southern exposure and where the soils are as shallow as eight inches.

The data provided by Mr. Caruana does not support Mr. Setchko's conclusion that the soils in the "grassland area with exposed rock" have zero productivity for timber. Mr. Caruana's data confirms that this area contains the same Philomath soils as are found in timbered areas, and that these soils are at least as deep as the average depth for the Philomath units as reported in the Soil Survey. Mr. Caruana has made no findings that the potential productivity for these soils for ponderosa pine is other than as reported in available publications or as measured on-site by Mr. Setchko. Mr. Caruana has not provided any forest cubic foot site class mapping or other forest productivity data and has presented no conclusions regarding potential productivity for either Douglas-fir or ponderosa pine.

The applicant's forestry consultant has reclassified 24.45 of the 43.83 acres of 107 and 108 Philomath soils as ""'Grassland with exposed rock," and has asserted that these soils are too shallow, rocky, and dry to support and tree growth whatsoever. The forestry consultant's conclusions are contradicted by the findings of the soil scientist, who has confirmed the accuracy of the Soil Survey data and mapping.

The Soil Survey states that the Philomath units are "shallow and well drained." Soil Survey, pp. 122-23. Ponderosa pine commonly grows on shallow, rocky clay soils in the Valley foothills.[9]

The applicant's consultants have not used an "equivalent method" of determining the forest suitability of the 24.46 acre area described as "grassland with exposed rock." Conclusions regarding forest productivity are not based upon measured growth or identified characteristics of the soils.

[9] See Exhibit 1, *Establishing and Managing Ponderosa Pine in the Willamette Valley,* p. 3.

The applicant's forestry consultant has also included an alternative computation of productivity which excludes the area beneath the powerline easements. The presence of a power line easement does not affect the *capability* of the land, which is the focus of the inquiry required by ORS 197.247(1)(b)(C). LUBA has held that, for purposes of inventorying parcels that are crossed by power line easements, such easement restrictions are not a proper consideration in determining the land's potential for forest productivity. *Wetherell v. Douglas County,* 50 Or LUBA 275 (2005), slip op 17.

**B. Income test**

The income test asks whether the proposed marginal land was part of a forest operation in at least three of five years during the period 1978-82 that was capable of producing an average, over the growth cycle, of $10,000 in annual gross income.

ORS 197.247(5) authorizes counties to use "statistical information compiled by the Oregon State University Extension Service or other objective criteria to calculate income[.]" The legislative intent of this provision was to ensure that the marginal lands provisions did not "reward someone who was not industrious." In addressing both the farm and the forest income tests, it is necessary for the applicant to provide objective information regarding the income capability of the farm and forest operations of which the subject property was managed as a part.

It is the "forest operation" that is the subject of inquiry. As the proposed marginal land was part of a larger 113.74 acre parcel during the relevant time period, the income potential of the entire 113.74-acre parcel must be considered.

**1. Prices**

The applicant's forestry consultant has used 1983 prices in computing potential income. LUBA has held that legislature intended the gross income test under ORS 197.247(1) to be applied based on the five-year period proceeding January 1, 1983. *Just v. Lane County*, 49 Or LUBA 456. Douglas fir prices rose substantially beginning in 1979, peaking in 1981; and then declined dramatically – 25% from the peak – by 1983. Prices over the 1978-1982 period averaged about 19.4% higher than in 1983.[10] Using 1983 prices substantially underestimates income potential over the relevant time period.

**2. Growth cycle**

The applicant uses a 50-year growth cycle to calculate average gross annual income over the growth cycle. This is predicated on the Board's Direction on Issue 5: "What 'growth cycle' should be used to calculate gross annual income?" in the March 1997 *Supplement to Marginal Lands Information Sheet.* No Lane County interpretation or application of ORS 197.247 or any of its terms or concepts will be due or receive any deference upon review. *Marquam Farms Corp. v. Multnomah County*, 35 Or LUBA 392, 403 (1999) (ORS 197.829 does not require that LUBA defer to county interpretations of state statutes).

In any event, the 1977 Marginal Lands Supplement misunderstands what the Base 50 site index currently utilized by the NRCS means and does. A Base 50 site index measures

[10] See Exhibit 3.

nothing more than the height of a site tree at age 50; it does not purport to suggest, much less mandate, a 50-year growth cycle. Rather, the Base 50 site index tables assume that culmination of mean annual increment (CMAI) for cf/ac/yr productivity occurs at age 90 for all site indices listed. As explained in the ODF article "Culmination of Mean Annual Increment for Commercial Forest Species" in *Technical Notes,* June 1986, this point is the most efficient time to harvest as far as tree growth is concerned. ***Relying on the NRCS's use a Base 50 site index would assume harvesting at 90 years of age, not 50 years of age*** – at least for the purpose of maximizing cf/ac/yr productivity, which is the only CMAI age reported by the King tables for Douglas-fir.[11] **Note that in computing potential *productivity* of the subject lands, this is exactly what the applicant's forestry expert has done: in using the cf/ac/yr productivity for Douglas-fir reported in the King tables, a 90-year rotation – harvesting at the age which maximizes productivity for cf/ac/yr productivity, or CMAI - is assumed.**

LUBA has explained that the choice of the phrase "capable of producing" in ORS 197.247(1)(a) requires "reasonable management practices over the growth cycle":

> "[T]he choice of the word "capable" requires the application of an objective test in determining a parcel's potential productivity. In other words, that a particular forest operator may use poor management techniques, and thereby cannot produce the requisite income from the parcel over the growth cycle, would not establish that the parcel was not "capable" of producing the requisite income level over the growth cycle. The statutory requirement that the land be "capable" of producing the specified annual income "over the growth cycle" requires an evaluation of the income potential of the property *assuming the utilization of reasonable forest management practices over the growth cycle.*" (Emphasis added). *DLCD v. Lane County (Ericsson),* 23 Or LUBA 33, 36 (1992).

Reasonable forest management practices over the growth cycle would include choosing an appropriate growth cycle – that is, one that would result in the highest average annual *income* over the growth cycle. The applicant and his representatives and experts have not argued that using a 50-year growth cycle reflects reasonable forest management practices. Rather, they rely entirely on the Board's 1997 directive.

Selecting a timber harvest rotation is an exercise of forest management practices. If the objective is to maximize average productivity as measured in cf/ac/yr, reasonable management practices would dictate harvesting at CMAI for board foot productivity. "Technical Note No. 2" published by the USDA Soil Conservation Service in June 1986 discusses CMAI and explains:

> "The attached tables express site index in such a way it can be related to volumes. It is necessary, for comparative purposes, to use a method that expresses one value for each site index. The method chosen is culmination of mean annual increment (CMAI).

[11] Compare Exhibit 5, King CMAI tables for Douglas-fir, Base 50, with Exhibit 6, NRCS Forestland Productivity tables for soils on the subject property. Note that cf/ac/yr productivity assumes CMAI is reached at age 90.

> "This age or point may be thought of as the most efficient time to harvest as far as tree growth is concerned. Other factors, such as stumpage values, taxes, interest rates, and management objectives affect the 'art' of choosing when to harvest."

The Base 50-year King tables do not report board foot/acre/year (bf/ac/yr) productivity or CMAI for bf/ac/yr productivity. However, the Base 100-year McArdle site index tables for Douglas-fir do, as do the Base 100-year Meyer tables for ponderosa pine. CMAI for Douglas-fir varies from 160 years for lower site indices to 90 for higher site indices. For ponderosa pine the Meyer table reports that CMAI for bf/ac/yr productivity varies from 200 years of age for the lowest site index of 40 to 90 years of age for the highest listed site index of 160.[12]

***The "income" test, like the "productivity" test, requires that bf/ac/yr productivity at CMAI be used to calculate potential income. This avoids the necessity of arbitrarily selecting any "growth cycle."***

Using bf/ac/yr productivity at CMAI would result in higher grading than assumed by the applicant's forestry consultant, resulting in higher prices and average annual income over the growth cycle.

The applicant's forestry consultant's previous income calculations for this very same 113.74 acres confirm that assuming a 50-yr cycle fails to maximize potential average annual income over the growth cycle. Harvesting at 50 years of age would yield an average gross annual income over the growth cycle of $5,099 per year, while assuming a 60-year cycle would yield an average annual gross income over the growth cycle of $6,487 per year. Thus harvesting at the end of a 60-year growth cycle would result in 27.2% greater average annual income over the growth cycle.[13] The applicant's forestry consultant has failed to explain why using a management practice that would result in substantially less income could be considered a reasonable management practice.

LUBA in *Carver* found that "petitioner does not explain why it is unreasonable to assume a 50-year growth cycle, or why ORS 197.247(1)(a) compels the county to assume a longer or different cycle." The evidence in the record, produced by the applicant's own forestry consultant, establishes that a 60-year cycle would result in substantially higher income averaged over the growth cycle. The King CMAI tables establish that maximum efficiency for cf/ac/yr productivity is reached at age 90, and the McArdle CMAI tables establish that maximum efficiency for bf/ac/yr productivity is reached at ages ranging from 90 years to 160 years of age. It would not be a reasonable management practice to arbitrarily select a growth cycle that would result in substantially less than optimum annual income averaged over the growth cycle.

ORS 197.247(1)(a) requires an inquiry into the *capability* of a forest operation to produce average annual income over the growth cycle; whether a particular operator chooses to manage so as to achieve that capability is not relevant. Similar to the inquiry required to determine potential productivity as measured in cf/ac/yr, the income capability inquiry requires a calculation of potential income based on bf/ac/yr at CMAI. The county may not

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[12] See Exhibit 5.

[13] See Goal One letter of 2/1/06, Exhibit 4 for Setchko's calculations based on a 60-year growth cycle, Exhibit 5 for Setchko's calculations based on a 50-year cycle.

arbitrarily mandate the use of a 50-year growth cycle which would result in substantially less average annual gross income over the growth cycle than the forest operation is capable of.

### 3. Calculation of potential income

The calculations that follow compare the annual gross income, averaged over the growth cycle, that would result using 50, 60, 70, and 100-year growth cycles.

The Hazelair, Philomath and Witzel soils on the subject property are not particularly productive for Douglas-fir; however, they are more productive for ponderosa pine. Table 4 summarizes potential productivity of those soils for ponderosa pine.

**TABLE 4: SITE INDEX AND PRODUCTIVITY, PONDEROSA PINE**

| Soil Type | Height | Age (BH) | Site Index (100) | cf/ac/yr (CMAI) |
|---|---|---|---|---|
| Hazelair | 93 | 52 | 121 | 144 |
| Philomath | 87 | 42 | 104* | 110* |

* from Setchko from on-site measurement.

The Setchko Report's table showing lumber volumes for the entire 113.74 acres does not disclose the methodology or assumptions used for determining the productivity of the Dixonville-Philomath-Hazelair complex or for the Philomath units. It appears that zero productivity was assumed for the Philomath and Hazelair components of the DPH complex.[14]

[14] The *Lane County Ratings* gives a cf/ac/yr rating of 54 for the 43C unit and 63 for the 43E unit. Entrees for the Dixonville/Philomath/Hazelair units are noted with three asterisks. A footnote at p. 6 of that document notes:

> "*** Indicates soil complexes with multiple site indices, refer to the CuFt/Acre/Year column for a composite volume rating for the complex."

The *Soil Survey of Lane County Area, Oregon (Soil Survey)* was published in 1987. The fieldwork for that publication was completed in 1980 and on soil names and descriptions approved in 1981. This information is found in the "green sheets" that were available and in use in 1983. Neither the green sheets nor current NRCS data indicate forest productivity for the 43C or the 43E complexes; rather, productivity is given for the individual soil units which comprise the complexes. Productivity data is available only for the Dixonville component. See Exhibit 6. Since no site indices were available for the Philomath and Hazelair units, site indices for those soils could not have been included in any calculation of a composite rating for the complex.

The *Soil Survey* states that the 43C unit is "30 percent Dixonville silty clay loam, 30 percent Philomath cobbly silty clay, and 25 percent Hazelair silty clay loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used. Included in this unit are small areas of Panther, Ritner, and Witzel soils and Rock outcrop. Included areas make up about 15 percent of the total acreage." *Soil Survey*, p. 62.

The Dixonville soil is given a cf/ac/yr rating of 152 in both the *Soil Survey* and the *Lane County Ratings*. The Ritner soil unit is listed in the *Lane County Ratings* as having a cf/ac/yr capability of 149. How was the *LC Ratings* productivity for the 43C complex derived? The following calculation gives a result which approximates the results found in the *Lane County Ratings*; and which probably approximates the methodology used as well.

> "The productivity of the complex can be approximated by calculating the productivity of the area for the individual components of the complex and then adding them together to on 100% excluding the inclusions. The following example illustrates this calculation for a soil complex which has a site index for only one of the two components."

The example given is for the 43C Dixonville/Philomath/Hazelair complex. The text has erroneously described this complex as having only two components. The table computes a "normalized" cf/ac/yr capability of 46. This differs from the capability given in the ratings themselves, in which this unit is listed as having a cf/ac/yr capability of 54.

The discrepancy between the computation of cf/ac/yr in the example and the capability as reported in the ratings is nowhere explained. What is clear is that the methodology assumes zero cf/ac/yr capability for soil components that do not have NRCS productivity ratings for forest productivity.

OAR 660-006-0010 provides, in relevant part:

> "Governing bodies shall include an inventory of 'forest lands' as defined by Goal 4[.] * * * If site information is not available then an equivalent method of determining forest site suitability must be used."

As LUBA explained in *Wetherell v. Douglas County,* __ Or LUBA __ (2005-045, September 8, 2005), OAR 660-006-0010 requires that any inventory of forest land requires objective measures of productivity:

> "Goal 4 and the Goal 4 rule strongly suggest that determinations of suitability for commercial forestry must be made based on published productivity data or, in the absence of such data, on an 'equivalent method of determining forest land suitability.' OAR 660-006-0010. An expert opinion that is not based on published productivity data or equivalent data, but instead relies heavily on the absence of such data, is not a sufficient basis for concluding that land is not subject to Goal 4." Slip op 31.[14]

LUBA concluded that OAR 660-006-0010 requires that Goal 4 inventory decisions be based on objective measures of productivity and that OAR 660-066-0010 applies when making inventory decisions regarding forest lands. *Wetherell v. Douglas County,* __ Or LUBA __ (LUBA No. 2005-075, September 30, 2005), slip op 10-12.

LUBA has rejected the argument that soils lacking a NRCS productivity rating will produce zero cf/ac/yr. *Wetherell* (2005-045), slip op 31-34; *Wetherell* (2005-075), slip op 12.

arrive at a total for the complex: multiply 0.3 (area) x 152 (productivity) = 46 cf/ac/yr for the Dixonville soils within the complex; 0.0375 (0.15/4 = 0.0375) x 149 = 6 cf/ac/yr for the Ritner component. Adding the two together gives 46 + 6 = 52 cf/ac/yr, which gives a composite productivity for the complex which is very nearly the same as the 54 cf/ac/yr found in the *LC Ratings*. The small discrepancy could possibly be explained by a difference in the way the inclusions were allocated.

A similar calculation can be done for the 43E unit. The *Soil Survey* states: "This unit is 35 percent Dixonville silty clay loam, 30 percent Philomath cobbly silty clay, and 20 percent Hazelair silty clay loam. * * * Included in this unit are small areas of Ritner and Witzel soils and Rock outcrop. Included areas make up about 15 percent of the total acreage."[14] 0.35 x 152 = 53.2; 0.05 x 149 = 7.45; 53.2 + 7.45 = 61, which again is very close to the 64 site index reported in the *LC Ratings*.

As illustrated above, the *LC Ratings* results for the Dixonville/Philomath/Hazelair complexes can only be achieved by assuming zero productivity for the nonrated soils in the complex.

The methodology purportedly used in the *Lane County Ratings* is explained at p. 8 of the *Lane County Ratings* as follows:

> "The methodology used in this table to calculate forest productivity volume ratings for soil complexes involves applying a weighted average to each component of the complex and then normalizing to base it on 100% excluding the inclusions. The following example illustrates this calculation for a soil complex which has a site index for only one of the two components."

The example given is for the 43C Dixonville/Philomath/Hazelair complex. The text has erroneously described this complex as having only two components. The table computes a "normalized" cf/ac/yr capability of 46. This differs from the capability given in the ratings themselves, in which this unit is listed as having a cf/ac/yr capability of 54.

The discrepancy between the computation of cf/ac/yr in the example and the capability as reported in the ratings is nowhere explained. What is clear is that the methodology assumes zero cf/ac/yr capability for soil components that do not have NRCS productivity ratings for forest productivity.

OAR 660-006-0010 provides, in relevant part:

> "Governing bodies shall include an inventory of 'forest lands' as defined by Goal 4[.] * * * If site information is not available then an equivalent method of determining forest site suitability must be used."

Assuming zero productivity for soils is not an "equivalent method." However, the Dixonville-Philomath-Hazelair map units comprise only 7.08 acres of the total area being considered, or only about 6% of the lands, a relatively insignificant amount. Changing assumptions made or methodology used in analyzing the complex would not change the conclusions of this letter – that the subject property could produce income in excess of $10,000 per year, averaged over the growth cycle.

Yield per acre for the soils on the 113.74-acre area are shown in Table 5. Yields in board feet per acre are from yield tables appended as Exhibit 7, *The Yield Table for Douglas Fir*; and *The Yield Table for Ponderosa Pine*.[15] The Setchko Report assumes that the forest operation would produce only logs of grades 2S, 3S and 4S. The use of a longer growth cycle should result in higher grading. However, Table 5 utilizes the grading assumptions of the Setchko Report. Table 5 shows yield in board feet at growth cycles of 50, 60 and 100 years for either Douglas-fir or ponderosa pine as most suited for the specific soil. Data is from CMAI tables.[16]

**TABLE 5: YIELD IN BOARD FEET AT GROWTH CYCLES OF 50, 60, AND 100 YEARS**

| Soil # | Soil name | Site index* | Species | Scrib 6" Board Feet/acre, 32' log | | |
|---|---|---|---|---|---|---|
| | | | | 50 yr | 60 yr | 100 yr |
| 41C | Dixonville | 109 | DF | 21,987 | 32,287 | 72,627 |
| 102C | Panther | 72*** | DF | 7,106** | 11,400 | 27,370 |
| 81D | McDuff | 112 | DF | 23,688**** | 34,644 | 76,875 |
| 113G | Ritner | 107 | DF | 20,988**** | 31,048 | 70,053 |
| 125C | Steiwer | 63*** | DF | 4,737** | 7,727 | 18,436 |
| 52C | Hazelair | 121 | PP | *21,553* | *29,628* | *57,990* |
| 107&8 | Philomath | 104** | PP | *11,992* | *18,155* | *40,187* |

* Base 50 for Douglas-fir; Base 100 for ponderosa pine

** from Setchko on-site measurements and/or calculations

*** from *The Yield Table of Douglas Fir*, working backwards from Setchko board feet data at total age of 50 years and interpolating. See Exhibit 7-1 through 7-11.

**** Values from *The Yield Table of Douglas Fir* used here are actually *lower* than the values used by Setchko in his calculations. Using Setchko's bf productivity

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As LUBA explained in *Wetherell v. Douglas County,* 50 Or LUBA 167, 200 (2005) and *Wetherell v. Douglas County,* 50 Or LUBA 275, 290 (2005), OAR 660-006-0010 requires that any inventory of forest land requires objective measures of productivity:

> "Goal 4 and the Goal 4 rule strongly suggest that determinations of suitability for commercial forestry must be made based on published productivity data or, in the absence of such data, on an 'equivalent method of determining forest land suitability.' OAR 660-006-0010. An expert opinion that is not based on published productivity data or equivalent data, but instead relies heavily on the absence of such data, is not a sufficient basis for concluding that land is not subject to Goal 4." Slip op 31.[14]

LUBA concluded that OAR 660-006-0010 requires that Goal 4 inventory decisions be based on objective measures of productivity and that OAR 660-066-0010 applies when making inventory decisions regarding forest lands. *Wetherell v. Douglas County,* 50 Or LUBA 167, 203-04 (2005).

LUBA has rejected the argument that soils lacking a NRCS productivity rating will produce zero cf/ac/yr. *Wetherell,* 50 Or LUBA 167, 203; *Wetherell v. Douglas County,* 50 Or LUBA 275, 292 (2006).

[15] See Exhibit 7.

[16] See Exhibit 7.

data for these soils would result in *higher* bf volume and income. The tables used by Setchko differ slightly in the values that appear in the tables at Exhibit 7.

The income calculations in the table below are for the subject property only. Data is for Douglas-fir unless otherwise noted. Douglas-fir site indices are 50 years, ponderosa pine 100 years. Productivity data is as reported by Setchko at p. 3 of his letter of February 23, 2004[17], except for the Hazelair and Philomath units which are assumed to be managed for ponderosa pine. Published ponderosa pine productivity data is used for the Hazelair unit and Setchko's data from on-site measurements is used for the Philomath units. Data is for ponderosa pine is in italics. Total volume is computed by multiplying acreage by board feet/acre from Table 5.

**TABLE 6: PRODUCTIVITY IN BOARD FEET AT VARIOUS ROTATIONS**

| # | Soil Name | Acres | Site Index | Scrib 6" Board Feet, 32' log 50 yr | 60 yr | 100 yr |
|---|---|---|---|---|---|---|
| 43C | DPH Complex | 6.64 | | | | |
| | Dixonville (30%) | 1.99 | 109 | 43,754 | 135,731 | 144,528 |
| | Philomath (30%) | 1.99 | 104* | *18,760* | *36,128* | *79,972* |
| | Hazelair (25%) | 1.66 | *121*** | *35,745* | *49,182* | *96,263* |
| 43E | DPH Complex | 0.44 | | | | |
| | Dixonville (35%) | 0.15 | 109 | 3,298 | 4,843 | 10,894 |
| | Philomath (30%) | 0.13 | *104** | *1,559* | *2,360* | *5,224* |
| | Hazelair (25%) | 0.11 | *121*** | *2,369* | *3,259* | *6,379* |
| 81D | McDuff | 5.60 | 112 | 132,653 | 194,006 | 430,500 |
| 102C | Panther | 14.68 | 72 | 104,316 | 167,352 | 401,792 |
| 107C | Philomath | 39.61 | *104** | *475,003* | *719,120* | *1,591,807* |
| 108F | Philomath | 30.20 | *104** | *362,158* | *548,281* | *1,213,647* |
| 113E | F&G Ritner | 13.38 | 107 | 280,819 | 415,422 | 937,309 |
| 125C | Steiwer | 3.19 | 63 | 15,111 | 24,649 | 58,811 |
| | **Totals, board feet (bf)** | | **DF** | **579,951** | **942,003** | **1,983,834** |
| | | | **PP** | ***895,594*** | ***1,358,330*** | ***2,993,292*** |

* Ponderosa pine, as measured in Setchko Report.

** Ponderosa pine. Data from *Establishing and Managing Ponderosa Pine in the Willamette Valley,* Exhibit 1-14. Site index data at Exhibit 1-14 is Base 50. Heights in table at 1-14 are used to determine Base 100 site index.

Average annual gross income over the growth cycle is then computed by multiplying the quantities times the average prices over the 1978-82 period. Average prices for the 1978-82 period are found in tables appended as Exhibits 3 and 4. Grading assumptions are those used by the applicant's forestry consultant: 40% 2S, 50% 3S, and 10% 4S for Douglas-fir; and 40% 4S, 50% 5S, and 10% 6S for ponderosa pine. These grading assumptions are extremely conservative for the 60-year and 100-year rotations, as a greater percentage of higher grades would be expected.

[17] See Exhibit 8, 8-3.

## TABLE 7: INCOME CAPABILITY OF SUBJECT PROPERTY AT GROWTH CYCLES OF 50, 60, AND 100 YEARS

**50-YEAR CYCLE**

Douglas-fir

40% 2S = .4 x 579,951 = 231,980 x $316/mbf = $ 73,306
50% 3S = .5 x 579,951 = 289,976 x $268/mbf = $ 77,714
10% 4S = .1 x 579,951 = 57,995 x $235/mbf = $ 13,629

Ponderosa pine

40% 4S = .4 x 895,594 = 358,238 x $245/mbf = $ 87,768
50% 5S = .5 x 895,594 = 447,797 x $213/mbf = $ 95,381
10% 6S = .1 x 895,594 = 89,559 x $197/mbf = $ 17,643

$365,441 ÷ 50 = **$7,309/year**

**60-YEAR CYCLE**

Douglas-fir

40% 2S = .4 x 942,003 = 376,801 x $316/mbf = $ 119,069
50% 3S = .5 x 942,003 = 471,002 x $268/mbf = $ 126,229
10% 4S = .1 x 942,003 = 94,200 x $235/mbf = $ 22,137

Ponderosa pine

40% 4S = .4 x 1,358,330 = 543,332 x $245/mbf = $ 133,116
50% 5S = .5 x 1,358,330 = 679,165 x $213/mbf = $ 144,662
10% 6S = .1 x 1,358,330 = 135,833 x $197/mbf = $ 26,759

$ 571,972 ÷ 60 = **$9,533/year**

**100-YEAR CYCLE**

Douglas-fir

40% 2S = .4 x 1,983,834 = 793,534 x $316/mbf = $ 250,757
50% 3S = .5 x 1,983,834 = 991,917 x $268/mbf = $ 265,834
10% 4S = .1 x 1,983,834 = 184,456 x $235/mbf = $ 46,620

Ponderosa pine

40% 4S =.4 x 2,993,292=1,197,317 x $245/mbf = $ 293,343
50% 5S =.5 x 2,993,292=1,496,646 x $213/mbf = $ 318,786
10% 6S =.1 x 2,993,292= 299,329 x $197/mbf = $ 58,968

$1,234,308 ÷ 100= **$12,343/year**

The calculated average annual income assuming a 60-year rotation is close enough to meeting the $10,000 threshold that it raises the question of whether assuming a 70-year rotation would yield the desired average annual income over the growth cycle. That calculation is shown in Table 8.

## TABLE 8: PRODUCTIVITY IN BOARD FEET AT 70 YEAR ROTATION

| # | Soil Name | Acres | Site Index | bf/acre, 32' log 70 yr | Total bf |
|---|---|---|---|---|---|
| 43C | DPH Complex | 6.64 | | | |
| | Dixonville (30%) | 1.99 | 109 | 42,913 | 85,397 |
| | Philomath (30%) | 1.99 | *104** | *24,099* | *47,957* |
| | Hazelair (25%) | 1.66 | *121*** | *37,334* | *61,974* |
| 43E | DPH Complex | 0.44 | | | |
| | Dixonville (35%) | 0.15 | 109 | 42,913 | 6,437 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | Philomath (30%) | 0.13 | *104** | *24,099* | | *3,133* |
| | Hazelair (25%) | 0.11 | 121** | *37,334* | | *4,107* |
| 81D | McDuff | 5.60 | 112 | 45,785 | | 256,396 |
| 102C | Panther | 14.68 | 72 | 15,804 | | 232,003 |
| 107C | Philomath | 39.61 | *104** | *24,099* | | *954,561* |
| 108F | Philomath | 30.20 | *104** | *24,099* | | *727,790* |
| 113E | F&G Ritner | 13.38 | 107 | 41,328 | | 552,969 |
| 125C | Steiwer | 3.19 | 63 | 10,816 | | 34,503 |
| | **TOTALS** | | | | **DF** | **1,167,705** |
| | | | | | **PP** | ***1,799,522*** |

* Ponderosa pine, as measured in Setchko Report.

** Ponderosa pine. Data from *Establishing and Managing Ponderosa Pine in the Willamette Valley,* Exhibit 1-14. Site index data for ponderosa pine at Exhibit 1-14 is Base 50. Heights in table at Exhibit 1-14 are used to determine Base 100 site index.

**70-YEAR CYCLE**

Douglas-fir

40% 2S = .4 x 1,167,705 = 467,082 x $316/mbf = $ 147,598
50% 3S = .5 x 1,167,705 = 583,852 x $268/mbf = $ 156,472
10% 4S = .1 x 1,167,705 = 116,770 x $235/mbf = $ 27,441

Ponderosa pine

40% 4S = .4 x 1,799,522 = 719,809 x $245/mbf = $ 176,353
50% 5S = .5 x 1,799,522 = 899,761 x $213/mbf = $ 191,649
10% 6S = .1 x 1,799,522 = 179,952 x $197/mbf = $ 35,451
$ 734,964 ÷ 70 = **$10,499/year**

The subject forest operation was capable of producing an average, over a 70-year growth cycle, of $10,509 in annual gross income, if managed for a combination of Douglas-fir and ponderosa pine planted on soils suited for those species. Again, note that the grading assumptions are those established by Mr. Setchko for a 50-year growth cycle; harvesting at 70 years rather than 50 years would result in higher grading and higher prices.

A final calculation will show income potential based on bf/ac/yr productivity at CMAI. Site index for Douglas-fir is Base 100 as reported in the 1987 Soil Conservation Service *Soil Survey of Lane County Area, Oregon.* Bf/ac/yr productivity for Douglas-fir is from the McArdle 100-year tables; for ponderosa pine, from the Meyer 100-year table.

**TABLE 9: PRODUCTIVITY IN BOARD FEET AT CMAI**

| # | Soil Name | Acres | Site Index | bf/ac/yr | CMAI age | Total bf |
|---|---|---|---|---|---|---|
| 43C | DPH Complex | 6.64 | | | | |
| | Dixonville (30%) | 1.99 | 120 | 437 | 120 | 104,356 |
| | Philomath (30%) | 1.99 | *104** | *408* | *120* | *97,430* |
| | Hazelair (25%) | 1.66 | 121** | *584* | *110* | *106,638* |
| 43E | DPH Complex | 0.44 | | | | |
| | Dixonville (35%) | 0.15 | 120 | 437 | 120 | 7,866 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | Philomath (30%) | 0.13 | 104* | *408* | *120* | *6,365* |
| | Hazelair (25%) | 0.11 | 121** | *584* | *110* | *7,066* |
| 81D | McDuff | 5.60 | 142 | 649 | 110 | 399,784 |
| 102C | Panther | 14.68 | na | 191*** | 160 | 448,621 |
| 107C | Philomath | 39.61 | *104** | *408* | *120* | *1,939,306* |
| 108F | Philomath | 30.20 | *104** | *408* | *120* | *1,478,592* |
| 113E | F&G Ritner | 13.38 | 131 | 542 | 110 | 797,716 |
| 125C | Steiwer | 3.19 | na | 131 | 160 | 66,862 |

* Ponderosa pine, as measured in Setchko Report.

** Ponderosa pine. Data from *Establishing and Managing Ponderosa Pine in the Willamette Valley,* Exhibit 1-14. Site index data for ponderosa pine at Exhibit 1-14 is Base 50. Heights in table at Exhibit 1-14 are used to determine Base 100 site index.

*** Setchko's methodology is adopted here: the average of the McDuff and Ritner values is multiplied by the ratio of the average cf/ac/yr for the McDuff and Ritner units to that of the Panther and Steiwer units. 148 cf/ac/yr (McDuff) + 131 (Ritner) = 139.5; 649 bf/ac + 542 bf/ac = 1191 ÷ 2 = 596. Panther: 45 cf/ac/yr ÷ 139.5 = .32 x 596 = 191 bf/ac/yr. Steiwer: 30 cf/ac/yr ÷ 139.5 = .22 x 596 = 131 bf/ac/yr.

The income calculation must take into account the different CMAI ages for the different site indices. In the table below, species and site indices with the same CMAI age are grouped together.

**TABLE 10: AVERAGE ANNUAL INCOME AT BF/AC/YR CMAI**

Douglas-fir, CMAI 110: 399,784 + 797,716 = 1,197,500 bf

| | | | | |
|---|---|---|---|---|
| 40% 2S = .4 x 1,197,500 | = 479,000 x $316/mbf | = $ 151,364 | | |
| 50% 3S = .5 x 1,197,500 | = 598,750 x $268/mbf | = $ 160,465 | | |
| 10% 4S = .1 x 1,197,500 | = 79,772 x $235/mbf | = $ 18,746 | | |
| | | $ 330,575 | ÷ 110 = | $ 3,005 |

Douglas-fir, CMAI 120: 104,356 + 7,866 = 112,222 bf

| | | | | |
|---|---|---|---|---|
| 40% 2S = .4 x 112,222 | = 44,889 x $316/mbf | = $ 14,185 | | |
| 50% 3S = .5 x 112,222 | = 56,111 x $268/mbf | = $ 15,038 | | |
| 10% 4S = .1 x 112,222 | = 11,222 x $235/mbf | = $ 2,637 | | |
| | | $ 31,860 | ÷ 120 = $ | 266 |

Douglas-fir, CMAI 160: 448,621 + 66,862 = 515,483 bf

| | | | | |
|---|---|---|---|---|
| 40% 2S = .4 x 515,483 | = 206,193 x $316/mbf | = $ 65,157 | | |
| 50% 3S = .5 x 515,483 | = 257,742 x $268/mbf | = $ 69,075 | | |
| 10% 4S = .1 x 515,483 | = 51,548 x $235/mbf | = $ 12,114 | | |
| | | $ 31,860 | ÷ 160 = $ | 915 |

Ponderosa pine, CMAI 110: 106,638 + 7,066 = 113,704 bf

| | | |
|---|---|---|
| 40% 4S = .4 x 113,704 | = 45,482 x $245/mbf | = $ 11,143 |
| 50% 5S = .5 x 113,704 | = 56,852 x $213/mbf | = $ 12,109 |

| | | | | |
|---|---|---|---|---|
| 10% 6S = .1 x 113,704 | = 11,370 x $197/mbf | = $ 2,240 | | |
| | | $ 25,492 | ÷ 110 = $ | 232 |

Ponderosa pine, CMAI 120:

97,430 + 6,365 + 1,939,306 + 1,478,592 = 3,521,693 bf

| | | | | |
|---|---|---|---|---|
| 40% 4S = .4 x 3,521,693 = | 1,408,677 x $245/mbf | = $ 345,126 | | |
| 50% 5S = .5 x 3,521,693 = | 1,760,846 x $213/mbf | = $ 375,060 | | |
| 10% 6S = .1 x 3,521,693 = | 352,169 x $197/mbf | = $ 69,377 | | |
| | | $ 789,563 | ÷ 120 = | $ 6,580 |

**TOTAL AVERAGE ANNUAL INCOME AT CMAI $ 10,998**

Note that the result of this calculation is substantially less than the previous calculation using a 100-year growth cycle, and only slightly more than the previous calculation using a 70-year growth cycle. The apparent anomaly can only be explained by observing that the calculations relied on different tables. As previously noted in reference to the difference between the tables appended in the exhibits to this letter and those used by Setchko, different tables published and in use give different values and yield different results.

## III. Conclusion

The average growth potential of the proposed marginal lands is 7,8028 cf/yr ÷ 73.74 acres = 106 cf/ac/yr., assuming the reasonable management practice of growing Douglas-fir on soils best suited for Douglas-fir and Ponderosa pine on soils best suited for Ponderosa pine. The proposed marginal land is capable of producing well in excess of 85 cf/ac/yr, if reasonable management practices concerning planting and harvesting are followed. This is far in excess of the 85 cf/ac/r standard (the threshold that separates Class 5 forest lands from Class 4 forest lands) established by ORS 197.247(1)(b)(C). The productivity test is not met.

The forest operation of which the proposed marginal lands were a part was, during the 1978-82 period, capable of producing $10,998 in average gross annual income at CMAI for bf/ac/yr., assuming the reasonable management practice of growing Douglas-fir on soils best suited for Douglas-fir and Ponderosa pine on soils best suited for Ponderosa pine and assuming the average price prevailing during the relevant 1978-1982 period. These calculations utilize the applicant's forestry consultant's grading assumptions, which are conceded by the forestry consultant to be very conservative for rotations longer than 50 years. The income capability is greater than the $10,000 threshold established by ORS 197.247(1). The income test is not met.

The forest operation was also capable of producing an average of $10,499 in average annual gross income over a 70 year cycle and $ 12,343 per year in average annual gross income over a 100-year growth cycle. These results are obtained using published and widely used yield tables.

All income calculations were made applying the methodology and assumptions of the applicant's forestry expert regarding productivity potential. All calculations utilize the applicant's forestry consultant's grading assumptions, which are conceded by the forestry consultant to be very conservative for rotations longer than 50 years. Also note that the results reported here for both productivity and income are based on Mr. Setchko's data for productivity for ponderosa pine on the Philomath soil units. Using published data would result in substantially higher volumes and higher income.

The request to redesignate the subject lands to marginal lands must be denied if either of the tests established by ORS 197.247 are not met. As neither the income nor the productivity test is met, the request must be denied.

Goal One and other parties whose addresses appear in the first paragraph of this letter request notice and a copy of any decision and findings regarding this matter.

Respectfully submitted,

Jim Just
Executive Director

EM 8805 • May 2003
$24.00

EXHIBIT 1

# Establishing & managing ponderosa pine

# in the Willamette Valley

OREGON STATE UNIVERSITY
EXTENSION SERVICE

1-1

*Rick Fletcher examines a 2-year-old planting of Willamette Valley pine near Elkton, OR.*

# Contents

# An overview of Willamette Valley ponderosas

*R. Fletcher and D. Hibbs*

Many people are surprised to learn that ponderosa pine (*Pinus ponderosa*), a common tree east of the Cascade Mountains, also is native to the Willamette Valley in western Oregon. No one is quite sure how ponderosa got into the Willamette Valley, but the local race is genetically different from those growing east of the Cascades.

This management guide will describe what is known about this unique race of ponderosa pine, how to establish, manage, and protect it on rural and urban sites in the Willamette Valley, and how to harvest and market ponderosa pine timber.

*Figure 1.—An old-growth ponderosa pine logging operation near Lebanon, OR in 1912.*

## History of ponderosa pine in the Willamette Valley

The year was 1852, and white settlement of the Willamette Valley was well underway. The town of Monroe was just getting its start with a new water-powered sawmill. The mill's records indicate that it cut ponderosa pine exclusively for several years until the supply ran out.

Other reports and studies of ponderosa pine in the Valley picture ponderosa in scattered pure stands or mixed in groves with Douglas-fir, ash, and oak. Two studies using pollen counts in deep cores from Valley bogs track pines' presence for the last 7,000 to 10,000 years. The hypothesis is that lodgepole was the dominant pine until about 7,000 years ago when a major climate shift removed lodgepole and brought in ponderosa. Pollen counts covering these 7,000 years indicate that ponderosa pine, while widespread across the Valley, has never been the dominant vegetation type.

Undoubtedly there is some connection between indigenous peoples' practice of burning and the distribution of pine in the Valley at time of white settlement. Ponderosa pine is very common in other fire-impacted landscapes and is quite tolerant of ground fires, especially when the trees are mature. The frequent ground fires set by native peoples very likely resulted in the widely spaced groves of "yellow pines" (ponderosas), surrounded by grass prairie, which confronted early settlers.

Surveyors, botanists, and historians in the 1850s recorded yellow pines in oak woodlands, on areas subject to flooding, and on foothill slopes and ridges where they were widely spaced and mixed with oak and Douglas-fir. These open stands have been called savannahs.

1-3

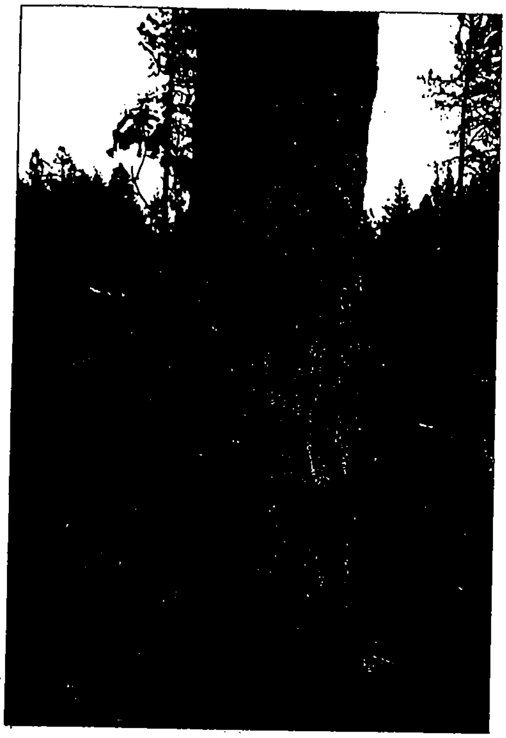


*Figure 2.—Old-growth ponderosa pine on private forestland near Brownsville, OR.*

Willamette Valley ponderosa's genetic difference from ponderosa east of the Cascades was the focus of a pine-race study begun in 1928 by Thornton Munger and T.J. Starker. The study featured seed sources from throughout the western United States, planted on six field sites. Included were seven sources east of the Cascades and three westside sources. The latter included Peoria (south of Corvallis, along the Willamette River); El Dorado, California, in the Sierras south of Sacramento; and Steilacoom, Washington, near Olympia.

The latest measurement of the study, completed by Roy Silen, found that after 65 years, only the westside sources were still alive and actively growing at the Willamette Valley test site on McDonald Forest, near Corvallis. Trees from eastside sources all appeared poorly adapted for the weather and pest conditions in the Willamette Valley.

The bottom line is that one should not plant ponderosa pine trees from eastside seed sources in the Willamette Valley. While the trees may survive 15 to 20 years, they aren't likely to reach mature size and may become carriers for all sorts of pine pests.

*Figure 3.—Principals in the Willamette Valley Ponderosa Pine Conservation Association admire the Robert H. Mealey gene conservation planting of Willamette Valley ponderosas at the State of Oregon seed orchard near St. Paul, OR.*

Another lesson from the Willamette Valley test site is that even the trees from westside sources that were still living were not doing very well. This might be expected because the McDonald Forest site was not on a soil and exposure common for pine in the Willamette Valley.

Concern about the dwindling supply of native Willamette Valley ponderosa pines, and the realization that the local source could not be replaced with eastside sources, led to the formation of the Willamette Valley Ponderosa Pine Conservation Association, in 1996.

A group of local foresters, landowners, and scientists had been studying the local pines for 15 years and had begun propagating local parent sources. The Association seeks to further this work in restoring ponderosa pine to the Willamette Valley through research, education, and increased availability of seed from the local race of pines. To date, more than 900 native stands have been mapped, and about 150 individual sources have been grafted into a seed orchard near St. Paul, Oregon.

The Association's work will be complete when landowners can buy native planting stock readily and when research has shown how best to plant and grow this tree.

1-4

## Ponderosa pine growing sites in the Willamette Valley

Ponderosas grow on a wide variety of both rural and urban sites throughout the Willamette Valley. Native groves are in Beaverton, in parks and on the grounds of such prominent businesses as Nike. Scattered trees and small groves are found on neglected bottomland farm sites the whole length of the Valley. Along riverbanks, it often is associated with black cottonwood, ash, or bigleaf maple. In the foothills, ponderosas occupy the harshest of forest sites, where Douglas-fir and other species cannot dominate. On sites suitable for other conifers, ponderosa may grow for some time but eventually is shaded out by the taller, more dominant species. Commonly, ponderosas are found in association with Oregon white oak and many times in thick patches of poison-oak.

Native ponderosas are commonly found on three general soil types:

1. Poorly drained, heavy clay soils on the Valley bottom or in the low foothills
2. Shallow, rocky clay soils in the Valley foothills
3. Well-drained, sandy soils in the flood plain of the Willamette River and its tributaries

These soil types represent the low end of growth potential for ponderosa pine. It grows better on soils with good drainage and depth.

*Figure 4.—Ponderosa pine replaces Douglas-fir on a typical, wet Willamette Valley site.*

## Benefits of planting Valley ponderosa pine

Willamette Valley ponderosa pine plantings can meet a number of objectives that include producing valuable wood, filling the need for a stately conifer in an urban setting, and restoring woodland and riparian habitat.

### Wood production

Wood from Willamette Valley ponderosa pine was an important building material for the settlers in the Valley in the 1840s and 1850s. Next to Douglas-fir, ponderosa pine has been the most widely used species for wood products in Oregon during the past 150 years. Most of it has come from eastern and southern Oregon; however, new plantings in the Willamette Valley have the potential to once again fuel a ponderosa-pine-based wood industry later in this century. Excellent growth rates and good wood quality will make maturing plantings in the Willamette Valley an attractive option for wood purchasers in the future.

### Ornamental trees

Most native conifers in the Willamette Valley are poorly suited to urban uses. Not so, however, with ponderosa pine. Its deep rooting structure, tolerance of drought and

*Figure 5.—Ten-year-old Valley ponderosa agro-forest on Rising Oak Ranch near Lebanon, OR. Spacing is 9 feet between trees and 18 feet between rows.*

1.5

flooding, and stately form make it an ideal choice for parks, schools, factories, and other urban locations where a large conifer is desired. Many fine specimens are in urban areas such as Eugene (Figure 6) and Beaverton.

## Habitat restoration

Habitat restoration is the order of the day for streams, rivers, and oak savannahs throughout the Willamette Valley.

Ponderosa grew historically in much of this habitat, so it is only natural that it would be a key species to reestablish. On the dry knobs and prairies, ponderosa is being intermingled with oaks and firs. In riparian areas or wet clay soils, it is planted alone or mixed with ash, maple, oak, and cottonwood.

One of the main features it offers for these habitat plantings is a long-lived conifer that will provide nesting, shade, and other habitat features while living and large woody debris for a healthy riparian system after it dies.

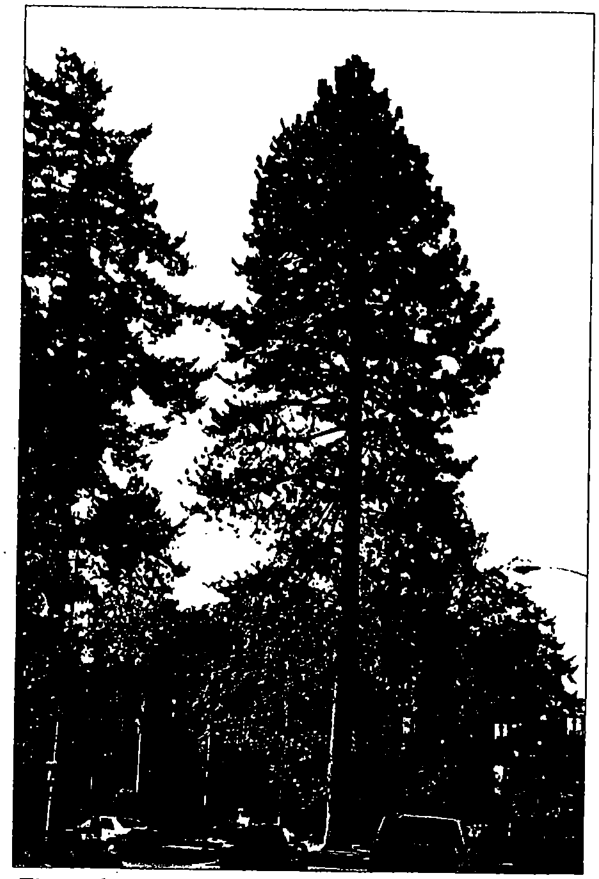


*Figure 6.—Mature ponderosa pines thrive on city streets in Eugene, OR.*

*Figure 7.—Ponderosa pine planted in a riparian restoration project near Brownsville, OR.*

1.6

# Managing a new ponderosa pine plantation

*H. Dew and B. Kelpsas*

Attention to the details of site preparation, stock type selection, and plantation maintenance is probably more critical in establishing Valley ponderosa pine than any other species planted west of the Cascades. This is because of the tough sites that ponderosa pine is expected to occupy.

No other tree is asked to survive and grow in conditions as adverse as these. From rocky, dry, and poison-oak-infested south slopes to marshy, heavy clay that cracks wide open in summer, sites that won't grow another commercial tree are typically where this durable species is planted.

For more information on site preparation and general reforestation topics, refer to OSU Extension publications EC 1188, "Site Preparation: An Introduction for Woodland Owners"; EC 1498, "Successful Reforestation: An Overview"; EC 1504, "The Care and Planting of Tree Seedlings on Your Woodland"; EC 1196, "Selecting and Buying Quality Seedlings"; and PNW 33, "Plant Your Trees Right" (see page 39).

## Site selection

Many times the search is for a tree that will grow on a site where a planting has already failed. It is true that ponderosa pine will grow in a flood-prone area, but is this really the place to grow trees at all? Often, the best sites are reserved for more profitable species such as Douglas-fir or western redcedar, as well they should be, but ponderosa will do very well on some good sites and may be the best choice for them. If you have questions about your site's suitability for growing ponderosa pine, contact your local office of the OSU Extension Service or Oregon Department of Forestry.

*Figure 8.—Pine shelterwood unit near Brownsville, OR, cleared of debris and ready for planting.*

## Site preparation

Site preparation is the most important step in reforestation with any species. Improper site preparation results in poor growth and a much higher risk of plantation failure. More tree-planting failures can be attributed to poor site preparation than to any other cause.

At the very least, make sure the site is free of weeds and grass for the first few years. Competing vegetation places moisture stress on newly planted trees with poorly established roots and is a primary cause of plantation failure. Whether you use herbicides, mulch mats, or hoeing, you must control vegetation to ensure the seedlings' survival and growth. An adequate

1·7

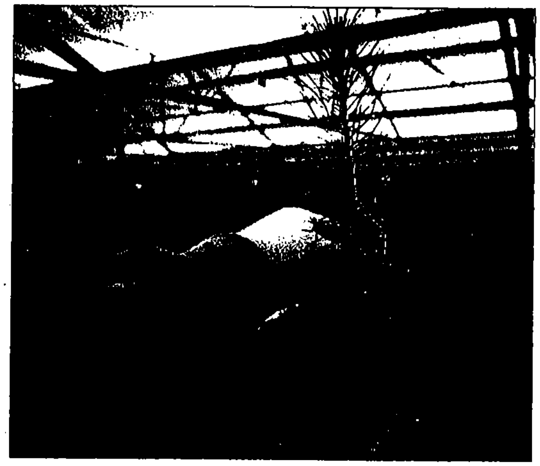


*Figure 9.—One-year-old container seedling at Kintigh's Nursery, Springfield, OR.*

weed-free space around each tree generally is thought to be a radius of about 2 to 3 feet for the first 3 years.

The secondary cause of plantation failure is girdling damage caused by rodents that use the grass for cover (see Chapter 7). Vegetation control is the best way to prevent rodent damage.

### Site preparation sprays

The best feature of site preparation sprays compared to herbicide applications after planting is that they involve little risk to seedlings you will plant later. You also have more flexibility in timing sprays when weather is favorable.

In applying any herbicide, follow the instructions on the label regardless of what is said elsewhere, including in this publication. The herbicide label is the legal guide to how that chemical may be used. Also, you must notify the Oregon Department of Forestry any time you plan to apply an herbicide on forestland, and you might also have to be licensed by the Oregon Department of Agriculture. In addition, you must report any pesticide use on your forestland annually to the Oregon Department of Forestry.

Table 1 lists the most common herbicides used for site preparation in ponderosa plantings.

Glyphosate and products like imazapyr work well on most species but are weaker on blackberries. Products such as metsulfuron and triclopyr often are added to spray mixes to improve blackberry control. These commonly are applied in midsummer or fall before planting. Evergreen weed species such as Scotch broom, snowbrush, manzanita, and madrone are best treated with triclopyr, imazapyr, or 2,4-D from spring through summer.

Herbaceous weeds also can be controlled for the following growing season by adding sulfometuron to the fall site-preparation mix. Pine seedlings planted the following spring can develop in relatively weed-free environments. Table 1 gives more detail on target vegetation.

[illegible] herbicides and target vegetation [illegible]paration

| Chemical name | Target vegetation |
|---|---|
| glyphosate | Deciduous brush, grasses, forbs, bracken fern |
| imazapyr | Maples, madrone, deciduous brush and trees |
| atrazine | Annual grasses, grass and forb germinants |
| 2,4-D | Alder, madrone, manzanita, thistles, and forbs |
| metsulfuron | Blackberries (*Rubus* spp.), ferns, deciduous brush |
| triclopyr | Blackberries, Scotch broom, evergreen brush |
| sulfometuron | Grasses and forbs; suppresses blackberries |
| clopyralid | Thistles, some forbs, elderberry |
| hexazinone | Established grasses and forbs |

## Planting considerations

The two stock types are containerized and bareroot. Both come in many different sizes; generally, the biggest are best. Containerized seedlings have many advantages. One of the best is that timed-release fertilizer can be incorporated into the planting medium to give the tree a boost the first year after planting. This is a great benefit on some of the poor sites where ponderosa is expected to grow. Also, containerized trees generally are easy to plant and suffer less transplant shock than bareroot seedlings.

The disadvantages to using containerized trees are (a) their high cost relative to size and (b) the seedlings' vulnerability to animal browsing, because they tend to have more lush growth. Sometimes container seedlings must have tubelike tree protectors, which can be as expensive as the seedlings to purchase and install.

Bareroot seedlings can be cheaper to purchase, but are often hard to find du to the current shortages of seed and the unwillingness of many purchasers to wait two seasons for their seedlings versus one for container seedlings.

Seed sources are particularly important. Be sure to ask whether the parent seed was truly Willamette Valley ponderosa pine seed. Seed from eastside sources will not grow well on the westside, as many plantations have proved.

Whether the seed comes from the north or the south Valley doesn't seem to make a large difference. Getting a source that is close to your plantation site is, however, highly desirable.

*Figure 10.—Mixed plantings of ponderosa pine and Douglas-fir might be a good idea on sites where there is a question about which species is better suited.*

Until the Willamette Valley ponderosa pine seed orchard at St. Paul begins to produce seed, infrequent wild crops are still the only source for local nurseries, so seedling availability may be an issue for the next 5 years or so. When the orchard begins to produce seed, it will be the best available.

**Use pesticides safely!**

- **Wear** protective clothing and safety devices as recommended on the label. **Bathe or shower** after each use.
- **Read the pesticide label**—even if you've used the pesticide before. Precisely follow label instructions (and any other instructions you have).
- **Be cautious** when you apply pesticides. Know your legal responsibilities as a pesticide applicator. **You may be liable** for injury or damage resulting from your pesticide use.

Plantation spacing depends on management goals. Plant in a way that gives you the most flexibility for future management decisions:

- Will you manage for an uneven-age or an even-age stand?
- Do you want a mixed-species stand?
- What is the site's carrying capacity?
- Will the stand be thinned later?

Discuss these questions with your OSU Extension forester or a forestry consultant *before* planting. Common spacing for newly planted ponderosa pine plantings is about 10 to 12 feet apart.

## Vegetation management around newly planted ponderosa pines

No matter which type of stock you choose to plant, controlling competing vegetation around newly planted trees is essential for good survival and growth. Strategies to manage competing vegetation involve physical removal through scalping or tilling, treated paper or other mats that smother competing weeds, and herbicides. For more information on weed control, refer to the current edition of the "Pacific Northwest Weed Management Handbook" (see page 39).

1.9

*Figure 11.—Blackberry competition has left this ponderosa pine seedling deformed and weak.*

Scalping or tilling to control vegetation can be effective if you are persistent and if you remove the vegetation in a way that does not damage the tree seedlings' tops or roots.

Scalping works best before the trees are planted. Tillage can work before planting and up until the tree roots begin to invade the scalped area.

One disadvantage of tillage is that it tends to leave competing weeds closest to the trees. Treated paper or other mats can be effective around newly planted trees if they are properly installed and maintained. Their main drawbacks are high cost and the fact that they sometimes provide cover for mice, which will girdle the young trees.

Ponderosa pine is more sensitive than Douglas-fir to many herbicides used in forestry. In addition, various surfactants and oils that are added to spray mixtures can increase the risk of pine damage.

Take care when using herbicides over seedlings, to avoid injury or death. In many cases, vegetation management around pine involves balancing seedling injury with weed control.

Two spraying strategies for controlling weeds around newly planted ponderosas are:

- Directed spraying, and
- Broadcast release applications

**[illegible] common forest herbicides: [illegible] tolerance for release [illegible]**

| Chemical name | Pine tolerance [1] | Use over pine? |
|---|---|---|
| atrazine | excellent | yes |
| imazapyr | marginal [2] | site prep only |
| metsulfuron | poor | site prep only |
| triclopyr | poor | no – only as directed spray |
| 2,4-D | poor to fair | possible but risky |
| sulfometuron | good | yes |
| glyphosate [3] | fair to good | yes |
| clopyralid | excellent | yes |
| hexazinone | excellent | yes |

[1] Herbicide injury is variable and is highly dependent on rate, timing, and tree condition.

[2] Imazapyr products can reduce shoot growth the next growing season.

[3] Some glyphosate products contain surfactant, which increases the risk of damaging pine.

## Directed spraying

Directed spraying uses herbicides in a spray directed around seedlings but not contacting them. Spot spraying with backpack sprayers is an example. Using a spray shield is another technique. The risk of injury is limited to seedlings that are sprayed or are overdosed through the soil. This method also allows you to use non-selective herbicides and a much wider effective spraying window of time.

Herbaceous weeds can be controlled effectively at any time with spot applications of glyphosate around seedlings. Since glyphosate has no soil activity, overdosing through the root system is not a risk. Often, glyphosate can be mixed with soil-active herbicides to give longer lasting pre-emergent activity. Using this treatment with spring residual soil-active products such as sulfometuron, atrazine, or hexazinone requires precise sprayer calibration and application in order to avoid damaging seedlings through the soil. Be very careful to keep glyphosate off the foliage, however; it is toxic to the plant.

Blackberries and Scotch broom are often problems on Valley sites. Both are treated effectively with directed foliar spot applications of triclopyr. Unfortunately, pine is extremely sensitive to any triclopyr spray drift, and triclopyr ester is volatile at warmer temperatures, so take care.

Blackberries are best treated in fall after conifer budset. Scotch broom can be treated any time during the growing season, but applications before conifer budbreak or after budset in the fall may be safer for trees.

1-10

Other evergreen species such as madrone, manzanita, and snowbrush also can be treated with a directed spray of triclopyr, 2,4-D, or imazapyr. However, these products can damage pine and should be used only as a site preparation or spot treatment. Larger weeds that cannot be efficiently controlled with a foliar spray from a backpack unit may be treated individually with a basal-bark application of triclopyr in an oil carrier.

Deciduous plants such as poison-oak, deerbrush, hazel, and bracken fern are sensitive to mid- to late summer foliar applications of glyphosate and/or imazapyr in water. Avoid spraying over pine, even though it has some tolerance to glyphosate (see the section on broadcast release applications, below). Maples and other hardwoods or brush often can be treated with a hack-and-squirt application using imazapyr, glyphosate, or triclopyr amine.

## Broadcast release applications

Another strategy for vegetation control uses herbicides selectively over seedlings in a calibrated broadcast treatment. Application methods include helicopter, backpack waving wand, meter jet, and backpack with flat-fan spray tips.

This strategy might give the most complete weed control, but it also carries the greatest risk of damaging pine seedlings. In addition, not all herbicides can be used selectively over pine. Table 2 shows pine tolerance to foliar-applied herbicides.

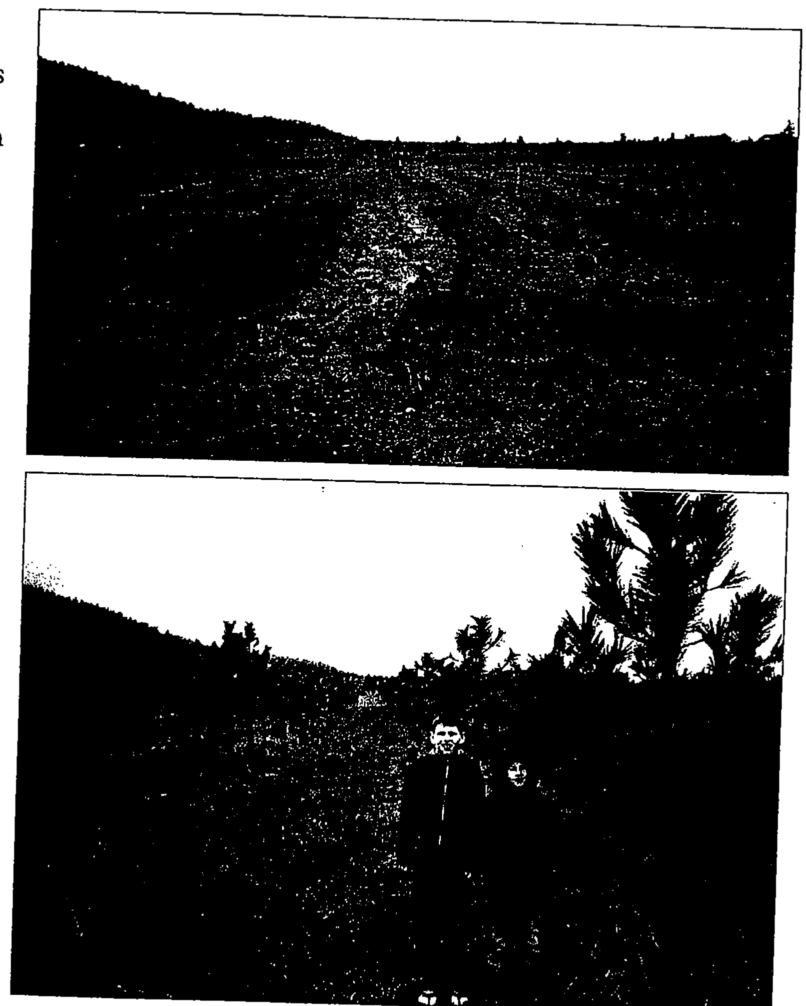
Broadcast release treatments for herbaceous weeds can be made selectively over newly planted or established pine with atrazine, sulfometuron, or hexazinone in spring before conifer budbreak.

Atrazine is least likely to injure pine but also has limited ability to control established vegetation. Ponderosa pine is extremely tolerant to hexazinone, which is a good choice on sites that have perennial grasses and forbs. Sulfometuron gives intermediate vegetation control; higher rates can affect seedling development temporarily on some sites.

Tank-mixes of these herbicides are effective and can help reduce per-acre costs. Note that all these products are soil active, so precise calibration is important to avoid overdosing seedlings.

Glyphosate products that contain no surfactant can be applied at reduced rates in spring before budbreak over established (second-year) seedlings. In western Oregon, sulfometuron also can be used over pine in spring or fall to suppress blackberries. Mixtures of sulfometuron and glyphosate as fall blackberry treatments may be a reasonable substitute for damaging triclopyr applications.

Thistles and some broadleaf plants are sensitive to clopyralid. Applications can be made at any time because clopyralid has little activity on pine or other conifers at any growth stage. Clopyralid has been a good addition to atrazine, sulfometuron, or hexazinone during spring weed control programs and makes a good substitute for the more injurious 2,4-D.



*Figures 12a and 12b—A newly established ponderosa pine plantation near Lebanon, OR (top) and after five growing seasons (above).*

Release applications of 2,4-D over pine have been made but usually cause some injury. Damage can range from mild to severe depending on weather, seedling growth stage, and spray adjuvants, among other variables.

Avoid adding oils or surfactants to spray mixes to improve selectivity. Spring treatments target madrone, manzanita, alder, and forbs. Since 2,4-D is the only herbicide for broadcast release pine programs on evergreen brush, some conifer injury may be acceptable. Applications in early spring before candle elongation or in fall after budset can help reduce risk of injury.

Unlike evergreen brush, deciduous brush species such as poison-oak, hazel, and deerbrush often are treated selectively over pine with glyphosate products. Typical release treatments are timed after budset in late summer or fall to reduce risk of damage.

Conifers still can be injured, however, especially if a surfactant is added or is in the formulation. The type of surfactant used with glyphosate over pine can have a very large impact on damage. Carefully screen new surfactant additions in small trials before using them in a full program. You also might want to consult with someone in the agricultural pesticides industry for recommendations on surfactants.

Because Valley sites often contain numerous plant competitors, no one herbicide will do the job in all cases. Combinations of these strategies probably will be the most effective on vegetation and least injurious to pines. Herbicide labels change frequently, so read and carefully follow the label on the product in hand.

1.12